Appendix A: Supporting Analysis

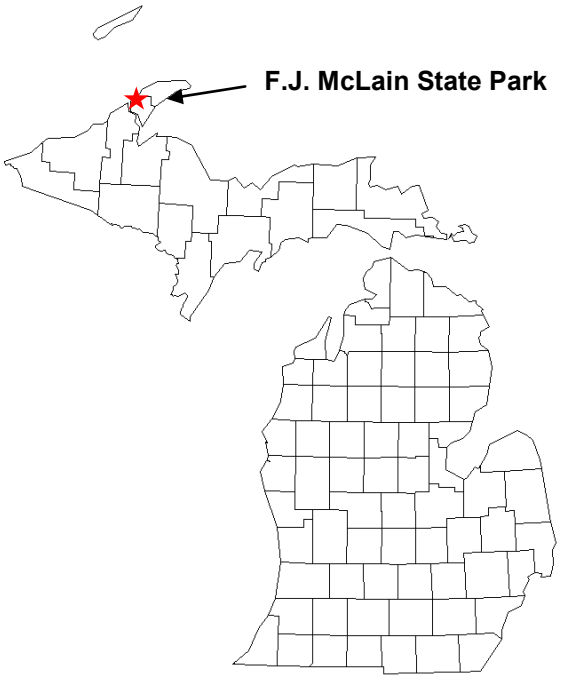
Table of Contents

A.1 PARK SETTING

Park Profile

Area: 443 acres
County: Houghton
City: Hancock Township
Latitude: 47°14′13″N
Longitude: 88°36′26″W

Address: 18350 Highway M-203
Hancock, MI 49930
Phone #: (906) 482-0278



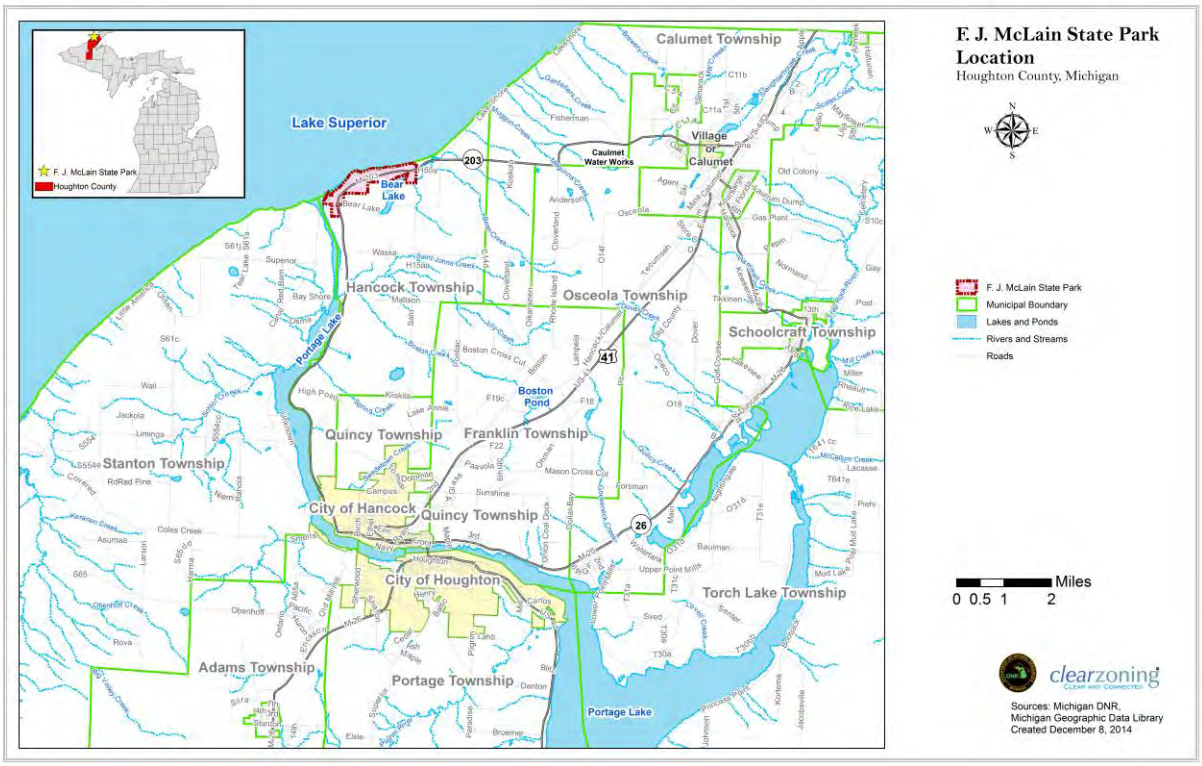
Location & Community

Situated on Lake Superior in the heart of Michigan's Keweenaw Peninsula, F.J. McLain State Park offers breathtaking lake views and is a popular destination for camping and swimming. While most of the park's two miles of shoreline is characterized by rocky beaches, there are sandy beaches along a stretch of land known as the Breakwaters located on the edge of the park near the Keweenaw Waterway.

The park is divided in half horizontally by M-203, which serves as a connector to the park from US-41. F.J. McLain State Park is located in Hancock Township and in close proximity to the cities of Houghton and Hancock, and the Village of Calumet.

The park is an important resource for surrounding communities, the Keweenaw Peninsula, and the Upper Peninsula as a whole. M-203 provides direct and easy access to the park for the local community as well as tourists. Additionally, the park serves as a base for exploration of the Keweenaw Peninsula and as a quiet and isolated area within the county. The park provides excellent opportunities for night-sky viewing with its location in an undeveloped area with little light pollution.

Houghton County's rich copper mining history, which resulted in a large number of migrant workers moving to the region, has greatly impacted the community, culture, and cuisine of the area. In fact, the City of Houghton was listed as one of the best places to live in the book, *The 100 Best Small Towns in America*. Both the city of Houghton and the city of Hancock compliment F.J. McLain State Park by providing a variety of year-round recreation opportunities for residents and visitors. Additionally, Houghton is home to one of the state's most popular technological universities, Michigan Technological University. The park serves as an important recreational and educational resource for the students, professors, families, and researchers associated with the University.


F. J. McLain State Park
Houghton County
Lake Superior
Calumet Township
Village of Calumet
Calumet Water Works
Bear Lake
Hancock Township
Osceola Township
Schoolcraft Township
Portage Lake
Boston Pond
Quincy Township
Franklin Township
Stanton Township
City of Hancock
City of Houghton
Torch Lake Township
Adams Township
Portage Township
Portage Lake
F. J. McLain State Park
Location
Houghton County, Michigan
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F. J. McLain State Park
Municipal Boundary
Lakes and Ponds
Rivers and Streams
Roads
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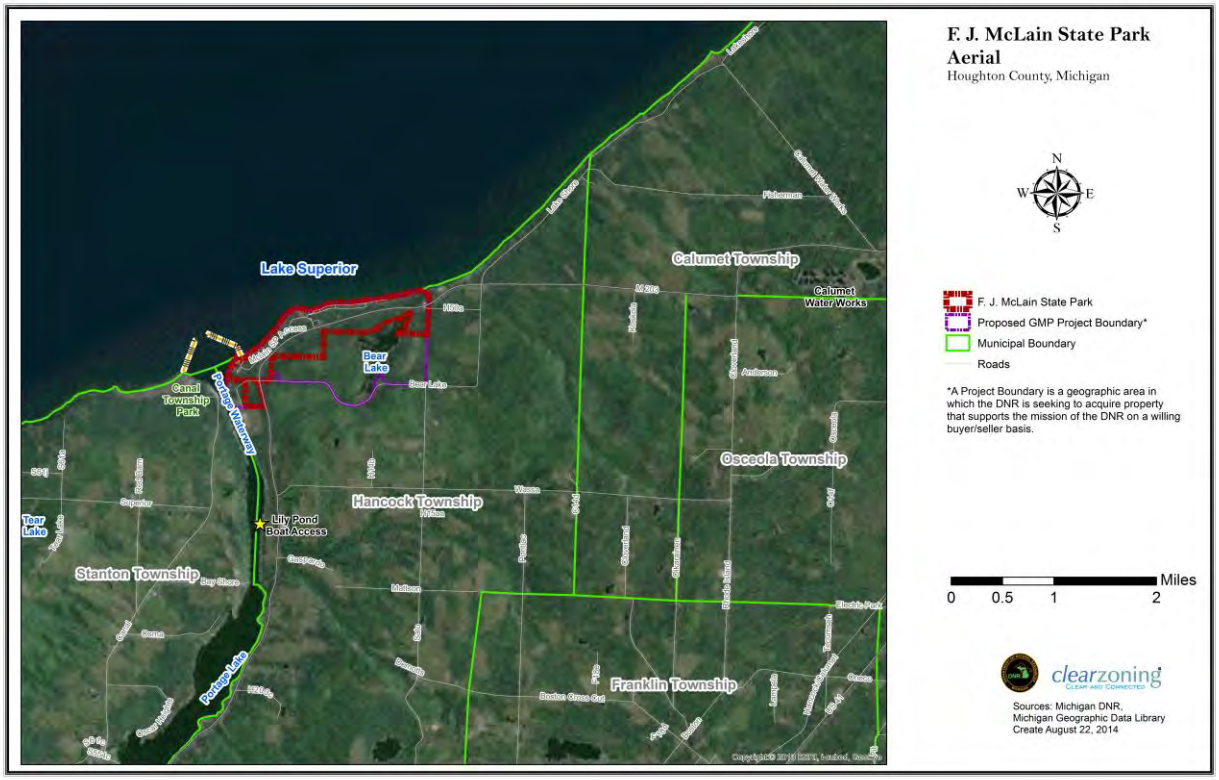
Miles
clearzoning
Sources: Michigan DNR,
Michigan Geographic Data Library
Created December 8, 2014


Lake Superior
Calumet Township
Calumet Water Works
Bear Lake
Canal Township Park
Portage Waterway
Lily Pond Boat Access
Hancock Township
Osceola Township
Stanton Township
Tear Lake
Portage Lake
Franklin Township
F. J. McLain State Park
Aerial
Houghton County, Michigan
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F. J. McLain State Park
Proposed GMP Project Boundary*
Municipal Boundary
Roads
*A Project Boundary is a geographic area in which the DNR is seeking to acquire property that supports the mission of the DNR on a willing buyer/seller basis.
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Miles
clearzoning
Sources: Michigan DNR,
Michigan Geographic Data Library
Create August 22, 2014

A.2 DEMOGRAPHICS

Houghton County was named for Professor Douglass Houghton, state geologist of Michigan. It was organized in 1845 from parts of Marquette, Schoolcraft and Ontonagon Counties. Historically the county is known for copper mining, processing, and transporting activities. The 2010 United States Census indicates Houghton County had a population of 36,628. This is an increase of 612 people from 2000, a growth of 1.7%. In 2010 there were 14,232 households and 8,093 families in the county.

The population breakdown of Houghton County by age shows that the county is on par with the Michigan average. However, the population density of 36 people per square mile is significantly lower than the state average of 174. The median household income and per capita income is also below the state average. According to the 2010 census, approximately 22.8% of residents live below the poverty level.

The main occupations in Houghton County today are:

1) Management, Business, Science, and arts occupations
2) Sales and office occupations
3) Service occupations

2010 U.S. Census Data for Houghton County

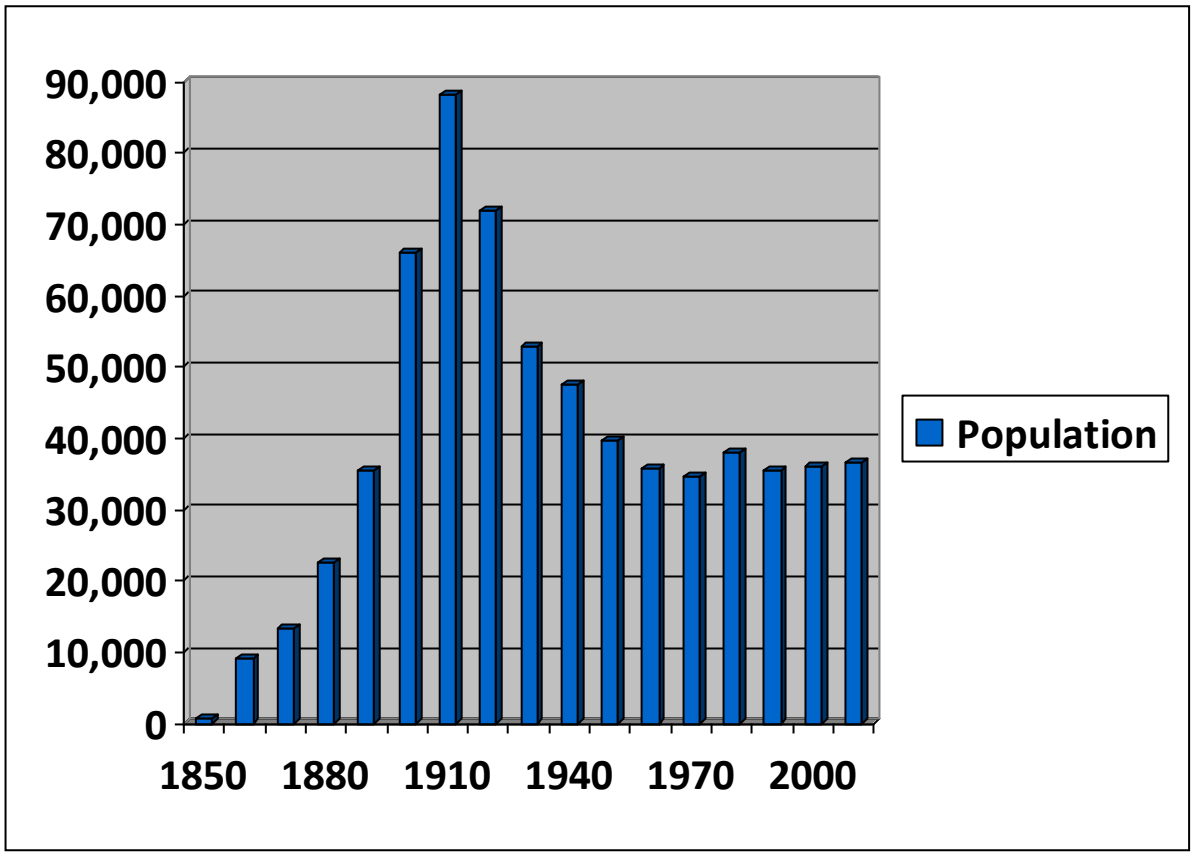
People QuickFacts Michigan	Houghton County	
Population, 2010	36,628	9,883,640
Persons under 5 years, percent, 2010	5.8%	6.0%
Persons under 18 years, percent, 2010	20.6%	23.7%
Persons 65 years and over, percent, 2010	15.0%	13.8%
Female persons, percent, 2010	45.9%	54.1%
White persons, percent, 2010	94.5%	78.9%
Black persons, percent, 2010	0.5%	14.2%
American Indian and Alaska Native persons, percent, 2010	0.6%	0.6%
Asian persons, percent, 2011 (a)	2.9%	2.4%
Native Hawaiian and Other Pacific Islander persons, percent, 2010	.04%	.02%
Persons reporting two or more races, percent, 2010	1.3%	2.3%
Persons of Hispanic or Latino Origin, percent, 2010	1.1%	4.4%
White persons not Hispanic, percent, 2010	98.9%	95.6%
People QuickFacts	**Houghton County**	**Michigan**
Foreign born persons, percent, 2008-2012	4.5%	6.0%
Language other than English spoken at home, percentage 5+, 2008-2012	6.8%	9.0%

High school graduate or higher, percent of persons age 25+, 2008-2012	90.7%	88.7%
Bachelor's degree or higher, percent of persons age 25+, 2008-20012	27.7%	25.5%
Veterans, 2010	3,108	703,970
Housing units, 2010	18,656	453,233
Households, 2010	14,016	3,825,182
Persons per household, 2010	2.38	2.53
Renter occupied housing, 2010	23.6%	27.9%
Median household income, 2010	$34,625	$48,669
Persons below poverty level, percent, 2008-20012	23.7%	16.3%
Seasonal housing occupancy, 2010	14,016	263,071
Housing units, 2010	18,656	453,233
Geography QuickFacts	**Houghton County**	**Michigan**
Land area in square miles, 2010	1,009.10	56,538.90
Persons per square mile, 2010	36.3	174.8
FIPS Code	061	26
Metropolitan or Micropolitan Statistical Area	Houghton, MI Micro Area	

Source: US Census Bureau State and County Quickfacts, 2010 Census

As indicated in the graph below, the population of Houghton County was strongly impacted by the emergence and decline of the copper mining industry.[1] The discovery of copper and iron in the mid-1800's led to a dramatic increase in Houghton County's population. The mineral industry resulted in a need for miners, trammers, engineers, technicians, mill workers and related laborers. This population influx led to a greater demand for services and food, which also attracted more people. Houghton County was the center of the mining industry; nearly 56% of the entire Upper Peninsula population resided in Houghton County.

The decline in population from 1910 to 1920 was due to several factors. First, the copper strike of 1913-1914, caused many immigrant miners to leave the county and seek work elsewhere. Second, many workers sought jobs in the automotive industry after Henry Ford announced the 8-hour day and $5 per day wage-base in 1914. Finally, many of the miners began recognizing that the copper mining industry would not last forever due to the increasing cost of production and decided to find employment in other regions. In all, the population reduced by approximately 50,000 between 1910 and1950, and has remained steady between 35,000 and 40,000 residents for the past 60 years.



[1] Magnaghi, Russel M. *Understanding Two Centuries of Census Data of Michigan's Upper Peninsula.* Available at http://www.nmu.edu/sites/DrupalUpperPeninsulaStudies/files/UserFiles/Files/Pre-Drupal/SiteSections/UPHistory/HeritageHistory/Census_Data.pdf

A.3 HISTORY OF F.J. MCLAIN STATE PARK

The existing toilet building was built in 1946

Beginning as early as seven thousand years ago and peaking around 3000 B.C., Native Americans dug copper from the southern shore of Lake Superior. During this period, copper was easily visible in the surface rock. The copper was used in this pre-historic period for tools and ornamental objects.

The mid-19th century gave way to copper extraction on a large industrial scale leading to the copper boom in the Keweenaw Peninsula. The industry grew through the latter part of the century and employed thousands of people well into the 20th century. (See A.2 Demographics for detailed discussion on the population fluctuation of Houghton County). During this time, the Michigan Mining School was founded (now Michigan Technological University). The last copper mine in the area ceased operation in 1967.

The other main industry in the region, running concurrently with mining, was logging, due to the amount of white pines located in the region. These trees were primarily cut for use in the mines and to build settlements in the area.

F.J McLain State Park was the vision of Frederick J. McLain, a Houghton County Commissioner, who was instrumental in securing ownership of the first parcels of land in the early 1930s. In 1964, M-203 was moved to its present location so that F.J. McLain State Park could be developed without a main road through the center of the park. A new entrance and contact station were built in 1965. The Work Projects Administration (WPA) was responsible for nearly all construction done in the park.

Below is a timeline of some of the historic events relating to the park.

- 1868 - Construction began of the Keweenaw Waterway from Portage Lake (on the east) to Lake Superior (on west), which allowed large vessels safe passage. The project was a collaboration between the United States Government and several mining corporations. The waterway allowed for increased shipping efficiency, helping to increase production of copper operations in the region and allow for supply ships to provide goods primarily to the towns of Houghton and Hancock. The canal also established a harbor of refuge from the often violent Lake Superior storms.

- 1874 - To safely guide ships into the Keweenaw Waterway on the northwest entrance of the peninsula, a large gabled two-story brick dwelling with an attached 33-foot high brick tower was constructed.

- 1875 - A bridge was built connecting the two towns of Houghton and Hancock, establishing the only linkage from Michigan's Upper Peninsula and the Keweenaw Peninsula.

- 1930 – Houghton County State Park was established (later named F.J. McLain State Park). This was a joint state and county proposition. The state owned 142 acres with 3,800 feet frontage on Lake Superior from tax reversion. The County pursued acquisition of surrounding land.

- 1931 - The Park was named after Frederick J. McLain, a Houghton County Commissioner who was instrumental in establishing the State Park.

- 1935 - The entrance to the canal was widened and the lighthouse demolished

- 1949 – Campground, workshop and garage was developed with water supply and electric service

- 1950 - The Keweenaw Waterway Upper Entrance Lighthouse (a.k.a. The Portage Lake Upper Entry Light), a 50 foot square steel, art deco style tower, was constructed at the end of the breakwater at F.J. McLain State Park on a cylindrical crib. Originally operated remotely by lighthouse keepers, the light became fully automated in the 1970s.

The Keweenaw Waterway Upper Entrance Lighthouse

A.4 LAND OWNERSHIP

The majority of the lands that compromise F. J. McLain State Park have been acquired either through special legislation or gifted. Other portions of the park were acquired through tax reversion or using the Michigan Natural Resources Trust Fund (MNRTF). Often, conditions attached to the original funding source or other details of the property transaction encumber the future use or disposition of the land. The following outlines in more detail each funding source associated with F.J. McLain State Park.

Acquisitions

Gift

Much of the initial park acreage was a gift from Houghton County in 1933. This includes a total of approximately 195 acres in the northeast of the park, on the shores of Bear Lake and Lake Superior. In 1963 3.65 acres was gifted to the state from William A. Close and Mildred O. Close.

Federal Lands to Parks Program

In 1980, 16.45 acres was granted from the Federal Government to the State of Michigan on the Keweenaw Waterway for the purposes of public use with the following restrictions:

- The property shall be used and maintained exclusively for the public purposes for which it was conveyed in perpetuity as set forth in the original grant application dated April 14, 1980.
- The property shall not be sold, leased, assigned, or otherwise disposed of except to another eligible governmental agency for the continued use and maintenance of the property as a public park or public recreational purpose. Transfer must be approved by the Secretary of the Interior in writing.
- Provides for reversion of the property to the United States of America if needed for national defense.
- Development of the property must be accessible to the handicapped and historic preservation must be coordinated with the State Historic Preservation Office (SHPO).

Michigan Natural Resources Trust Fund

In 1997, 29.39 acres was purchased southwest of Coast Guard Road. Restrictions include the following:

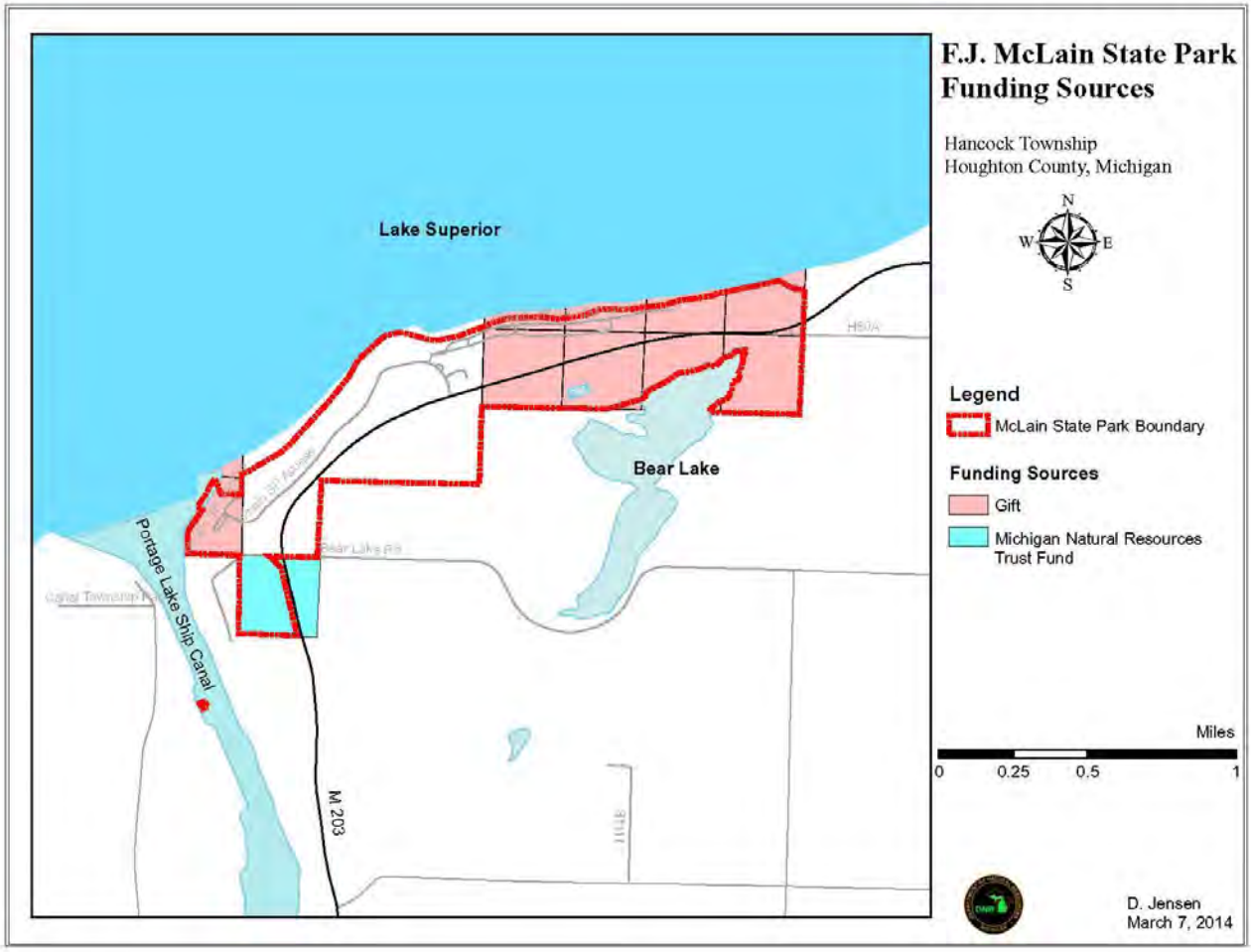
- Retaining all rights acquired in coal, oil, gas, sand, gravel or any other minerals in perpetuity.
- To not develop any rights in coal, oil, gas, sand, gravel or any other minerals that will diminish the usefulness of the project area for its intended purposes including adjacent lands.
- Erect and maintain a sign or other acknowledgement that the lands were acquired with assistance of MNRTF
- To make the land and any future recreation development provided on the land thereon open and available for public outdoor recreation in perpetuity

Tax Reversion

Beginning as early as 1918, the State acquired a total of 78 acres through tax reversion, including 0.23 acres of land west of the Portage Canal

Exchange Acquisition

Two parcels totaling 31.85 acres were acquired in 1962 and 1963 through land exchange.



Leases

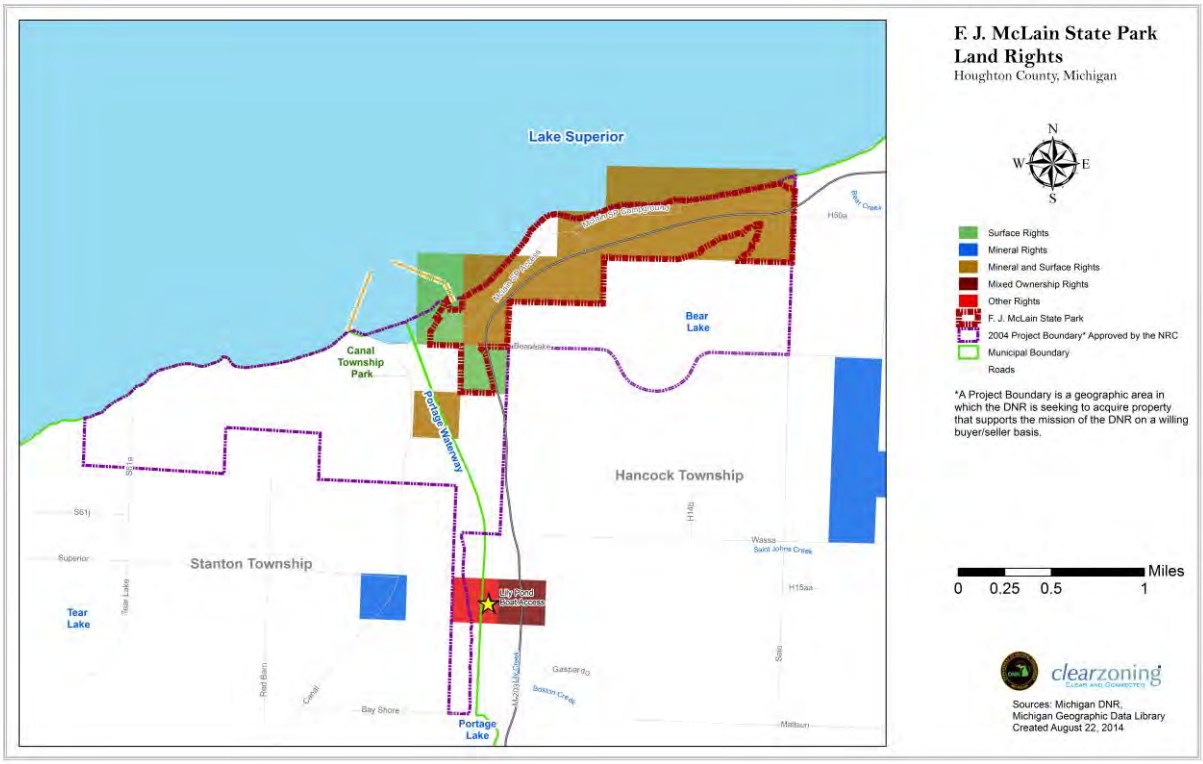
The following lease impacts the park:

- A 25 year lease from 1996 to 2021 from the Army Corps of Engineers for the purpose of public recreation located at the mouth of the Keweenaw Waterway. The State has the right to erect structures relating to public recreation on the property and the Federal Government has the right to enter the premises at any time and make other use of the land for any purposes necessary at the time. Restrictions include gambling, no commercial use of timber.

Easements

The following is a list of easements impacting F.J. McLain State Park

- 1953 to the Michigan Department of Transportation for M-203
- 1957 to the Michigan Department of Transportation for M-203
- 1984 to the Upper Peninsula Power Company for the purpose of transmitting electricity
- 1973 to the Michigan Department of Transportation for M-203
- There is a power line easement along the east side of Bear Lake



A.5 RELATIONSHIP OF F.J. MCLAIN STATE PARK TO OTHER RECREATION RESOURCES

F.J. McLain State Park is located on the 20 mile stretch of M-203 between Calumet and Houghton/Hancock. Being approximately 10 miles from each area, the park is a popular destination for road bikers that travel to see the historic sites nearby. Many of the attractions in the surrounding area are associated with the mining industry, including abandoned shaft houses, tram cars, spoil piles and ghost towns. The following are some of the recreational and cultural/historic resources in the area:

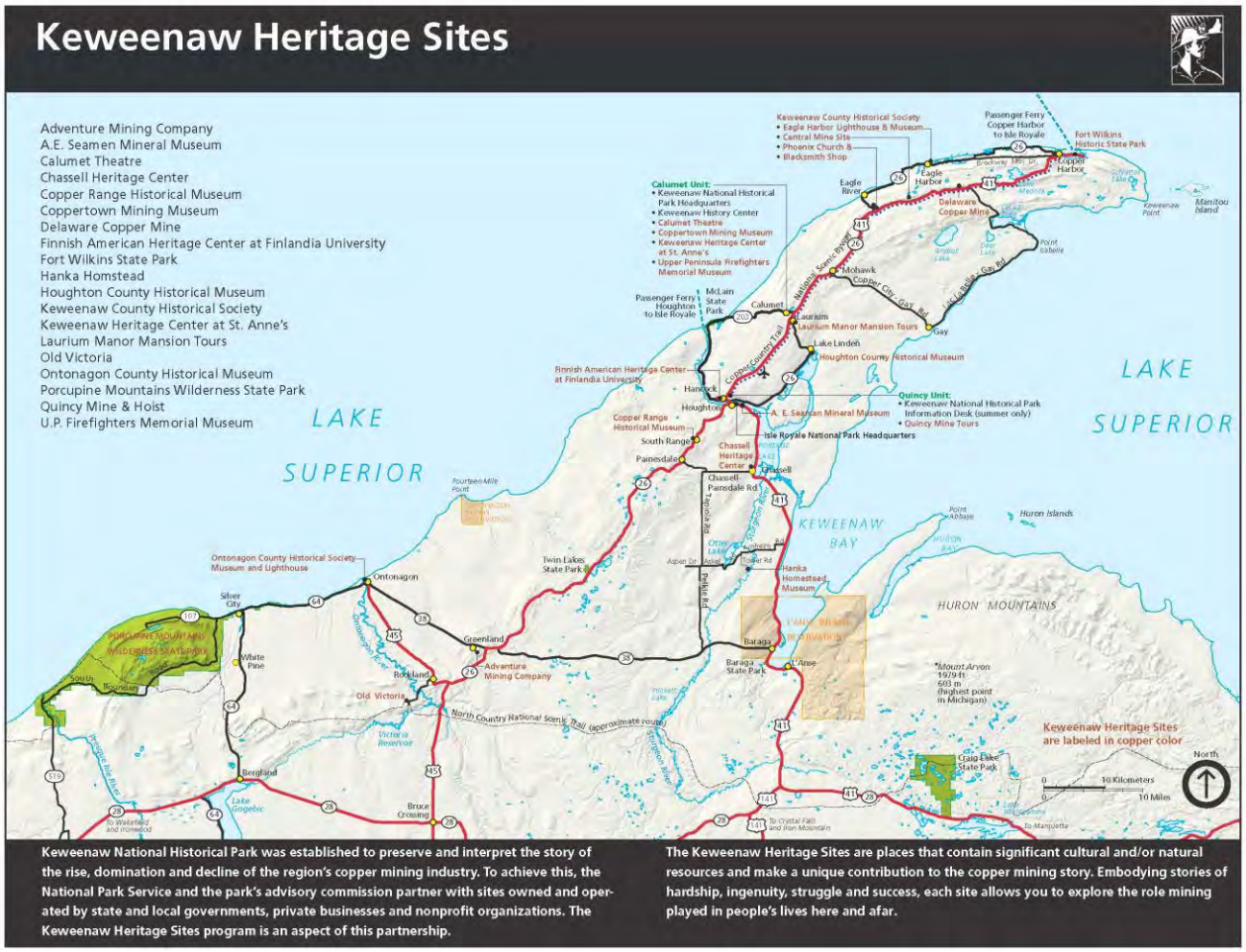
National/State Recreational Resources

- Baraga State Forest Area – The State Forest lands in the Baraga unit comprise approximately 142,000 acres and are spread across a four county area. Recreation activities permitted within this area include camping, snowmobiling, and hiking. There are also ORV trails and rail-trails within the unit.
- Fort Wilkins State Historic Park – The 700-acre park is located approximately 43 miles northeast of F.J. McLain State Park in the tip of the Keweenaw Peninsula and features a restored military outpost from 1844 as well as one of Lake Superior's first lighthouses. Visitors can watch live interpretive demonstrations of the history of the Fort. Additionally, the park offers a variety of overnight accommodations, hiking, swimming, fishing, biking, and picnicking.
- Twin Lakes State Park – Located approximately 30 miles south of F.J. McLain State Park, the 175-acre park features a lodge that sleeps up to eight people, a modern campground situated on a lake, swimming, picnicking, fishing, boating, as well as hiking, cross-country ski and snowmobile trails.
- Lily Pond Boat Access Site – Located approximately two miles south of the park on the portage canal, this hard surfaced ramp with paved parking is managed out of F.J. McLain State Park. It also provides a popular fishing access site. The property is operated under a lease agreement with the US Army Corps of Engineers.
- Keweenaw National Historic Park – The park is comprised of various Keweenaw Heritage Sites that are significant cultural and natural resources related to the copper mining industry within the region. The U.S. Congress established the Keweenaw National Historic Park in an effort to preserve and interpret these sites in partnership with local municipalities and organizations. The heritage sites are located along the length of the Keweenaw Peninsula. Several of these heritage sites are listed below.
- Isle Royale National Park – Located in Lake Superior, the park headquarters is located in Houghton. The park is accessible by ferry and a one-way ride from Copper Harbor takes approximately 3 hours. The park was designated as a Biosphere Reserve in 1981 in recognition of its unspoiled nature and is part of a program designed to protect examples of the different ecosystems of the world and to encourage research.
- Swedetown Creek Boating Access Site – This carry-in boating access site is owned by the City of Hancock and managed by F.J. McLain State Park under a lease agreement. Its location can be found on the "Recreation Opportunities Map" which is attached
- Hancock-Calumet (Jack Stevens) Trail – This 13.4 mile rail trail is designated for ORV and snowmobile use. The trail is also open for hiking, biking, and equestrian use and is managed by the DNR. While a small section of the trail is paved, the majority is unimproved.

- Snowmobile Trail 3 – Designated 166 mile snowmobile trail stretching from Ontonagon to Copper Harbor.

Heritage Sites

- A.E. Seaman Mineral Museum (Houghton) - Exhibits in the museum focus on the extensive influence that copper has had on the area by focusing on the geology of the Keweenaw Peninsula, copper formations, as well as the mining industry.
- Calumet Theatre (Calumet) - Built in 1899, the Calumet Theatre is the oldest municipal-built opera house in the country. The venue still offers a variety of shows including theatrical performances and concerts.
- Chassell Heritage Center (Chassell) - The heritage center highlights the history of the community as it has evolved from a fishing community, to a lumber town, to present day.
- Copper Range Historical Museum (South Range) - Exhibits at the museum focus on the Copper Range Mining Company and its workers. Additionally, Painesdale, one of the most well-preserved copper company towns, is located nearby.
- Coppertown Mining Museum (Calumet) - The museum hosts exhibits associated with the operations of the massive mining operation, Calumet & Hecla and features in the Calumet industrial landscape.
- Delaware Copper Mine (Copper Harbor) - This mine site provides tours of one of the oldest underground copper mines in the Keweenaw Peninsula.
- Finnish American Heritage Center & Historical Archive (Hancock) - The center hosts an art gallery, theater and the Finnish American Historical Archive, the largest collection of Finnish-North American material in the world.
- Houghton County Historical Museum - The museum exhibits artifacts associated with mining. Visitors are also able to ride behind a C&H Porter 0-4-0 Steam Engine.
- Quincy Mine & Hoist (Hancock) - The site hosts tours that explore the Quincy Mining Company including walk through surface structures, cogwheel tram rides and an excursion into underground mine works.
- Copper Country Firefighters Historical Museum (Calumet) - The historic Red Jacket Fire Station features exhibits about firefighting in Michigan's Upper Peninsula.

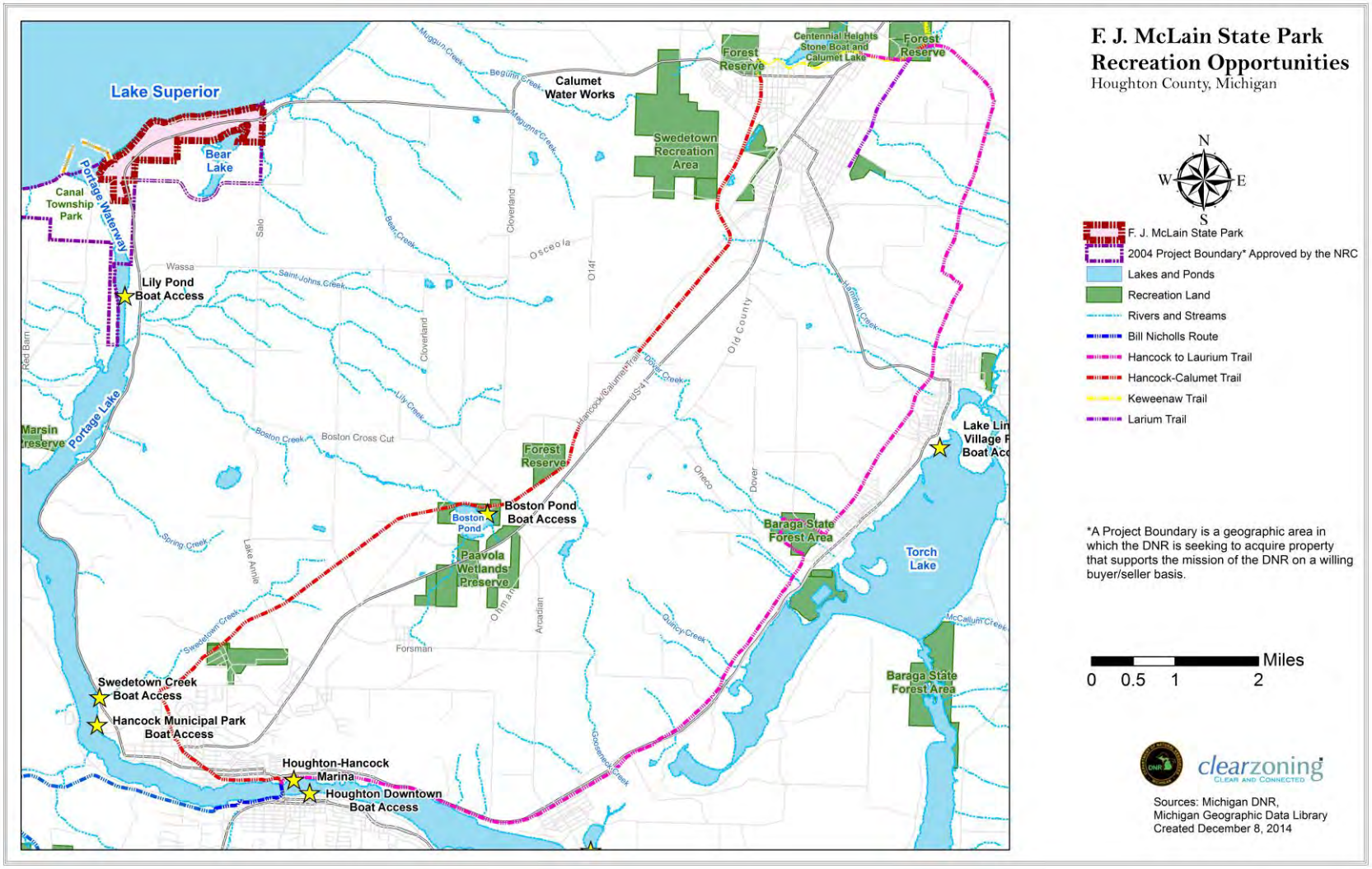


Local Parks and Trails

- Hancock Beach (Hancock) – Located on the west side of Hancock, the park is located on the north side of the Portage Canal and features a swimming beach with a wooden dock, boating access site, kayak launch, volleyball courts, a picnic shelter, and play equipment.
- Hancock Campground (Hancock) – Located adjacent to Hancock Beach, the campground offers 71 campsites, all of which are situated in a natural wooded setting.
- Houghton County Marina – Located in Hancock and just east of the Portage Lake Lift Bridge, the marina features 44 seasonal boat slips and 10 transient slips. Two ramps on the Portage Canal allow for easy access to the water. Additional amenities include electricity (30- and 50-amp service), restrooms, showers, gasoline, diesel, pump out, ice, boat launch, long-term parking, public phone, dog run, grills/picnic tables, cable hookups, laundry and marine supplies.
- Maasto Hiihto Ski Trail & Churning Rapids Ski Trail – A cross-country ski system that offers scenic views and varying terrains to challenge users of different abilities. The system includes approximately 15 miles of groomed trails operated and maintained through a joint agreement between the Keweenaw Nordic Ski Club and the City of Hancock.
- Village of Lake Linden Campground and Beach – Located on Torch Lake, the campground offers 20 full hook-up campsites and 6 rustic campsites as well as beach and swimming

area. A park, nature trail, skate park, and disc golf course area located in close proximity to the campground and beach.

- Village of Lake Linden Marina – Adjacent to the park is a modern docking facility with a boat launch.
- Schoolcraft Township Park – Situated on Grand Traverse Bay on the east side of the Keweenaw Peninsula, the park offers a sandy swimming beach and picnic area. Primitive camping is the only overnight accommodation available.
- Sunset Bay Campground (Private) – Located 17 miles northeast of F.J. McLain State Park on the Lake Superior shoreline, the Sunset Bay RV Resort & Campground provides 12 tent sites, 18 RV sites, and 3 cabins. Established in 1944, the Campground is one of the oldest in the Upper Peninsula.
- North Canal Park – Located in Stanton Township, the park includes 177 acres and 19 rustic, primitive campsites. The park is located on Lake Superior and is open to fishing, swimming, and boating.
- Swedetown Trails (Calumet Twp. and Houghton County Water Authority) – The 1,900 acre park offers an extensive system of mountain bike and cross country ski trails, many of which are groomed. The trails are maintained by the Swedetown Trails Club in cooperation with Calumet Township.
- Waterworks Park – Located on Lake Superior and 4 miles west of Calumet, the park offers swimming, hiking trails, a playground, and picnic facilities.
- Houghton RV Park – The canal-front park is located just a half mile from downtown Houghton and features 22 units for RV camping. Full-hookups and Wi-Fi are provided at the campground.
- Mont Ripley Ski Hill (MTU) – Located east of the City of Hancock, providing 112 acres of skiable terrain with 24 trails offering 440’ vertical drop. Caters from beginner to expert with terrain parks with jumps and slides
- Michigan Tech Trails – over 55km of interconnected trails accommodating hiking, biking, snow-showing and cross-country skiing.
- Paavola Wetland Nature Area - A 115 acre public nature area located just outside of Hancock. It is home to year-round hiking trails for viewing a wide variety of flora and fauna.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Forest Reserve
Centennial Heights Stone Boat and Calumet Lake
Forest Reserve
Boston Pond Boat Access
Boston Pond
Paavola Wetlands Preserve
Forest Reserve
Boston Cross Cut
Baraga State Forest Area
Torch Lake
Baraga State Forest Area
Swedetown Creek Boat Access
Hancock Municipal Park Boat Access
Houghton-Hancock Marina
Houghton Downtown Boat Access
Forsman
Hancock/Calumet Trail
US41
Old County
Cloverland
Osceola
Arcadian
Dover
Oneco
Lake Linden Village Boat Access
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F. J. McLain State Park
2004 Project Boundary* Approved by the NRC
Lakes and Ponds
Recreation Land
Rivers and Streams
Bill Nicholls Route
Hancock to Laurium Trail
Hancock-Calumet Trail
Keweenaw Trail
Larium Trail
*A Project Boundary is a geographic area in which the DNR is seeking to acquire property that supports the mission of the DNR on a willing buyer/seller basis.
Miles
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clearzoning
CLEAR AND CONNECTED
Sources: Michigan DNR,
Michigan Geographic Data Library
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A.6 LEGAL MANDATES

For all park General Management Plans, legal mandates are identified that serve to further guide the development of the General Management Plan and subsequent Action Plans. For our planning purposes, the term "Legal Mandates" refers to not only state law, but also the administrative tools of "Policy" and "Directive" of the Natural Resource Commission, the Department, and the Parks & Recreation Division. Examples include Wildlife Conservation Orders, Orders of the Director, and all other laws, commission orders, and rules or directives that apply to the park. Specific to F.J. McLain State Park, several legal mandates have been identified and are listed below:

PA 451 of 1994, Natural Resources & Environmental Protection Act (NREPA), Article 1, Part 5
Section 324.504: This law describes the DNR's authority to make rules that support its mission.

(1) "The department shall promulgate rules to protect and preserve lands and property under its control from depredation, damage, or destruction or wrongful or improper use or occupancy."

The rules relate to camping, motorized vehicle use, control of animals, trail use etc.

Land Use Orders of the Director

The possession or use of alcohol in the park is prohibited during the K-Day welcome event held at the park every September by the students of Michigan Technological University.

PA 451 of 1994, Part 303 - Wetlands Protection, of NREPA, as amended.

The law requires that persons planning to conduct certain activities in regulated wetlands apply for and receive a permit from the state (DEQ) before beginning the activity. A permit is required for the following:

- Deposit or permit the placing of fill material in a wetland.
- Dredge, remove, or permit the removal of soil or minerals from a wetland.
- Construct, operate, or maintain any use or development in a wetland.
- Drain surface water from a wetland.

PA 451 of 1994, Part 325 – Great Lakes Submerged Lands (NREPA)

Any dredging, filling, modifying, constructing, enlarging, or extending of structures in Great Lakes waters or below the ordinary high water mark of the Great Lakes requires a permit. Permits are required by both the Water Resources Division within the Michigan Department of Environmental Quality (MDEQ), and the US Army Corps of Engineers. The purpose of this permit is to protect the waters of the Great Lakes and the Great Lakes bottomlands (the land lying below the ordinary high water mark).

PA 451 of 1994, Part 353 – Shoreline Protection and Management

- Administered by the DEQ
- Designates “Environmental Area” and “High Risk Erosion Area” and requirements related to their use.

The illustration on page 20 shows the 30-year and 60-year projected recession distance along the shoreline of F.J. McLain State Park and the high risk erosion area.

PA 451 of 1994, Part 419 - Hunting Area Control (NREPA)

Section 324.41901 establishes the powers of the Department to establish safety zones for hunting. F.J. McLain State Park is open to hunting south of M-203.

PA 451 of 1994, Part 741 - State Park System (NREPA)

Sec. 74102:

(1) The legislature finds:

(a) Michigan state parks preserve and protect Michigan's significant natural and historic resources.

(b) Michigan state parks are appropriate and uniquely suited to provide opportunities to learn about protection and management of Michigan's natural resources.

(c) Michigan state parks are an important component of Michigan's tourism industry and vital to local economies.

(d) A holistic, integrated park system that reflects the unique value of both state and local parks is a goal of this state.

(e) State and local park planners should work in concert for a coordinated Michigan park and recreation plan.

(2) The department shall create, maintain, operate, promote, and make available for public use and enjoyment a system of state parks to preserve and protect Michigan's significant natural resources and areas of natural beauty or historic significance, to provide open space for public recreation, and to provide an opportunity to understand Michigan's natural resources and the need to protect and manage those resources.

PA 451 of 1994. Part 761, Section 324.76102 – Aboriginal Records and Antiquities

(1) The state reserves to itself the exclusive right and privilege, except as provided in this part, of exploring, surveying, excavating, and regulating through its authorized officers, agents, and employees all aboriginal records and other antiquities, including mounts, earthworks, forts, burials and village sites, mines or other relics, and abandoned property of historical or recreational value found upon or within any of the lands owned by or under the control of the state.

(2) The state reserves to itself a possessory right or title superior to that of a finder to abandoned property of historical or recreational value found on the state owned bottomlands of the Great Lakes. This property shall belong to this state with administration and protection jointly vested in the department and the department of history, arts and libraries.

PA 35 of 2010, Part 741 ("Recreation Passport")

This act amended the Michigan Motor Vehicle Code to provide for a State Park and State-operated public boating access site "Recreation Passport" that a Michigan resident may obtain by paying an additional fee when registering a motor vehicle. The Recreation Passport is required for entry into F.J McLain State Park.

PA 45 of 2010 - Natural Resource and Environmental Protection Act

Amends the Natural Resources and Environmental Protection Act (PA 451 of 1994) to require the DNR to establish a plan for a statewide trail network that includes Michigan trailways, pack and saddle trailways, and other recreational use trailways, and to permit pack and saddle animals on designated trailways managed by the DNR.

PA 46 of 2010 - Natural Resource and Environmental Protection Act

Amends the Natural Resources and Environmental Protection Act (PA 451 of 1994) with a finding that a statewide system of trails, trailways, and pack and saddle trailways is in the best interest of the state; requires the DNR to establish an "adopt-a-trail" program that allows volunteer groups to assist in maintaining and enhancing Michigan trailways, pack and saddle trailways, and rail-trails; and creates the Michigan Snowmobile and Trails Advisory Council within the department.

DNR Policy 26.04-04 - Use of State-Owned Lands Administered by the Michigan Department of Natural Resources (ISSUED: 02/01/2006)

It shall be the policy of the Natural Resources Commission (NRC) to manage State-owned lands in a manner that protects and enhances the public trust while providing for the use and enjoyment of those lands as outlined in the Natural Resources and Environmental Protection Act. Applications to use State-owned lands will be considered and may be approved if the proposed use is consistent with other public interest and natural resource values.

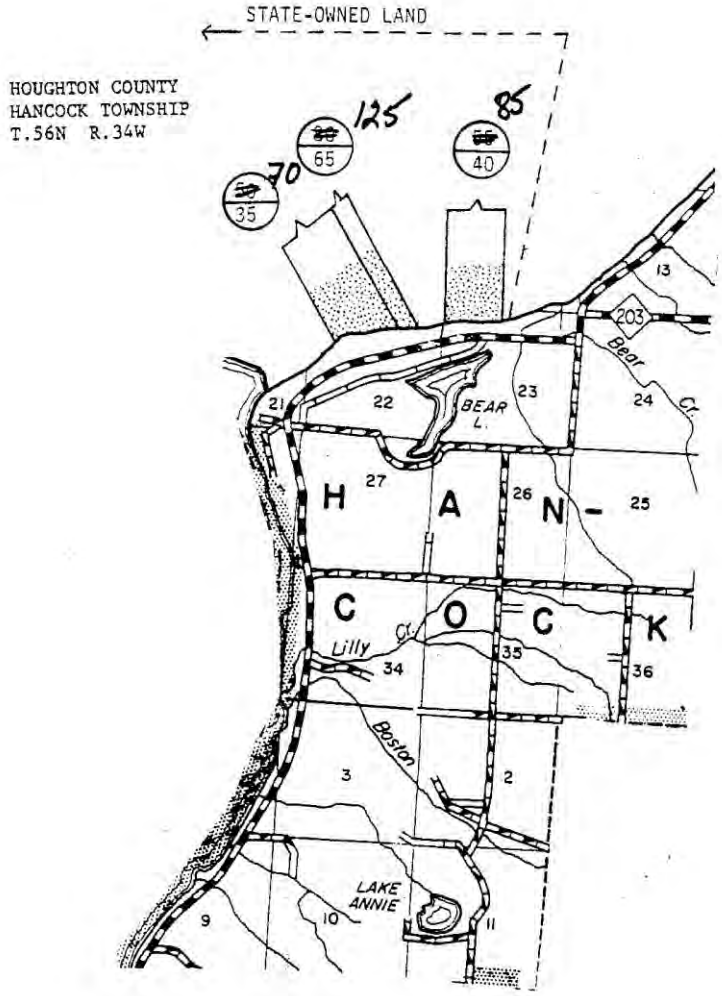
PA 368 of 1978, Article 12 - Environmental Health, Part 125 – Campgrounds – Part 125 of the Public Health Code

Established to protect and promote the public health by establishing health code requirements and regulations that all public (including DNR) and private campgrounds must meet. Campground wastewater system must meet the construction permit, design, and operation requirements under Michigan's Public Health Code.

PA 451 of 1994, Part 22 – Campground Wastewater Systems

These rules apply to all campground wastewater systems and regulate discharges to groundwater; administered by the Water Division, Groundwater Discharge Unit.

1982



WIDE SHADED BAND DEMARKS HIGH RISK EROSION AREA

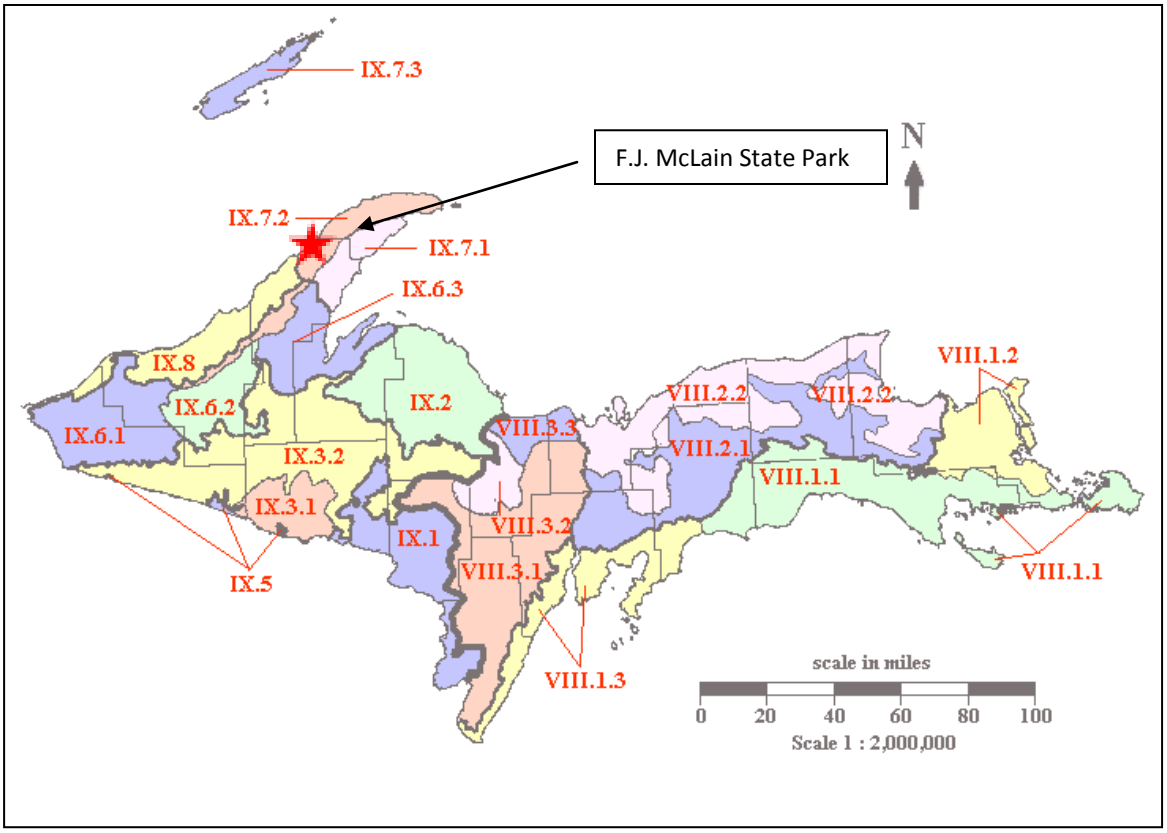
60-year projected recession distance
30-year projected recession distance

A.7 NATURAL SYSTEMS AND NATURAL RESOURCES

Eco-Regional Context

The following information was obtained from Regional Landscape of Michigan and Wisconsin. A working Map and Classification. Dennis Albert, September 20, 1995.

Regional Landscape Ecosystems of Michigan's Upper Peninsula



Source: http://www.npwrc.usgs.gov/resource/habitat/rlandscp/s9-7-2.htm

F.J. McLain State Park is located in sub-subsection IX.7.2, which is noted for steep ridges of Keweenawan (late Precambrian) basaltic lavas and conglomerates rising several hundred feet above the adjacent lake and till plains. The ridges of the Keweenaw Peninsula are part of the Lake Superior syncline, which extends from northern Wisconsin to the tip of the Keweenaw Peninsula of Michigan.

Climate

Lake Superior significantly controls the climate of the Keweenaw Peninsula, keeping winters milder than those in surrounding areas. Spring is cool and brief, transitioning into a summer with highs near 70 °F (21 °C). Fall begins in September, with winter beginning in mid-November. The area receives an average of 220 inches of snowfall annually due to lake-effect.

Geology

The ancient lava flows of the Keweenaw Peninsula were produced during the Mesoproterozoic Era as a part of the Midcontinent Rift. This volcanic activity produced the only strata on Earth where large-scale economically recoverable 97 percent pure native copper is found.

Much of the native copper found in the Keweenaw comes in either the form of cavity fillings on lava flow surfaces which has a *lacy* consistency, or as *float" copper*, which is found as a solid mass. Copper ore may occur within conglomerate or breccia as void or interclast fillings. The conglomerate layers occur as interbedded units within the volcanic pile.

The Keweenaw Peninsula and Isle Royale, formed by the Midcontinent Rift System, are the only sites in the country with evidence of prehistoric aboriginal mining of copper. Artifacts made from this copper by these ancient Indians were traded as far south as present day Alabama. These areas are also the unique location where Chlorastrolite (Michigan Greenstone), the state gem of Michigan, can be found.

The primary geological make-up of F.J. McLain State Park is Lacustrine sand and gravel.

Shoreline Erosion

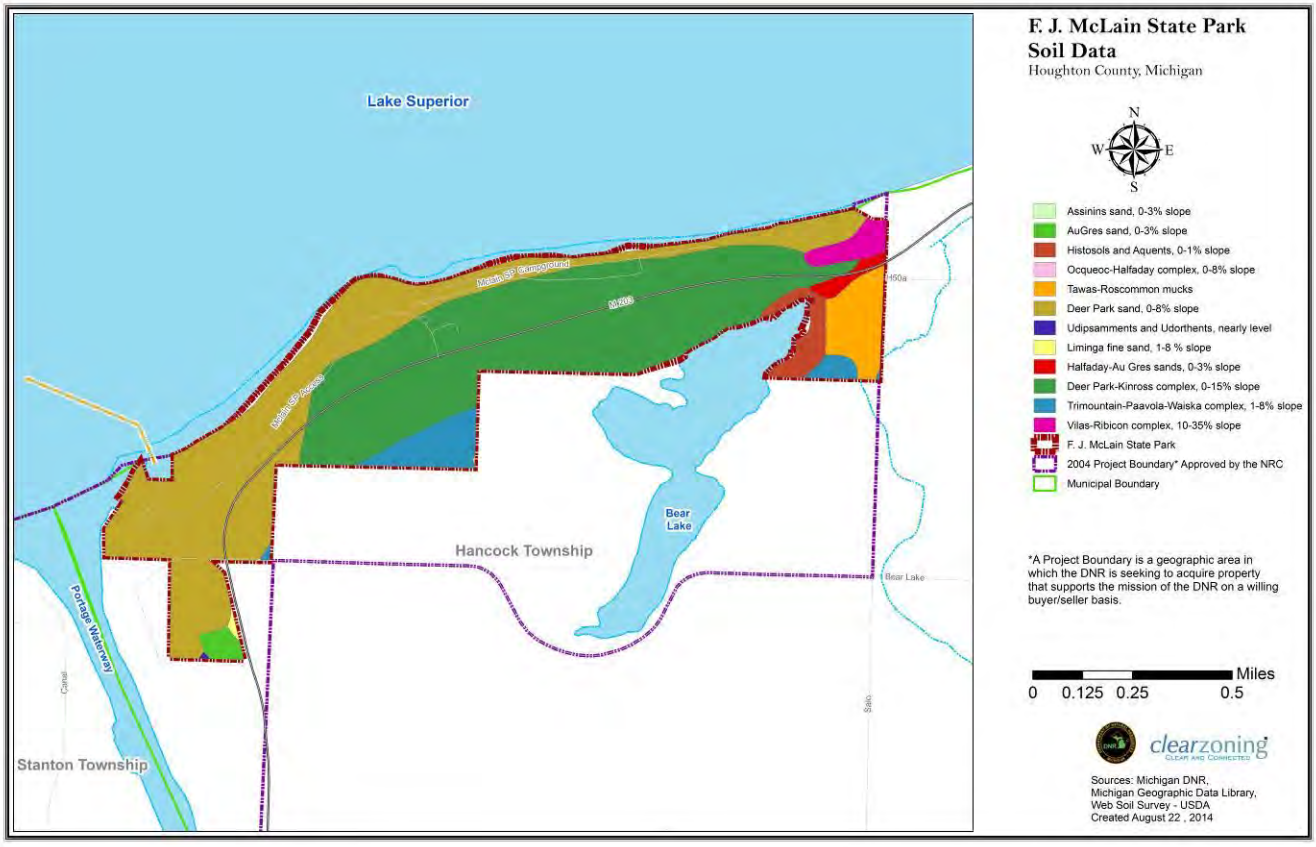
In 1997, the DNR paid the Corps of Engineers to conduct a study under Section 22 of the Water Resources Act of 1974 to determine the cause of the rapid erosion of the shoreline effecting F.J. McLain State Park. The study concluded that the upper navigational structure built by the Corps of Engineers effectively blocked shore transport of sand from the south. For many years, the dredged sand from the Keweenaw Waterway was deposited on the beaches of McLain State Park, which prevented further erosion to the north. When dredging ceased in the late 1970's, the deposited sand eventually eroded and exposed the northern bluffs to the rapid erosion we see today. The Corps and the University of Michigan concluded that further shoreline protection measures and the application of dredge sand was not cost effective and recommended in this study to relocate and rebuild the campground and other threatened park facilities on stable ground.

A study conducted in 2001 concluded that additional research regarding shoreline erosion at the park is needed. Thus, current efforts are focusing on the specific locations where erosion occurs. In particular, a geophysical survey is underway for the purpose of examining the depth of bedrock to determine high and low risk erosion areas. In consultation with the state geologist and the Department of Environmental Quality (DEQ), the study is planned for the summer of 2014.The Planning Team recognizes that shoreline erosion at the park is a serious and costly issue that should be at the forefront of future planning and management.

Soils

The majority of the park is Deer Park- Kinross complex, 0-15% slopes and Deer Park sands 0-8% slopes. Soils found on site are illustrated by the following map and the main soil types described below:

Soil Descriptions



- **Au Gres sand, 0-3% slope** soils are very deep, nearly level, somewhat poorly drained soils found on broad plains and in depressions and drainageways. These irregular or long and narrow shaped soil areas range in size from 5 to 200 acres. The top 1 inch of soil is usually black, well decomposed forest litter. The remaining surface layer consists of light brownish gray, mottled sand about 19 inches thick. Subsoils are dark reddish brown, reddish brown, and yellowish red, loose sand about 20 inches thick. Some areas of the soil are gravelly or very gravelly sand throughout. Permeability is rapid and the seasonally high water table is at a depth of 0.5 to 1.5 feet in the spring and other excessively wet periods. Available water capacity is low and runoff is very slow.

  Soils are droughty during dry periods and have a seasonably high water table, which can lead to seedling losses of 25% – 50%. The seasonal high water table also leads to shallow rooted trees. This can create the potential for trees to be blown down during excessively wet periods with high winds.

- **Histosols and Aquents, 0-1% slope** soils are nearly level, poorly drained, and found in depressions and along streams and lake edges. They consist of a high water table at or above the surface throughout the year. Histosols soils are organic, while the Aquents are sandy and loamy. The soil areas may consist of solely Histosols, Aquents, or a combination of both. Up to 20% of the areas may consist of open water.

The soil lands are mostly marsh, consisting or cattails, reeds and grasses. Clumps of trees and shrubs can be found along the edges of the soils mapping areas. Wildlife such as waterfowl, beavers, muskrats and other wetland animals frequently inhabit these areas.

- **Tawas-Roscommon mucks** are very deep soils that are nearly level and found in depressions and drainageways. Both soils are poorly drained, thus subject to ponding. The surface layer of Tawas soils are dark reddish brown muck extending to a 4 inch depth. This is followed by 16 inches of very dark gray and black muck. Roscommon's surface layer consists of black muck and mucky sand extending approximately 6 inches in depth. Its upper substratum is light brownish gray and pale brown sand to a depth of 60 inches. For Tawas mucks, permeability is moderately slow to moderately rapid in muck layers and rapid in the substratum. Roscommon soils have rapid permeability. For both soils, the seasonally high water table is near or above the surface during the spring and excessively wet periods. Both soils have a runoff that is very slow or ponding, while available water capacity is high in Tawas soils and low in Roscommon.
- **Deer Park sand, 0-8% slope** soils are very deep, nearly level and undulating. This excessively drained soil can be found located on beaches and dunes. The surface of the soil consists of approximately 2 inches of partially decomposed, black leaf litter. The remaining surface layer is black sand to a depth of 4 inches. Pale brown sand to a depth of approximately 20 inches makes up the subsurface. Permeability is rapid and the soil has a low available water capacity and very slow runoff.

  These soils are primarily used as woodlands with major management concerns consisting of equipment limitations and seed mortality. In heavily traveled areas, heavy equipment has a hard time gaining traction in the loose sands. This problem is exacerbated during dry periods. The very dry soils can lead to 25% to 50% seedling losses.
- **Halfaday-Au Gres sands, 0-3% slope** soils are irregular shaped areas ranging from 5 to 500 acres. The Halfaday portions of this sand consist of very deep, nearly level, moderately well drained soils found on low knolls. Au Gres potions of this sand are deep, nearly level, somewhat poorly drained soils found in slight depressions. These two soils are very intricately mixed. The top 1 inch of Halfaday soil is composed of partially decomposed forest litter on the surface. The remaining surface layer of the soil is pinkish gray sand to a depth of about 3 inches. Approximately the next 27 inches of subsoil are dark reddish brown, yellowish red and strong brown friable sand. The top 1 inch of Au Gres soil is well decomposed, black forest litter on the surface. Light brownish gray, mottled sand to a depth of about 19 inches make up the rest of the surface layer. Dark reddish brown, reddish brown and yellowish red loose sand make up the subsoil to a depth of approximately 20 inches. Both soils have rapid permeability. The seasonally high water table is at 2.0 to 3.5 feet for Halfaday soils and 0.5 to 1.5 feet for Au Gres. Available water capacity for both soils is low and runoff is slow.
- **Deer Park-Kinross Complex, 0 – 15 % slope** soils are very deep and found on plains. The Deer Park soils are level to rolling, excessively drained and found on dunes and low ridges. In contrast, Kinross soils are nearly lever, poorly drained soils subject to ponding that are found in swales and depressions. These soils are very intricately mixed. The top 2 inches of Deer Park soil are black, partially decomposed leaf litter at the surface. Black sand to a depth of 4 inches makes up the rest of the surface layer. The subsurface layer consists of brown and yellowish brown loose sand to a depth of 20 inches. The top 3 inches of the surface area for Kinross soils is black muck. Pinkish gray sand to a depth of 6 inches makes up the subsurface layer. In both soils the permeability is rapid and available water capacity is low. The seasonally high water table is near or above the surface during the excessively wet

periods and the spring for Kinross soils. Kinross soils also have very slow runoff or ponding of water. Deer Park soils have very slow runoff.

These soils are typically used as woodlands. The major management concerns associated with the soils are equipment limitations, seedling mortality, windthrow hazard, and plant competition. The very wet Kinross soils should only have equipment be used during dry periods or periods of adequate snow cover or when roads are adequately frozen. Due to droughtiness of the Deer Park soil and the wetness of the Kinross soils, seedling losses can be as high as 50%. The wetness of the Kinross soils leads to shallow rooting of trees, which can lead to them being blown down during high wind periods.

- **Trimountain-Paavola-Waiska complex, 1 to 8% slope** soils are very deep, nearly level and gently sloping soils found in low knolls and broad plains. The top 1 inch of Trimountain soil is composed of black, decomposed forest litter. The rest of the surface layer is a dark reddish gray cobbly fine sandy loan to a depth of 4 inches. The complex subsoil is 41 inches in depth. The top 2 inches of Paavola soil are composed of undecomposed forest litter at the surface. The remainder of the surface layer is dark reddish brown gravelly coarse sandy loam to a depth of 4 inches. The subsoil extends to a depth of 53 inches. The top 1 inch of Waiska soil is comprised of partially decomposed forest litter. The remainder of the surface layer is brown sand to a depth of 6 inches. The subsoil extends down to a depth of 29 inches.

  The permeability of these soils varies. Trimountain soils have moderate permeability in the upper layers, very slow permeability in the middle portion, and moderate or moderately rapid permeability in the lower portions. Paavola permeability is moderate to very rapid in the upper portions, very slow in the middle portion, and moderate to very rapid in the lower potion. Waiska soil has very rapid permeability. The seasonal high water table in the Trimountain and Paavola soils is perched at a depth of 1 to 2 feet in the spring and other excessively wet periods. Runoff for all of these soils is slow. Available water capacity is low in the Trimountain soil and very slow in the other two soils.

- **Vilas-Rubicon complex, 10 to 35% slope** soils are very deep, gently rolling to steep, excessively drained soils that can be found in knolls, ridges, and alongside slopes. They are generally comprised of 45% to 60% Vilas soils and 35% to 50% Rubicon soils. The two soils are very intricately mixed. The top 1 inch of Vilas soil is comprised of partially decomposed forest litter. The remaining surface layer extends to a depth of 2 inches and is brown loamy sand. The subsoil extends to a depth of 33 inches and is dark brown and strong brown, very friable loamy sand in the upper potion and strong brown, friable sand in the lower portion. The top 1 inch of the Rubicon soils is black, well decomposed forest litter. The remaining portion of the surface layer is brown sand that extends to a depth of 4 inches. The subsoil extends to a depth of 24 inches and is comprised of dark brown and brown, very friable sand. Permeability is rapid in the Rubicon soil and in the upper portion of the Vila soil. Available water capacity is low in both soils and runoff is slow.

Topography

F.J. McLain State Park is generally flat at 640 feet above sea level with steep slopes at the Lake Superior shoreline at 607 feet above sea level.

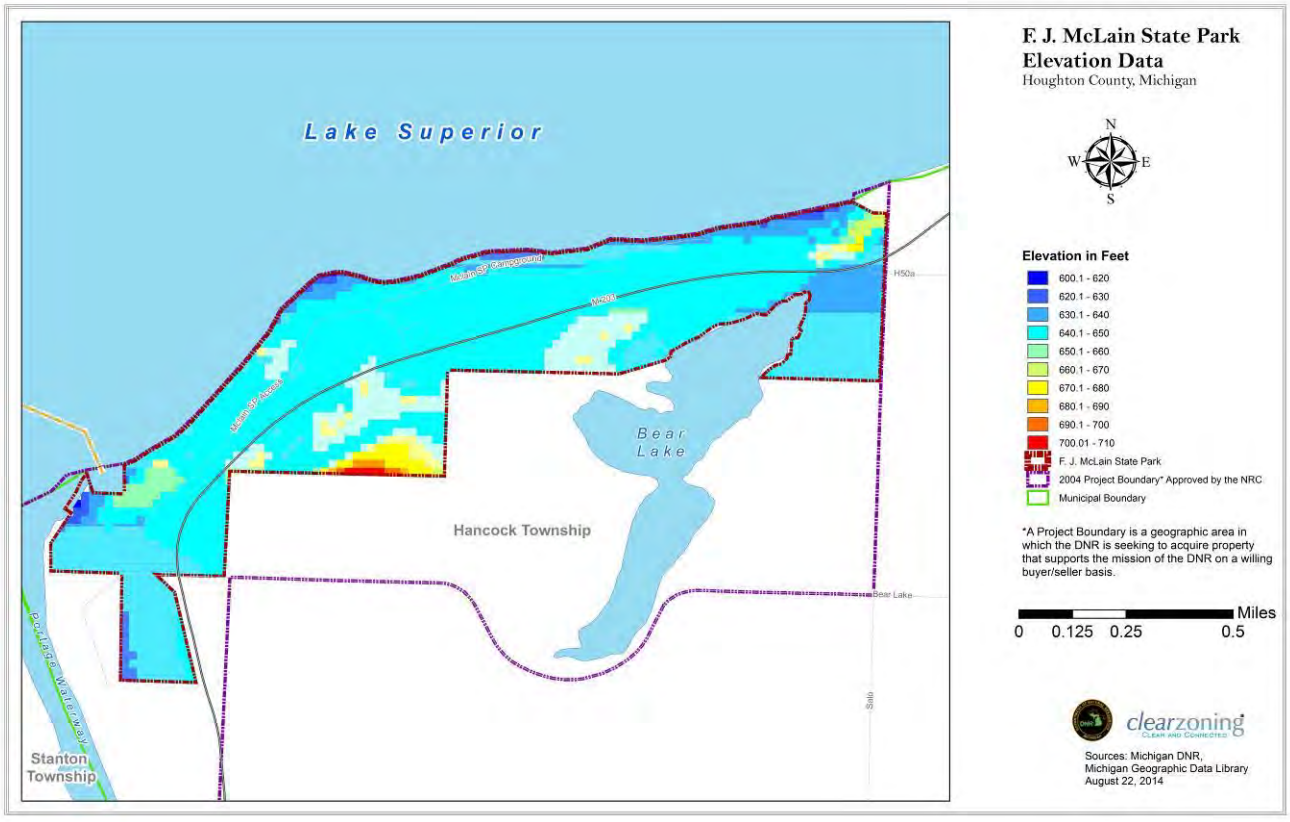
Water Resources

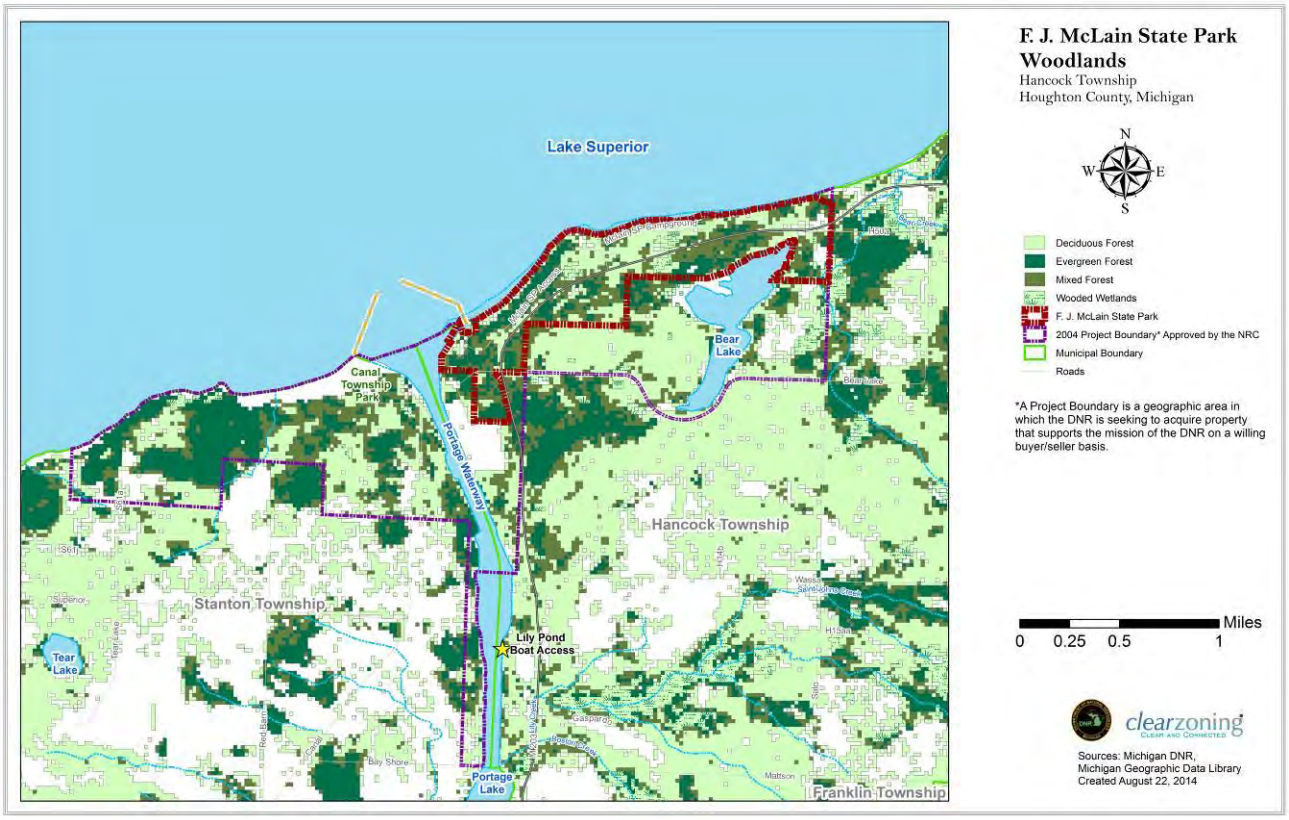
Houghton County hosts numerous inland lakes. The park itself is most significantly impacted by the waters of Lake Superior, Bear Lake (116 acres per DNR lake topography maps - bathymetric maps) and the Keweenaw Waterway. The Keweenaw Waterway is now seldom used by lake freighters. Modern, large freighters can no longer navigate the waterway. The

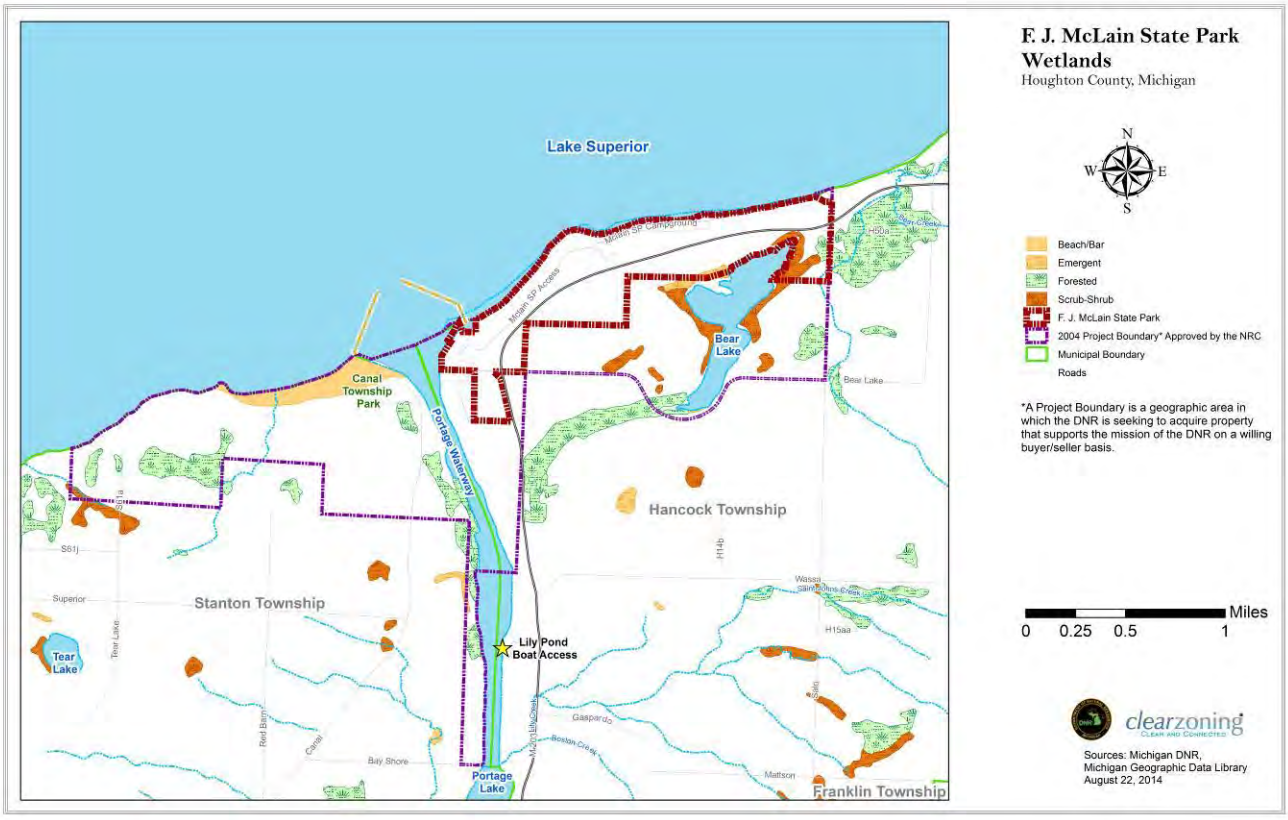
closing of the mines means that shipping from the Keweenaw is much reduced and there is a reduced need for refuge due to modern equipment. The channel is still used by pleasure craft.

Land Cover

The area of F.J. McLain State Park was historically dominated by a mix of pine and oak on the west half of the park and aspen on the east. The majority of the original land cover and hardwood trees were removed from the lands of and surrounding the park during the aggressive lumbering of the area in the 1860s-1890s. Since the logging in the late 1800's, forests have regrown in the park with a mixture of hardwoods and pines with the developed portions of the park remaining open.




Lake Superior
Bear Lake
Canal Township Park
Portage Waterway
Hancock Township
Stanton Township
Lily Pond Boat Access
Tear Lake
Portage Lake
Franklin Township
F. J. McLain State Park
Woodlands
Hancock Township
Houghton County, Michigan
N
W
E
S
Deciduous Forest
Evergreen Forest
Mixed Forest
Wooded Wetlands
F. J. McLain State Park
2004 Project Boundary* Approved by the NRC
Municipal Boundary
Roads
*A Project Boundary is a geographic area in which the DNR is seeking to acquire property that supports the mission of the DNR on a willing buyer/seller basis.
Miles
0 0.25 0.5 1
clearzoning
Sources: Michigan DNR, Michigan Geographic Data Library
Created August 22, 2014


Lake Superior
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Lily Pond Boat Access
Tear Lake
Portage Lake
Franklin Township
F. J. McLain State Park
Wetlands
Houghton County, Michigan
N
W
E
S
Beach/Bar
Emergent
Forested
Scrub-Shrub
F. J. McLain State Park
2004 Project Boundary* Approved by the NRC
Municipal Boundary
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*A Project Boundary is a geographic area in which the DNR is seeking to acquire property that supports the mission of the DNR on a willing buyer/seller basis.
Miles
0 0.25 0.5 1
clearzoning
Sources: Michigan DNR, Michigan Geographic Data Library
August 22, 2014

Threatened and Endangered Species

No threatened or endangered species are currently known to occur at McLain State Park. Bald eagle (state special concern) and peregrine falcon (state endangered) have both nested within a few miles of the park and have potential to use the park. A sandstone lakeshore cliff natural community, supporting a population of the special concern plan butterwort (Pinguicula vulgaris) occurs about a mile west of the park. There is some potential for these or other rare species to be found at the par in the future.

Wildlife

F.J. McLain State Park's geographic location on Lake Superior and the Keweenaw Peninsula make it attractive as a stopping point for neo-tropical migrants and migrating shorebirds and waterfowl. Trees along the shores edge are used by insect eating songbirds as perches from which to hunt for hatching insects or resting out of the wind. Bear Lake is important for foraging shorebirds and for waterfowl seeking shelter from Lake Superior. Year round resident wildlife such as white-tailed deer, mink, coyote, fox and squirrels are common species that may be found using the parks natural resources. The oak component of the park in particular is an attraction for many of these species.

Fisheries

In 1874, a 22-mile canal was completed between the northwest end of Portage Lake and Lake Superior which allowed ships to bypass the trip around the Keweenaw Peninsula and provided a harbor of refuge. One of the outlets of Portage Lake is the Portage Canal at the north entry. Here the Lily Pond boating access site offers a convenient place to launch boats or a place to fish from shore.

Fish communities in the vicinity of the F.J. McLain State Park are comprised of 37 different species consisting of both Lake Superior coastal types as well as inland compositions from the Portage Canal system. Typically lake trout, lake whitefish, and pacific salmon (Coho, Chinook) are found in the Lake Superior shoreline waters, while the Portage waterway fish includes walleye, northern pike, yellow perch, rock bass, bluegill, pumpkinseed sunfish, black crappie, smallmouth bass, black bullhead, largemouth bass, and smallmouth bass. Lake sturgeon, a state threatened species is also found in both the Lake Superior and Portage Canal waters near F.J. McLain State Park. Fishing for lake sturgeon in this area is limited to hook-and-line and catch-and-immediate-release from July 16 through November 30.

Fishing rules and regulations are in place that control harvest seasons, size and catch limits. A fishing license is required for persons 17 years of age or older. Those under 17 years old may fish without a license, but are required to observe all fishing rules and regulations.

A.8 HISTORIC AND CULTURAL RESOURCES

There are no above ground structures at F. J. McLain State Park that are eligible for listing on the National Register of Historic Places.

As of 2012, there are eight known archaeological sites located within F. J. McLain State Park boundaries. These sites consist of two prehistoric sites, two historic period sites, two historic period isolated find locations, one pre-World War II location, and a historic period shipwreck site (which was located on the beach). Generally, isolated finds are transportable artifacts representing a single activity or event. A single feature may be considered an isolated feature.

In 2012, an archaeological investigation was conducted at F.J. McLain State Park on behalf of U.P. Engineers & Architects, Inc. by the Public Service Archaeology & Architecture Program of the University of Illinois at Urbana-Champaign. The university investigation included a literature review, review of the state archaeological site files, and a Phase I archaeological reconnaissance survey of approximately 264 acres (107 hectares) within a portion of F.J. McLain State Park in advance of proposed park redevelopment and improvements.

The background research indicated the presence of four previously reported archaeological sites within F.J. McLain State Park and the Phase I archaeological reconnaissance survey yielded 4 new sites within the designated survey area. The reconnaissance survey found that the majority of the investigated property was largely undisturbed, but that existing campground, cabin area and day use areas had been moderately to significantly impacted by the park infrastructure.

The 264 acres surveyed yielded two new historic period archaeological sites, two new historic period isolated find locations, redefined a previous historic period shipwreck site and revisited a known prehistoric site. The other two known archaeological sites were not in the designated 264 acres surveyed by the University of Illinois at Urbana-Champaign.

Given the data documented at the prehistoric sites, it is recommended these sites be avoided due to the potential for the sites to contain artifacts of a sensitive nature. If site avoidance is not possible, it is recommended for archaeological monitoring should any of the proposed development or improvement project be under taken in or adjacent to the mapped site area.

A.9 EDUCATIONAL, INTERPRETATION, AND RECREATION EVENTS

- Michigan State Park Explorer Program - a summer program offered at 41 Michigan State Parks to campers and day visitors. The program arms participants with field gear (animal skins, bug boxes and hands-on materials) and a guide for informal hikes and other programs. These activities cater to each parks' unique physical and cultural resources, targeting both children and adults. A partnership between the Michigan Department of Natural Resources (MDNR) Explorer Program and Michigan Technological University has allowed F.J. Mc Lain State Park to host astronomy programs during the summer months.

- The Portage Canal Run - an annual event held in July which has begun from inside the park since 1981. The run is organized by a group of volunteers representing Portage Health, and typically sees close to 1,000 participants.

- "K-Day" (Keweenaw Day) – a long-standing tradition for students of Michigan Technological University in which students celebrate the beginning of the new academic year by setting up displays and participating in activities at the park. There is also food and music available to students. The event takes place each year in September and is typically attended by 6,000 students.

K-Day is an annual event at the park

A.10 RECREATION RESOURCES

Beach

- The park offers two miles of sandy beach, which extends to the seawall leading to the lighthouse.

Biking

- On paved surfaces and unofficial woodland paths

Camping

- The park features 103 modern camp sites most of which offer spectacular views of Lake Superior.

The campground offers beautiful views of Lake Superior

Cabins

- There are six mini cabins called Oaks, Pines, Aspens, Cedars, Hemlocks, and Maples
- There is one rustic cabin called Birches

Cross Country Skiing and Snowshoeing

- Users are able to ski and snowshoe along four miles of hiking trails located in the park.

The lighthouse is a maritime resource at the park

Games

- Volleyball courts and horseshoe pits are available at the day-use areas.

Hiking

- There is a total of four miles of hiking trails in the park.

Hunting

- The area south of M-203 is open to hunting during appropriate hunting seasons.

Lighthouse

- The Keweenaw Upper Entrance Lighthouse was built in 1950. The lighthouse, managed by the U.S. Coast Guard, is a scenic feature which can be viewed from the park.

Kayaking

- F.J. McLain is located along the Keweenaw Water Trail, which circles the tip of the Keweenaw Peninsula. Kayakers may spend the night at the park.

Picnicking

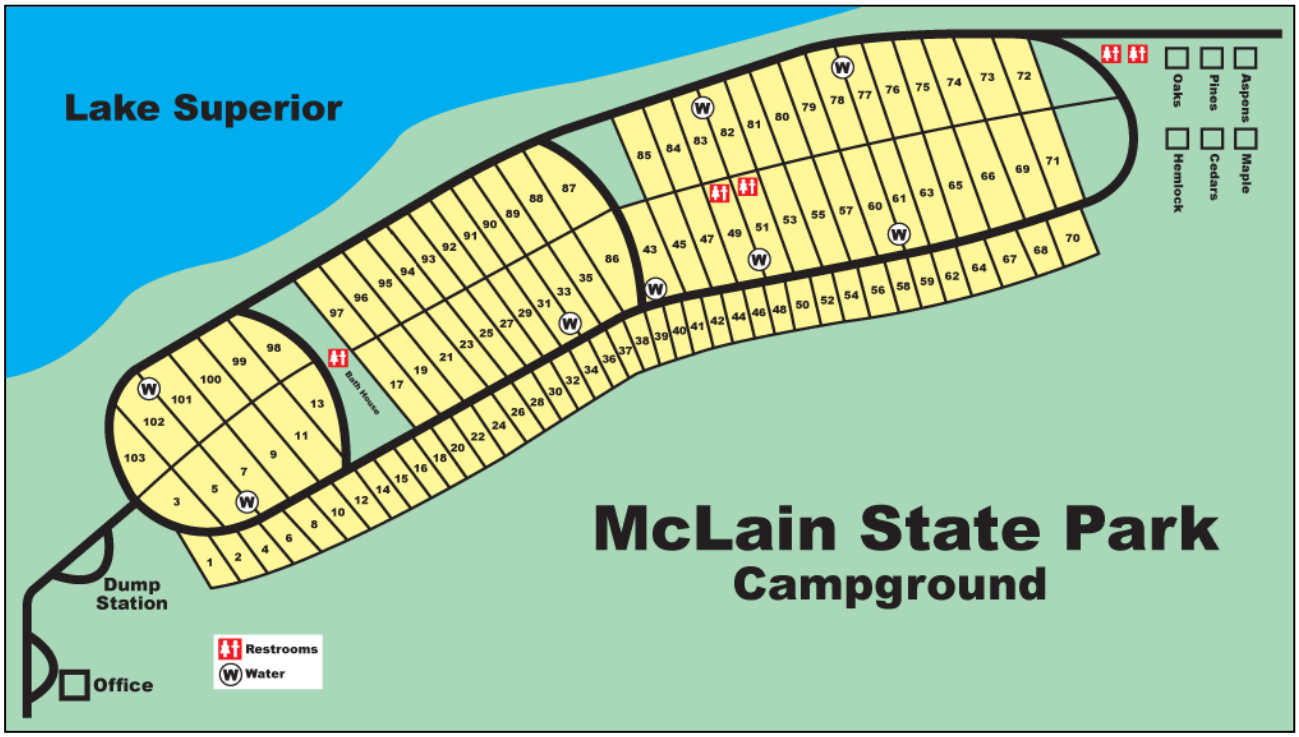
- There are three picnic shelters that are available for reservation. Two of the shelters have fireplaces.

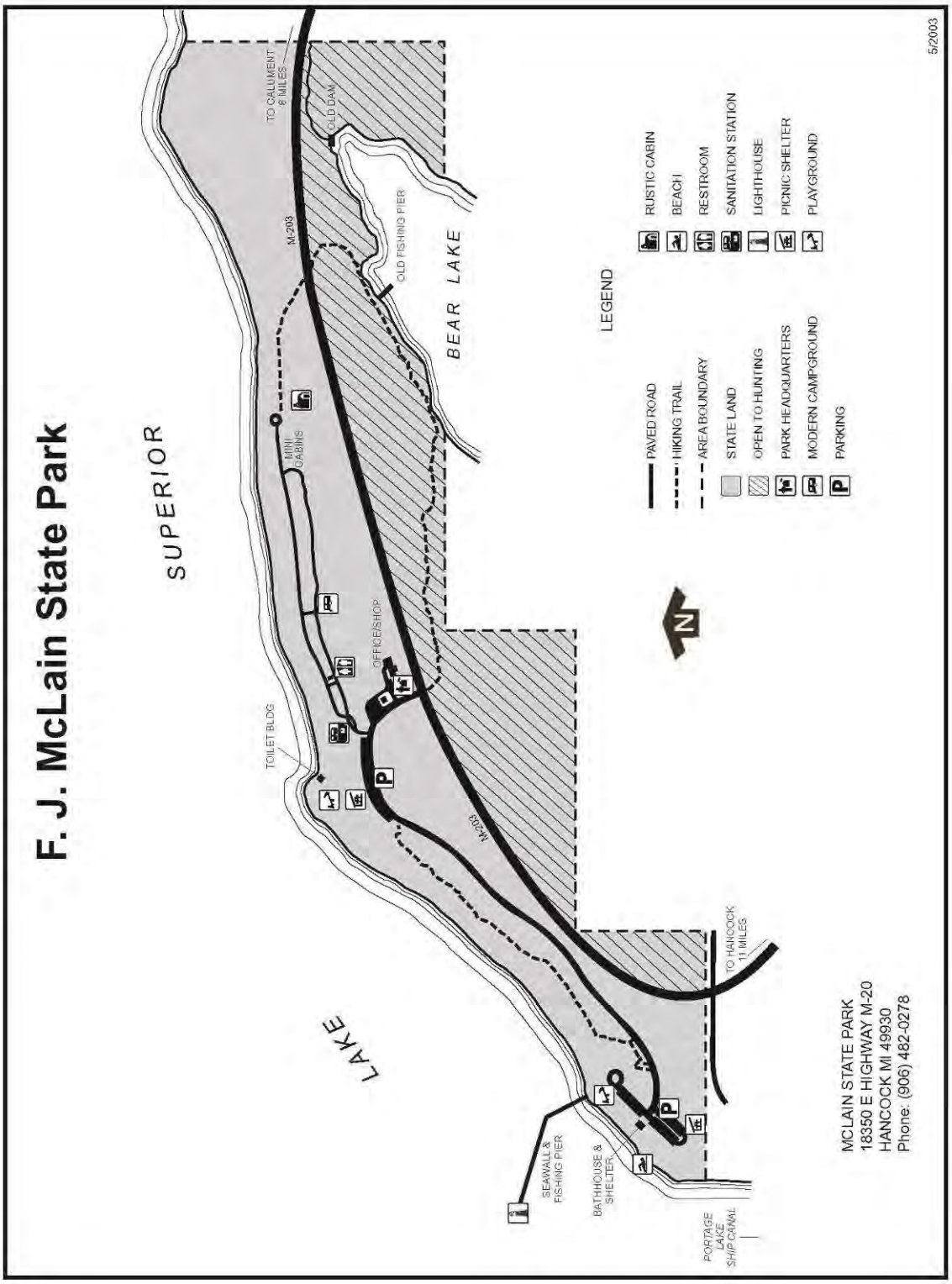
Playgrounds

- A playground is located at both day use areas.

Swimming

- The swimming area is located on the southwest side of the seawall in the southernmost day-use area. It is not a designated swimming area. The nearby lighthouse pier buffers the incoming waves on Lake Superior and shelters the swimming area. The day-use area also provides a bathhouse and shelter.




F. J. McLain State Park
SUPERIOR
LAKE
BEAR LAKE
TO CALUMET 8 MILES
OLD DAM
M-203
OLD FISHING PIER
MINI CABINS
OFFICE/SHOP
TOILET BLDG
SEAWALL & FISHING PIER
BATHHOUSE & SHELTER
PORTAGE LAKE SHIP CANAL
TO HANCOCK 11 MILES
LEGEND
PAVED ROAD
HIKING TRAIL
AREA BOUNDARY
STATE LAND
OPEN TO HUNTING
PARK HEADQUARTERS
MODERN CAMPGROUND
PARKING
RUSTIC CABIN
BEACH
RESTROOM
SANITATION STATION
LIGHTHOUSE
PICNIC SHELTER
PLAYGROUND
N
MCLAIN STATE PARK
18350 E HIGHWAY M-20
HANCOCK MI 49930
Phone: (906) 482-0278
5/2003

A.11 ISSUES AND OPPORTUNITIES

The main issue at F. J. McLain State Park is currently shoreline erosion, which is threatening park buildings, cabins and other infrastructure. Specifically, erosion has already claimed campground roads and campsites and is currently threatening the campground toilet/shower building, additional campground roads, campsites and cabins, as well as utilities that serve the campground and day use toilet building. A sewer line in the central day use area is now only 10 feet from the eroding bank.

- Day users park in the campground parking lot rather than the day use parking area. This results in a lack of available parking for campground users as well as congested campground roads.
- Park users access the beach in ways that accelerate the rate of erosion. Additional education is needed at High Risk Erosion areas to inform park users about erosion and how they can help minimize their impact on erosion.
- The stamp sand on the day use beach is not appealing to users.
- Campground roads are used by both motor vehicles and bicyclists which poses safety concerns.
- The potential future relocation of park amenities, including the campground, could impact the existing aquifer and availability of water at the park.
- Shoreline erosion is an urgent and significant issue at the park that should remain at the forefront of future planning and management. Shoreline erosion also provides an important research and education opportunity for research organizations and universities.

Shoreline erosion is a major issue at the park

Stamp sand at the day use beach

A.12 PARK USE STATISTICS AND ECONOMIC IMPACTS

Park Use

The total number of day-use visitors for 2012 was 46,519 and the total number of campers was 103,010. Total revenues (camping fees) generated by the park in 2012 was $ 325,576.00

A characterization of park use is described as follows (based on 2012 MDNR-Park Attendance Statistics):

Day-use

- Summer Use Season – This is defined as the three-month period of June through August, when schools are not in session. This is the busiest season for the park, as 65% of all day-use takes place during these months.
- Fall Use Season – The fall season is defined by the months of September through November. An estimated 21% of all day-use takes places within this season.
- Winter Use Season – December through March marks a significant decline in park use, as only 5% of its day-use occurs during this time.
- Spring Use Season – April through May shows gradual increase in park use with day-use at 9%.

Camping

- Summer Use Season – This is defined as the three-month period of June through August, when schools are not in session. This is the busiest season for the park, as 68% of all camping takes place during these months.
- Fall Use Season – The fall season is defined by the months of September through November. An estimated 26% of all camping takes places within this season.
- Winter Use Season – The winter season is defined from December through March. 1% of the park's camping occurs during this time.
- Spring Use Season – April through May shows gradual increase in park use with camping at 5%.

Economic Impacts

Michigan State University (Dr. Dan Stynes) developed an economic analysis model known as "MGM2". This model is an update of the MGM model developed by Dr. Ken Hornback for the National Park System in 1995. The purpose of the updated MGM2 model is to estimate the impact of park visitor spending on the local economy. These economic impacts are reflected in terms of sales, income, employment, and value added.

This analysis tool relies on three primary factors in the common equation:

Economic Impact of Tourism Spending = Number of Tourists (x) Average Spending per Visitor (x) Multiplier (to estimate extended effects of direct spending).

For our purposes of conducting a very basic review of impacts, we have utilized the "MGM2-Short Form" version of the program, which simplifies the extent of analysis required for input, and utilizes more generalized multipliers for spending outputs. For the non-economist, this provides an excellent tool for establishing a baseline assessment of the economic impacts of our parks.

The following are the relative economic impacts of F.J. McLain State Park to the economy of Houghton County.

Direct Economic Effects to the Community

- Direct spending attributable to F.J. McLain State Park visitors totaled $ 4,849,000 of which $491,500 came from day-use, and $4,357,280 from Camping.
- Jobs totaled 153, with 15 related to day-use activity and 137 to camping. (Note…jobs are not full-time equivalent. They include part-time and seasonal positions.)
- Personal Income total is $1,649,000 with $167,150 associated with day-use of the park and $1,481,840 associated with camping.
- Value added (total income plus business taxes) totaled $2,490,000. Day-use accounted for $252,350 and camping accounted for $2,237,190.

Total Economic Effects to the Community

(NOTE…this reflects 'Direct Effects' plus the 'Secondary Effects' of visitor spending on the local economy. Secondary Effects (sometimes called 'Multiplier Effects') capture economic activity that results from the re-circulation of money spent by the park visitors in the community.

- Total spending = $6,410,000
- Jobs = 178
- Personal Income = $2,169,000
- Value added = $3,452,000

Appendix B – Public Input Summary

Over the duration of the General Management Planning process, the F.J. McLain State Park Planning Team ensured a variety of opportunities for public input and feedback. These avenues included:

Overview of Public Input Opportunities

- **Public Input Survey –** an online survey developed to gather general information about park visitors and their use of the park as well as recommendations for improving features and amenities offered at the park. The survey was made available for a 10-week period.
- **F.J. McLain State Park Website** – the public could post comments on the website, which also included additional resources about the General Management Planning process. The link for the website is: **http://www.clearzoning.com/clearzoning-clients/mclain-state-park/**
- **Stakeholder Input Open House (September 10th, 2014)** – located at Portage District Library, stakeholders had the opportunity to learn about the General Management Planning process and provide input regarding the Statements of Significance and the Draft 10-Year Action Goals. Approximately 53 stakeholders were invited to the open house; three stakeholders attended.
- **Public Input Meeting (October 29, 2014)** – located at Keweenaw National Historical Park, members of the public were invited to learn about the General Management Planning process and comment on the Statements of Significance and the Draft 10-Year Action Goals.

DNR Stakeholder Open House
F.J. McLain State Park

We Want Your Input!!

You are invited to complete a 5-10 minute online survey, which can be found at:

https://www.surveymonkey.com/s/McLainSPSurvey

Your input will inform the Planning Team as they develop appropriate zones and action goals for the park!

You are encouraged to visit the project website at:

http://www.clearzoning.com/clearzoning-clients/mclain-state-park/

For more information, or to RSVP, please contact Mardy Stirling at mardy@clearzoning.com or 248.423.1776 x 15

DNR Stakeholder Open House
Draft General Management Plan
F.J. McLain State Park

The Parks & Recreation Division of the DNR is in the process of developing a Management Plan for F.J. McLain State Park. The Management Plan includes a 20-year management outlook for natural and cultural resources and educational opportunities at the park. In addition, the plan includes a set of 10-year action goals that will guide specific management decisions and enhance the visitor experience, while protecting the natural, cultural and historic resources for the enjoyment of future generations.

You and/or your group have been identified as a stakeholder, with active interests in F.J. McLain State Park. Using an open house format, the DNR will share its initial thoughts on the Draft General Management Plan and welcomes your input.

You may drop in at any time during the scheduled open house. However, we request that each stakeholder group limit itself to not more than 3 representatives, so that we may accommodate everyone based on meeting space and time constraints.

Wednesday, September 10, 2014
2:00 p.m. to 4:00 p.m.
Portage Lake District Library
58 Huron Street
Houghton, MI 49931

F.J. McLain State Park

DEPARTMENT OF NATURAL RESOURCES
General Management Planning Process
Stakeholder Input Workshop
F.J. McLain State Park

September 10, 2014
2:00 PM – 4:00 PM
Portage Lake District Library

1. **Planning Team Introductions at 2:00 p.m.**

2. **Brief Presentation of Management Planning Process and Status at 2:05 p.m.**
   a. Significance Statements
   b. Development of Management Zone Maps
   c. Action Goal Development – Draft 10-year strategies to address the desired future condition of each zone
   d. F.J. McLain State Park Planning Team Draft Action Goals organized by:
      - ❑ General Action Goals
      - ❑ High Risk Erosion Zone
      - ❑ Backcountry Zone
      - ❑ Developed Recreation Zone
      - ❑ Cultural Landscape Overlay Zone
   e. Priority Exercise explained
   f. Action Goals input sheets described
   g. Questions and Answers

3. **Open House at 2:30 p.m.**
   a. You are invited to visit each of the stations and talk to Planning Team members
   b. Sticky notes are available to comment on Management Zone Map
   c. Color dots are available for you to identify your priority actions (please limit yourself to 10 dots)
   d. "Additional Input" sheets are available for you to contribute additional suggested actions goals

4. **Adjournment at 4:00 p.m.**

Survey: https://www.surveymonkey.com/s/McLainSPSurvey

For More Information:

Project Website: http://www.clearzoning.com/clearzoning-clients/mclain-state-park/

DNR Management Planning Website: www.michigan.gov/parkmanagementplans

Email: JensenD1@michigan.gov, Mardy@clearzoning.com or Dave@clearzoning.com

Phone: 517.284.6105 (Debbie Jensen, DNR-PRD Management Administration) or 248.423.1776 (Clearzoning)

Stakeholder Input Open House Attendees	
Name	**Affiliation**
Steve Delong	Keweenaw National Historical Park
Glenn Anderson	City of Hancock
Liz Valencia	Isle Royale National Park

General Action Goals

Many of the 10-Year Action Goals for F.J. McLain State Park are general in nature and apply within all of the management zones. These often deal with park-wide issues, such as invasive species control, universal access, developing Stewardship, Wildlife and Emergency plans, or marketing the park's many recreational opportunities to a wider audience of potential users. Many of the overall maintenance and operational issues of running a state park also result in the need for actions across all zone boundaries, such as law enforcement.

Action Goals	Target Completion Date	Program Input From	Responsible Program Position	Priority Stickers (Stakeholders)
Natural Resources				
1. Develop Stewardship Plan.	3-5 Years	Park Manager Stewardship	Stewardship Ecologist	
2. Implement Stewardship Plan for the park	Ongoing	Park Manager Stewardship	Park Manager Stewardship	
3. Implement early detection and rapid response to invasive species control	Ongoing	Park Manager Stewardship Fisheries	Park Manager	
Historic/Cultural Resources				
1. Continue to protect cultural resources	Ongoing	Park Manager Stewardship State Historic Preservation Office Regional Planner	Park Manager Stewardship Office of State Archaeologist	2
2. Review all proposed earthwork activities for potential impact on historic/cultural resources	Ongoing	Stewardship State Historic Preservation Office Regional Planner	Cultural Resource Analyst Office of State Archaeologist	
3. Review all projects involving historic structures, existing or acquired	Ongoing	Stewardship State Historic Preservation Office Regional Planner	Cultural Resource Analyst State Historic Preservation Office	1
Recreation Opportunities				
Refer to individual management zones				
Education/Interpretation Opportunities				
1. Develop specific interpretation and education opportunities	Ongoing	Park Manager Stewardship Historical Center Marketing & Outreach	Marketing & Outreach Historical Center	
2. Develop an interpretive plan that utilizes a variety of traditional and new media, including audio and visual technologies, podcasts, and other emerging technologies for interpretation opportunities.	2 Years	Park Manager Historical Center Marketing & Outreach	Park Manager Historical Center Marketing & Outreach	1
3. Implement the Interpretive Plan	3-5 Years	Park Manager Historical Center Marketing & Outreach	Park Manager Historical Center Marketing & Outreach	1

Stakeholder Comments:

Work with National Park Service to coordinate efforts in the region.

General Action Goals				
Management Focus				**Priority Stickers (Stakeholder)**
1. Develop new Master Plan for relocation of park infrastructure	3-5 Years	Regional Planner Park Manager	Regional Planner Park Manager	**2**
2. Develop Transition Plan for relocation of park infrastructure	3-5 Years	Regional Planner Park Manager	Regional Planner Park Manager	
3. Explore acquisition of property within the General Management Plan Proposed Boundary as opportunities present themselves	Ongoing	Park Manager Stewardship Lands Manager	Lands Manager	**2**
4. Review and update Wildfire Plan and Emergency Plan	Completed with Annual Update	Park Manager Stewardship	Park Manager	
5. Continue to support PRD and local initiatives to explore and develop revenue generating opportunities that are sustainable	Ongoing	Park Manager Historical Center Marketing & Outreach	Park Manager Historical Center	
6. Continue to complete and comply with annual safety inspections and plans	Ongoing	Park Manager	Park Manager	
7. Implement PRD marketing effort at local level and within the park	5 Years	Park Manager Recreation Programmer Historical Center Marketing & Outreach	Park Manager Marketing & Outreach	
8. Review concession contracts	Ongoing Annual Review	Park Manager Contracts and Lease Coordinator	Park Manager	
9. Continue to collaborate with community partners to support the mutual goals of PRD and the local partners	Ongoing	Park Manager Local Partners	Park Manager Local Partners	
10. Continue to support the Keweenaw Water Trail	Ongoing	Park Manager Local Partners	Park Manager Local Partners	**1**
Development				
1. Relocate or maintain park facilities and infrastructure consistent with Master Plan and Transition Plan	5-10 Years	Park Manager Regional Planner	Park Manager	**2**
2. Continue to ensure ADA accessibility for all development opportunities	Ongoing	Park Manager Regional Planner	Park Manager	

High Risk Erosion Zone Over 50% of F.J. McLain State Park's shoreline is designated as a High Risk Erosion Zone. This zone corresponds to the High Risk Erosion Area, as assigned by the Michigan Department of Environmental Quality (DEQ), which are those shorelines of the Great Lakes where active erosion has been occurring at a long-term average rate of one foot or more per year over a minimum of 15 years. While some park infrastructure is currently located within this zone, the intent is to remove the infrastructure over time and allow only very limited development in the future. A permit is required to construct any permanent structure and the only structures permitted in the zone will be designed to minimize shoreline erosion. This zone will generally reflect natural processes, but will allow for active vegetative management techniques focused on protecting the shoreline from erosion.				
Action Goals	**Target Completion Date**	**Program Input From**	**Responsible Program Position**	**Priority Stickers (Stakeholder)**
Natural Resources				
1. Continue to follow shorelands management program regulations as administered by the DEQ for the designated High Risk Erosion Area	Ongoing	MDEQ Park Manager Regional Planner	Park Manager	1
Historic/Cultural Resources				
None identified at this time				
Education/Interpretation Opportunities				
None identified at this time				
Recreation Opportunities				
1. Maintain lake viewing, swimming, beach walking, and like activities consistent with the zone	Ongoing	Park Manager	Park Manager	3
Management Focus				
1. Control access to beach in a way that protects the resource and minimizes further shoreline erosion	Ongoing	Park Manager	Park Manager	
2. Continue to develop and implement management strategies that minimize erosion	Ongoing	Regional Planner Park Manager	Park Manager	
3. Phased relocation of infrastructure and facilities out of the High Risk Erosion Zone consistent with the Master Plan and Transition Plan	10 years	Park Manager Regional Planner PRD Development Unit	Park Manager Regional Planner PRD Development Unit	2
Development				
None proposed at this time				

Backcountry Zone The character of the Backcountry Zone is intended to be natural, with minimal evidence of human impact. Backcountry allows for various low-intensity, non-motorized recreational opportunities such as hiking, cross-country skiing, hunting, and nature observation. Furthermore, the Backcountry Zone allows for slight modifications of the landscape (trail development) to accommodate a use where it is consistent with the protection of the resource. At F.J. McLain State Park, the area south of M-203 is designated as Backcountry Zone.				
Action Goals	**Target Completion Date**	**Program Input From**	**Responsible Program Position**	**Priority Stickers (Stakeholder)**
Natural Resources				
1. Perform threatened and endangered species survey.	1-3 Years	MNFI Stewardship Ecologist	MNFI	
Historic/Cultural Resources				
1. Perform Phase 1 archaeological survey	10 Years	Park Manager Regional Planner Stewardship Office of State Archaeologist	Stewardship	1
Education/Interpretation Opportunities				
None identified at this time				
Recreation Opportunities				
1. Evaluate opportunities for hiking, cross-country skiing, snowshoeing, and/or mountain biking trails	5-10 Years	Park Manager Regional Planner Stewardship	Park Manager	1
Management Focus				
1. Provide management which facilitates low intensity non-motorized recreational opportunities in a natural environment.	Ongoing	Park Manager	Park Manager	1
Development				
1. Improve ADA accessibility compatible with the natural character of the zone	5-10 Years	Park Manager Regional Planner	Park Manager	

Developed Recreation Zone Active recreation with high density of use, conducted in areas not designated for natural resource significance, is characteristic of the Developed Recreation Zone. In this zone, recreation dominates with natural resource attributes enhanced where possible. More than half of the park is designated as Developed Recreation Zone. F.J. McLain State Park's day-use and camping area are located in this zone.				
Action Goals	**Target Completion Date**	**Program Input From**	**Responsible Program Position**	**Priority Stickers (Stakeholders)**
Natural Resources				
None proposed at this time				
Historic/Cultural Resources				
None identified at this time				
Education/Interpretation Opportunities				
1. Determine appropriate location and add interpretive kiosks about local/regional features, geological process, history…etc.	1-3 Years	Stewardship Park Manager	Stewardship	1
Recreation Opportunities				
1. Evaluate opportunity for ORV trail connection to Hancock/Calumet Trail.	5-10 Years	Park Manager Regional Planner District Supervisor Recreational Partners	Park Manager	2
2. Pursue acquisition of Coast Guard property and evaluate the suitability of canal for recreational opportunities	5-10 Years	Regional Planner Land Manager District Supervisor	Land Manager	4
Management Focus				
Maintain and improve facilities and structures consistent with Capital Outlay priorities	Ongoing	Park Manager	Park Manager	
Development				
1. Relocate or maintain park facilities and infrastructure consistent with Master Plan and Transition Plan	5-10 Years	Park Manager Regional Planner	Park Manager	2

Cultural Landscape Overlay Zone The Cultural Landscape Overlay Zone addresses the overall setting in which is found not only historic structures, but all non-structural evidence of the traditions, beliefs, practices, life ways, arts, crafts and social institutions of any community. A Cultural Landscape Overlay Zone has been applied over the entire F.J. McLain State Park in recognition of cultural resources known to be present in this area. Yet while interpretation opportunities within the overlay should be explored, the recommendations of the underlying Developed Recreation Zone and Backcountry Zone are the primary focus.				
Action Goals	**Target Completion Date**	**Program Input From**	**Responsible Program Position**	**Priority Stickers (Stakeholder)**
Education/Interpretation Opportunities				
1. Refer to General Action Goals and the underlying zones				

F.J. McLain State Park

Stakeholder Input Meeting
September 10, 2014
Discussion/Comments/Actions

1. Brainstorming Session
   a. Concern about the number of camping sites and whether there were any proposals to change the current level or inventory because of their importance to the tourism industry. Team members responded that the number of sites would likely remain constant at the park.
   b. Comment that the condition and adaptability of the Coast Guard Station structures should be included in any consideration to acquire from Federal Government. Discussion regarding the historical significance of the buildings, their recent history and deteriorating condition and what role, if any, the DNR would have in acquiring and using the property.

2. Review of Management Zone Map comments
   a. Questions regarding including the private property in the proposed park boundary adjacent to Bear Lake. It was explained that the 2004 NRC Project Boundary included a much larger area. Land to the west and south, and other developed parcels, have been removed from the proposed project boundary, which now includes just two private landowners. It was noted that landowners would be contacted to explain what this boundary means prior to the plans being made public.

Action Item for Planning Team:

Mardy will send L. Valencia of the National Park Service the goals sheet to prioritize and comment.

DNR Public Open House
F.J. McLain State Park

We Want Your Input!!

Your input will inform the Planning Team as they develop appropriate zones and action goals for the park!

The draft plan is available for review online on the project's website at:

http://www.clearzoning.com/clearzoning-clients/mclain-state-park/

Additional information on the DNR's General Management Plan process is available at

http://www.michigan.gov/parkmanagementplans/

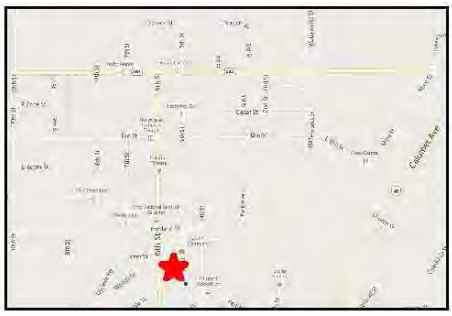
For more information, or to RSVP, please contact Mardy Stirling at mardy@clearzoning.com or 248.423.1776 x 15

DNR Public Open House
Draft General Management Plan
F.J. McLain State Park

The Parks & Recreation Division of the DNR is in the process of developing a Management Plan for F.J. McLain State Park. The Management Plan includes a 20-year management outlook for natural and cultural resources and educational opportunities at the park. In addition, the plan includes a set of 10-year action goals that will guide specific management decisions and enhance the visitor experience, while protecting the natural, cultural and historic resources for the enjoyment of future generations.

Using an open house format, the DNR will share its initial thoughts on the Draft General Management Plan and welcomes your input. **You may drop in at any time during the scheduled open house.**

Wednesday, October 29, 2014
6:00 p.m. to 8:00 p.m.
Keweenaw National Historical Park Headquarters
25970 Red Jacket Road
Calumet, Michigan

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DNR to hold open house Oct. 29 on new General Management Plan for F.J. McLain State Park
Contact: Debbie Jensen, 517-284-6105 or Debbie Munson Badini, 906-226-1352
Agency: Natural Resources
Oct. 17, 2014
The Department of Natural Resources will hold a public open house Wednesday, Oct. 29, to invite public input on a new draft General Management Plan for F.J. McLain State Park. The open house will be held from 6 to 8 p.m. in the training room at the Keweenaw National Historical Park Headquarters, located at 25970 Red Jacket Road, in Calumet, Michigan.
F.J. McLain State Park includes 443 acres and two miles of Lake Superior shoreline, located between Calumet and Hancock in Houghton County. The park's location in the heart of the Copper Country makes it an ideal base for visitors to explore the area's many attractions. Park visitors can enjoy camping, picnicking, windsurfing, beachcombing, sight-seeing, hunting and watching spectacular sunsets.
The General Management Plan for McLain State Park defines a long-range planning and management strategy that will assist the DNR Parks and Recreation Division in meeting its responsibilities to protect and preserve the site's natural and cultural resources, and to provide access to land- and water-based public recreation and educational opportunities. The draft plan is available for review online at www.clearzoning.com/clearzoning-clients/mclain-state-park.
Additional information on the DNR's General Management Plan process is available at www.michigan.gov/parkmanagementplans.
"The management plan for F.J. McLain State Park is in response to the ongoing shoreline erosion and the impact it will have on the park's recreational assets," said DNR park management plan administrator Debbie Jensen. "It will provide a framework for managers as we plan for the future."
The public input meeting will begin with a short presentation of the draft plan, but members of the public are welcome to attend at any time during the two-hour period to review the planning material, provide comments and talk to DNR staff.
For more information about the public input open house or the draft General Management Plan, contact Debbie Jensen at 517-284-6105 (TTY/TDD711 Michigan Relay Center for the hearing impaired) or via email at Jensend1@michigan.gov. Persons with disabilities who need accommodations for the meeting should contact Debbie Jensen at least five business days before the meeting.
The Michigan Department of Natural Resources is committed to the conservation, protection, management, use and enjoyment of the state's natural and cultural resources for current and future generations. For more information, go to www.michigan.gov/dnr.

F.J. McLain State Park

DEPARTMENT OF NATURAL RESOURCES
General Management Planning Process
Public Open House
F.J. McLain State Park

October 29, 2014
6:00 PM – 8:00 PM
Keweenaw National Historical Park Headquarters

1. **Planning Team Introductions at 6:00 p.m.**
2. **Brief Presentation of Management Planning Process and Status at 6:15 p.m.**
   a. Significance Statements
   b. Development of Management Zone Maps
   c. Action Goal Development – Draft 10-year strategies to address the desired future condition of each zone
   d. F.J. McLain State Park Planning Team Draft Action Goals organized by:
      - ❑ High Risk Erosion Zone
      - ❑ Backcountry Zone
      - ❑ Developed Recreation Zone
      - ❑ Cultural Landscape Overlay
      - ❑ General Action Goals
   e. Priority Exercise explained
   f. Action Goals input sheets described
   g. Questions and Answers
3. **Open House at 6:30 p.m.**
   a. You are invited to visit each of the stations and talk to Planning Team members
   b. Sticky notes are available to comment on Management Zone Map
   c. Color dots are available for you to identify your priority actions (please limit yourself to 10 dots)
   d. "Additional Input" sheets are available for you to contribute additional suggested actions goals
4. **Adjournment at 8:00 p.m.**

For More Information:

Project Website: http://www.clearzoning.com/clearzoning-clients/mclain-state-park/

DNR Management Planning Website: www.michigan.gov/parkmanagementplans

Email: JensenD1@michigan.gov, Mardy@clearzoning.com or Dave@clearzoning.com

Phone: 517.284.6105 (Debbie Jensen, DNR-PRD Management Administration) or 248.423.1776 (Clearzoning)

Public Input Open House Attendees	
Name	**Name**
Deb Dlubala	Jonathan Neufeld
Charles Dlubala	
Lorraine Burg	
Dave Pelli	
Linda Pelli	

General Action Goals

Many of the 10-Year Action Goals for F.J. McLain State Park are general in nature and apply within all of the management zones. These often deal with park-wide issues, such as invasive species control, universal access, developing Stewardship, Wildlife and Emergency plans, or marketing the park's many recreational opportunities to a wider audience of potential users. Many of the overall maintenance and operational issues of running a state park also result in the need for actions across all zone boundaries, such as law enforcement.

Action Goals	Target Completion Date	Program Input From	Responsible Program Position	Priority Stickers (Public Open House)
Natural Resources				
1. Develop Stewardship Plan (Natural Resource Plan)	3-5 Years	Park Manager Stewardship	Stewardship Ecologist	
2. Implement Stewardship Plan for the park	Ongoing	Park Manager Stewardship	Park Manager Stewardship	
3. Implement early detection and rapid response to invasive species control	Ongoing	Park Manager Stewardship Fisheries	Park Manager	1
Historic/Cultural Resources				
1. Continue to protect cultural resources	Ongoing	Park Manager Stewardship State Historic Preservation Office Regional Planner	Park Manager Stewardship Office of State Archaeologist	
2. Review all proposed earthwork activities for potential impact on historic/cultural resources	Ongoing	Stewardship State Historic Preservation Office Regional Planner	Cultural Resource Analyst Office of State Archaeologist	1
3. Review all projects involving historic structures, existing or acquired	Ongoing	Stewardship State Historic Preservation Office Regional Planner	Cultural Resource Analyst State Historic Preservation Office	
Recreation Opportunities				
Refer to individual management zones				
Education/Interpretation Opportunities				
1. Develop specific interpretation and education opportunities	Ongoing	Park Manager Stewardship Historical Center Marketing & Outreach	Marketing & Outreach Historical Center	
2. Develop an interpretive plan that utilizes a variety of traditional and new media, including audio and visual technologies, podcasts, and other emerging technologies for interpretation opportunities, in conjunction with regional partners.	2 Years	Park Manager Historical Center Marketing & Outreach Regional Partners	Park Manager Historical Center Marketing & Outreach	
3. Implement the Interpretive Plan	3-5 Years	Park Manager Historical Center Marketing & Outreach	Park Manager Historical Center Marketing & Outreach	

General Action Goals				
Management Focus				**Priority Stickers (Public Open House)**
1. Develop new Master Plan and Transition Plan for relocation of park infrastructure	1-3 Years	Regional Planner Park Manager	Regional Planner Park Manager	2
2. Explore acquisition of property within the General Management Plan Proposed Boundary as opportunities present themselves	Ongoing	Park Manager Stewardship Lands Manager	Lands Manager	
3. Review and update Wildfire Plan and Emergency Plan	Completed with Annual Update	Park Manager Stewardship	Park Manager	
4. Continue to support PRD and local initiatives to explore and develop revenue generating opportunities that are sustainable	Ongoing	Park Manager Historical Center Marketing & Outreach	Park Manager Historical Center	
5. Continue to complete and comply with annual safety inspections and plans	Ongoing	Park Manager	Park Manager	
6. Implement PRD marketing effort at local level and within the park	5 Years	Park Manager Recreation Programmer Historical Center Marketing & Outreach	Park Manager Marketing & Outreach	
7. Review concession contracts	Ongoing Annual Review	Park Manager Contracts and Lease Coordinator	Park Manager	
8. Continue to collaborate with community partners to support the mutual goals of PRD and the local partners	Ongoing	Park Manager Local Partners	Park Manager Local Partners	
9. Continue to support the Keweenaw Water Trail	Ongoing	Park Manager Local Partners	Park Manager Local Partners	
10. Continue to plan and support connections to non-motorized trail systems throughout the region by engaging with our local recreation partners.	Ongoing	Park Manager Regional Planner Local Partners	Park Manager	
Development				
1. Relocate or maintain park facilities and infrastructure consistent with Master Plan and Transition Plan	5-10 Years	Park Manager Regional Planner	Park Manager	
1. Strive to achieve universal accessiblity compatible with the character of the zone	Ongoing	Park Manager Regional Planner	Park Manager	

High Risk Erosion Zone

Over 50% of F.J. McLain State Park's shoreline is designated as a High Risk Erosion Zone. This zone corresponds to the High Risk Erosion Area, as assigned by the Michigan Department of Environmental Quality (DEQ), which are those shorelines of the Great Lakes where active erosion has been occurring at a long-term average rate of one foot or more per year over a minimum of 15 years. While some park infrastructure is currently located within this zone, the intent is to remove the infrastructure over time and allow only very limited development in the future. A permit is required to construct any permanent structure and the only structures permitted in the zone will be designed to minimize shoreline erosion. This zone will generally reflect natural processes, but will allow for active vegetative management techniques focused on protecting the shoreline from erosion.

Action Goals	Target Completion Date	Program Input From	Responsible Program Position	Priority Stickers (Public Open House)
Natural Resources				
1. Continue to follow shorelands management program regulations as administered by the DEQ for the designated High Risk Erosion Area	Ongoing	MDEQ Park Manager Regional Planner	Park Manager	2
Recreation Opportunities				
1. Maintain lake viewing, swimming, beach walking, and like activities consistent with the zone	Ongoing	Park Manager	Park Manager	6
Management Focus				
1. Control access to beach in a way that protects the resource and minimizes further shoreline erosion	Ongoing	Park Manager	Park Manager	4
2. Continue to develop and implement management strategies that minimize erosion	Ongoing	Regional Planner Park Manager	Park Manager	2
3. Phased relocation of infrastructure and facilities out of the High Risk Erosion Zone consistent with the Master Plan and Transition Plan	Ongoing	Park Manager Regional Planner PRD Development Unit	Park Manager Regional Planner PRD Development Unit	3

Backcountry Zone

The character of the Backcountry Zone is intended to be natural, with minimal evidence of human impact. Backcountry allows for various low-intensity, non-motorized recreational opportunities such as hiking, cross-country skiing, hunting, and nature observation. Furthermore, the Backcountry Zone allows for slight modifications of the landscape (trail development) to accommodate a use where it is consistent with the protection of the resource. At F.J. McLain State Park, the area south of M-203 is designated as Backcountry Zone.

Action Goals	Target Completion Date	Program Input From	Responsible Program Position	Priority Stickers (Public Open House)
Natural Resources				
1. Perform threatened and endangered species survey on newly acquired parcels.	Ongoing	MNFI Stewardship Ecologist	MNFI	
Historic/Cultural Resources				
1. Perform Phase 1 archaeological survey	10 Years	Park Manager Regional Planner Stewardship Office of State Archaeologist	Stewardship	
Recreation Opportunities				
1. Evaluate opportunities for hiking, cross-country skiing, snowshoeing, and/or mountain biking trails	5-10 Years	Park Manager Regional Planner Stewardship	Park Manager	4
Management Focus				
1. Provide management which facilitates low intensity non-motorized recreational opportunities in a natural environment.	Ongoing	Park Manager	Park Manager	2
Development				
1. Strive to achieve universal accessiblity compatible with the natural character of the zone	5-10 Years	Park Manager Regional Planner	Park Manager	1

Developed Recreation Zone Active recreation with high density of use, conducted in areas not designated for natural resource significance, is characteristic of the Developed Recreation Zone. In this zone, recreation dominates with natural resource attributes enhanced where possible. More than half of the park is designated as Developed Recreation Zone. F.J. McLain State Park's day-use and camping area are located in this zone.				
Action Goals	**Target Completion Date**	**Program Input From**	**Responsible Program Position**	**Priority Stickers (Public Open House)**
Education/Interpretation Opportunities				
1. Determine appropriate location and add interpretive elements about local/regional features, geological process, history, and the like.	1-3 Years	Stewardship Park Manager Marketing & Outreach	Stewardship	**1**
Recreation Opportunities				
1. Evaluate the need and appropriateness of an ORV trail connection to Hancock/Calumet Trail and support facilities at the park appropriately separated from non-motorized activities. .	5-10 Years	Park Manager Regional Planner District Supervisor Recreational Partners Local Partners	Park Manager	**4**
2. Pursue acquisition of Coast Guard property and evaluate the suitability of canal for recreational opportunities	3-10 Years	Regional Planner Land Manager District Supervisor	Land Manager	
Management Focus				
Maintain and improve facilities and structures consistent with Capital Outlay priorities	Ongoing	Park Manager	Park Manager	**5**
Development				
1. Relocate or maintain park facilities and infrastructure consistent with Master Plan and Transition Plan	3-10 Years	Park Manager Regional Planner	Park Manager	
Developed Recreation Public Open House Comments:				
ORV trail connection to McLain could cause adverse consequences of ORV's and snowmobiles impacting the surrounding areas - ORV's on the adjacent beaches could become a huge problem. Also, ORV's and snowmobiles short cutting through Swedetown trails which are mountain bike trails and ski trails. The park neighbors like our quiet neighborhood - NO ORV trail please!				
Leave the present campground area to use too then there will be more campsite available for everyone.				
Bathrooms - showers - No ORV trail.				
New shower and bathroom facilities ASAP Please!				
Highly prioritize - new bathing facilities please. Need more showers for heavily used campground.				
ORV Trails - not near campsites.				
Non-motorized and mountain bike trail / hiking trail between the bottom of Swedetown trail - M203 trailhead and McLain State Park. No snowmobile or ORV access - please! Non-motorized mountain bike / ski / hiking tail to/from Churning Rapids trails (Christian Road Trailhead) potential for mountain bike loop from Hancock to Calumet.				

Cultural Landscape Overlay Zone The Cultural Landscape Overlay Zone addresses the overall setting in which is found not only historic structures, but all non-structural evidence of the traditions, beliefs, practices, life ways, arts, crafts and social institutions of any community. A Cultural Landscape Overlay Zone has been applied over the entire F.J. McLain State Park in recognition of cultural resources known to be present in this area. Yet while interpretation opportunities within the overlay should be explored, the recommendations of the underlying Developed Recreation Zone and Backcountry Zone are the primary focus.				
Action Goals	**Target Completion Date**	**Program Input From**	**Responsible Program Position**	**Priority Stickers (Public Open House)**
Education/Interpretation Opportunities				
1. Refer to General Action Goals and the underlying zones				

F.J. McLain State Park

Public Comments
Summary of Public Input
Open House, Emails, Website and Park Comment Cards

Public Input Open House Comments, October 29, 2014
Comments on Developed Recreation Action Goals:

- ORV trail connection to McLain could cause adverse consequences of ORV's and snowmobiles impacting the surrounding areas - ORV's on the adjacent beaches could become a huge problem. Also, ORV's and snowmobiles short cutting through Swedetown trails which are mountain bike trails and ski trails. The park neighbors like our quiet neighborhood - NO ORV trail please!
- Leave the present campground area to use too then there will be more campsite available for everyone.
- Bathrooms - showers - No ORV trail.
- New shower and bathroom facilities ASAP Please!
- Highly prioritize - new bathing facilities please. Need more showers for heavily used campground.
- ORV Trails - not near campsites.
- Non-motorized and mountain bike trail / hiking trail between the bottom of Swedetown trail - M203 trailhead and McLain State Park. No snowmobile or ORV access - please! Non-motorized mountain bike / ski / hiking trail to/from Churning Rapids trails (Christian Road Trailhead) potential for mountain bike loop from Hancock to Calumet.

Public Input Received by Email (to DNR):

Dear Sir or Madam,

Please do not allow a ORV trails at McClain's State Park in Hancock Michigan. Myself and other families visit that area to enjoy nature, the beauty of Lake Superior and the peaceful atmosphere. If you allow ORV trails that will destroy such a pristine area and encourage potential routes through the Swedetown trails and shoreline trails. Please I urge you to value silent sports and recreations and not to allow ORV trails to wreak havoc on such a pristine place. This is the place where people fall in love with Lake Superior and the surrounding forest, don't take that opportunity away.

Thank you
Denise Landsberg

As someone from the Lansing MI area, I would like to voice my opinion on the plan http://www.clearzoning.com/wp-content/uploads/2014/10/10-15-14-Draft-FJ-McLain-GMP.pdf . The link was forwarded and I am not sure if this is the official way to respond. My wife and I have camped several times at McLain State Park over the past summers and really enjoy the peaceful nature of the park. We would hate to see the natural setting ruined by the noise of ORV's allowed in the area. There are many areas in the Keweenaw where ORV's are allowed, we have even rented some at Trailside Lodge and enjoy the ability to do it. Usually we see large

groups of 12 or more ORV's and although the groups are very friendly, they do make noise, cause erosion and very much degrade the peace and quiet of the natural setting that can be presently enjoyed at McLain. Please keep McLain free of ORV's. It is nice to have many areas were ORV's are allowed and equally nice to have many areas that do not. Our primary reason for vacationing in the Keweenaw on an annual basis is the silent non-motorized trails (mountain biking, hiking and cross country skiing) and parks that we predominantly visit. We would like the plan to include a "Non-motorized trail" connecting Swedetown ski and bike trails and potentially Churning Rapids trails to McLain Below are pasted a couple of my saved camping receipts at McLain.

Regards

Mike and Patty Toth

Deborah,

I took some time to review the McLain Draft GMP (http://www.clearzoning.com/wp-content/uploads/2014/10/10-15-14-Draft-FJ-McLain-GMP.pdf) . Please see my comments below:

1. Good overall plan - Glad to see there is concern about the erosion and the need to remedy the situation

2. I agree with the goal to "Ensure campground continues to have lakeview (Superior) campsites" The Lake Superior lakefront sites, along with the peaceful, beautiful setting is what makes McLain a great State Park.

3. I strongly disagree with the idea of adding ORV trails and facilities to the park. There are several reasons ORVs are not compatible:

a. The park is, according to the respondents in the Wordle graphic, "relaxing", "peaceful", "clean", "scenic" and "quiet". Existance of ORVs will destroy each of these. ORVs are incompatible with the very essence of F.J. McLain state park.
b. The erosion issue of the beach and land will be accelerated with the introduction of ORVs. No amount of policing and signage will keep the ORVs off the beach (please consider the neighboring beaches also). Also, much of the park land is sand, covered with a thin layer of topsoil. ORVs will quickly cause extensive damage to any trails within the park.
c. The region (0-4 miles) around McLain State park is quiet, rural neighborhood. Many, many homeowners chose this corner of the Keweenaw to live/build homes due to the peaceful setting. Introduction of a ORV trailhead will not be consistent with being a good neighbor to current residence of Hancock and Calumet township.
d. Calumet Township is interested in developing a ORV trailhead on or near the existing Hancock-Calumet ORV trail. This makes more sense than adding a new trail head miles away from the existing trial and using public roads or public parks (Swedetown Rec area) to get to the existing Hancock-Calumet ORV trail.
e. Swedetown Recreational Area already struggles to maintain it's trail system due to the damage done by ORVs. Introduction of more ORVs traveling through the recreational area will only exasperate the problem. These trails are used extensively by non-motorized users, including hikers, runners, mountain bikers, and skiers. The Swedetown Trails club, based on these trail system, has over 400 annual members using the trails for non-motorized uses. Many more day users and visitors use the trail system. The trails are home to several annual on-motorized events (200-500 participants).

Thank you for your time and please reconsider your recommendation to add a ORV trailhead anywhere near the F.J. McLain State park.

Sincerely,

Craig Hughes

Please do not open a ORV trail head at McClain State Park. The potential for damage to nearby silent sport locations, which many people have spent decades developing, is just too great. We no longer live in the area but we come to McClain several times a year to enjoy the peace and beauty of the park. Having ORVs with ready access would probably make us rethink McClain as a vacation site.

Grace and Francis Strong

Dear Sir or Madam;

Regarding ORV Trail connection from Calumet to McLain Park:

I just wanted to express my concerns regarding the ORV Trail connection, particularly if routed through the Swedetown Recreation Area.

My involvement in this area is thus:

1. Major Sponsorship by my business of the Swedetown Trails Club's events: Great Bear Chase and Great Deer Chase. Both are used to raise funds to groom and maintain the trails system (we receive no funds from the Township or State to do so)

2. I have personally volunteered over 100 hours per season to help build and maintain the system of mountain bike trails in the area since 1999.

3. In addition to sponsorship I have donated monies for equipment, tools and supplies for the aforementioned maintenance.

4. Use of my personal tools and equipment to maintain and build trails in the system.

Currently I have been designated the project manager to open and maintain the sustainable ski trails for summer use (hikers, bikers and runners who prefer something more moderate and open to the singletrack trails). This has been an uphill battle from the get go as there is much damage over the years to repair and remediate from ORV use (mudbogging). In fact we have been denied grant monies to repair these trails for the fact that we cannot close this area completely to ORV use.

To allow consistent use of the main road as a connector from the ATV trail in Calumet to McLain Park would adversely affect the Swedetown Trails system in the following ways:

1. Make the maintenance of this system virtually impossible with the limited time and resources available to the trails club.

2. Increased erosion, particularly on the western end (near the M-203 trailhead) where the soil is considerably sandy.

3. Increased chance of collision with single-track tail users These trails cross the main road many times. Having an increased amount of ORVs running through the area would carry an increased chance of a collision and subsequent injury(ies).

4. Mud holes, ruts and other effects of erosion would become more frequent and the trails less smooth and attractive to hikers, runners, bikers and the like. It even gets bad enough where someone who wants to fish on McGunns creek but only has a small car, cannot access the area because the road is in such bad shape.

My wife and I used to ride our mountain bikes on the snowmobile trails in the late 90s and early 2000s. Back then the surface was well packed and mudholes were periodic at best. Since the proliferation of ATVs the trails have become rough, with soft treads and many dips and mudholes. As a result she has stopped riding these trails altogether. Currently my wife cannot enjoy her bike on the two track roads at Swedetown as the ORV traffic has done much the same there.

I would only support such a thoroughfare for ORVs through the system if the following criteria were met.

1. The main road/trail would be sufficiently armored, outsloped and graveled to properly manage the development of mudholes and other affects of erosion.

2. An enforceable speed limit of 15 mph or less for ORVs passing through the system.

3. ORVs would be limited to the main road only, except those deemed by the Swedetown Trails Club as sustainable for ORV access.

4. A maintenance stipend would be available to pay for periodic grading, compacting and the resupply of gravel surface material.

Thanks for considering this. If you have further questions you may contact me.

Marc Norton

Hi there - I am writing about the proposed management plan at McClain state park. This is a beautiful park, and we use it all the time with our children. I really hope that it does not become an ORV accessible park, that would destroy the quiet, the safety for walkers and hikers and kids, and the park. I would love to see more non-motorized trails for bikes and walking and hiking, but I think its important to keep the trails (and of course the beach) and the park free from ORV's if you want to maintain the usefulness of this park for families and bikers and hikers. If you have any questions, please feel free to contact me.
Yours truly, Susanna

Good Morning!

My name is Dan Dalquist. I am a long-time Houghton Co resident, bicyclist (both mtn bike and road bike) and periodic user of McLain Park.

The park development plan includes a comment about adapting to ORV use including connecting to the DNR Multiuse trail from Hancock to Calumet.

I am concerned about any attempt to permit ORV to travel on county roads up to the Swedetown Recreation area and transit thru Swedetown to connect to the DNR Trail that parallels Swedetown road. This trail system is heavily used by runners/walkers and mtn bikers. The Swedetown Trails club spends money and a ton of volunteer time to repair and improve current trails as well as building new trails for the cycling community. I am concerned about permitting any additional use of the trails by ORV users.

Very simply, the ORV and mtn bikes/runners/walkers should be using separate trails. Speed, dust and noise are hazards the human powered sports folks do not want to experience. I am also concerned about the impact on the trails, ability of the DNR or orv folks to contribute time and money to repair/maintain trails.

My experience is with the DNR trail that crosses the Swedetown Access road along Osceola Rd. ORV traffic has worn the surface to the point it is very soft and dusty. Most mtn bikers do not ride that section as it is very soft. Second, some (not all) ORV users drive fast and do not share the trail. They accelerate, steer from side-to-side

and do whatever they can to discourage any other use. I see this as I ride from Hancock to Calumet frequently. Once the trail intersects the pavement on Woodside road, I ride on the pavement into Calumet.

Perhaps a solution is to build a trailhead with parking for ORV Trailers near the trail in Calumet. Encourage ORV users to trailer their machines to that point and then ride. That eliminates ORV on the side roads/county roads (a dangerous mix), removes the noise from McLain park , gets the ORV folks closer to fuel sources and parts suppliers and retains the quiet that McLain is known for.

Dan Dalquist

As a outdoor enthusiast, I value the silent sports as these areas are becoming few and far between any more. I would like to voice my concerns about the proposed ORV trail head at McLain with potential routes to the Hancock/Calumet ORV-Snowmobile trail through Swedetown and along local county and township roads. I am concerned that the increased traffic, even if the designated ORV route is on county and township roads, will cause more more ORV ruts and mudding at Swedetown, as it is the shortest way to Calumet from McLain. Also the ORV's will undoubtedly be on the beach and the neighboring beaches, which are high erosion areas.

I hope in our effort to accommodate the ORVs, the state does not ruin the peaceful beauty of this special area. Watching a beautiful the sunset on the beach, camping and ORVs do not seem compatible at this site.

Thank you for your consideration,
Sandy Sullivan

Dear Ms. Jensen:

Your planning group is to be commended for putting a thoughtful plan together for McLain State Park. The purpose of this note is to make one suggestion and that is to not develop motorized trails.

McLain is a small park in terms of acreage and prone to erosion. It is beautiful even during the winter and one public place where one can easily walk to the beach and explore ice formations along the shore. It is heavily used by many local people from Houghton and Keweenaw Counties as well as visitors year round. It is also for local school/UP cross country track meets. McLain is beautiful and rustic and I would encourage you to keep it non-motorized. One noisy motor can wreck the visitor experience for hundreds of people, not to mention the destruction of habitats and soil and spread of invasive species that typically follow motorized trails.

Thank you for your consideration,

Gina M. Nicholas

Here are the points which make it a huge NO to us:

The ORVs will take away from the peaceful, quiet, tranquil, natural atmosphere of the park and surrounding area.

The ORVs will not just travel on the designated route, they will be on McLain beach and property, surrounding beaches, also on the properties of as many privately owned properties along the route.

The increased ORV traffic on the roads will make them dangerous to drive as they will travel various routes not just the designated route.

If the trail goes through Swedetown the increased traffic will cause us to spend more money on mitigating damage to the trails that will occur. It will also cause a significant safety hazard for the mountain bikers.

Hello,

I am in support of the proposed ORV trail head. I believe the Keweenaw needs every tourism opportunity available.

You will probably see a sudden flood of negative opinions about this proposal. Most of these are probably coming from the silent sports community in the area.

The Keweenaw already has one of the best mountain bike trail systems in the United States. Unfortunately, outside of a few races every year, these trails do not bring much money into the local economy. These trails are mainly used by locals.

Contrast this with motor sports such as snowmobiling and atv riding which have traditionally been a tourist life blood of the UP and will continue to do so in the future.

Just my two cents

Dan

I'm writing today to voice concern over the proposed ORV plan. More specifically, the potential disturbance between loud and quiet activities. As far as the Park itself goes, keeping the ORV"s at the far south end -- and not allowing them into the rest of the park might work. Also, allowing them access to the county roads may also work. I am VERY MUCH AGAINST having a route through the Swedetown Recreation Area. There are presently 24.5 miles of hand-built mountain bike trails there. Mountain bikers do not want motorized vehicles in that area. While there is some vehicle traffic there now, it is minimal. Increased traffic would be detrimental to the mountain biking experience as well as more dangerous-- the mountain bike trails frequently cross the "2-track" trails and many bikers ride on the 2-track itself.

The Swedetown Trails Club is currently working to repair the 2-track which is damaged by vehicle traffic every year to better the mountain biking experience. Introducing more vehicle traffic will do nothing but degrade that experience. Please do not hurt what so many people have worked hard to establish.

Sincerely,
Rick Oikarinen

I am Janet Anuta Dalquist. I have been using McLain Park since 1956 and continue to use it almost weekly year round for hiking, bicycling, and XC sking.

Your plan states concern of "protection and interpretation of natural resources" which I am happy to see. Emphasis on quiet and peaceful surroundings is important for campers. It is important also for the public who have chosen to live in the quiet, wooded areas near the park. Your plan concentrates on trail development for ORVs which do not allow that. Any trail development should be for non-motorized use.

The McLain plan lists popular activities of the park. None suggest ORV use. In fact, you state "the majority of respondents feel that ORV campsites, ORV trail connections (designated trailheads) and an organizational campground are not needed." One of the words describing the park is listed as "Peaceful." So why has your plan concentrated on trail development for ORVs?

Bicycling is fast becoming a major tourist activity in this area, both on road and off road. There is MUCH bicycle traffic on all the areas near McLain Park--not just M-203. And winter biking is becoming popular. It would seem most logical to develop non-motorized trail connections.

Due to erosion future park camping sites will need to be considered. Erosion of the shoreline is likely to force eventual moving of the cabin area. A wet gulley area is behind the cabins between them and the new access road. Where will the cabins be moved when the erosion gets so close that it becomes dangerous for their use? The most logical area of expansion of campsites and cabin use is the west end of the park and the COAST GUARD AREA.

I have reviewed the proposed plan for McLain State Park and am opposed to those aspects of it that involve ORVs. Extending already existing trails so that they link up is a great idea, but the trails should be available only to non-motorized vehicles. Noise pollution and damage to trails are a serious concern and could reduce the quality of our wonderful park and its environs. I live on Lily Creek Rd. about a mile from the Lily Pond Public Access.

Thanks you for your consideration.

Sincerely,

Elizabeth Flynn

Dear Ms. Jensen,

I am writing about the proposed management plan for McLain State Park. First, I am primarily a silent sports person who only infrequently uses jet skis, snowmobiles and ATVs. I am not opposed to their use, but there are several key considerations in any motorized recreational development and some that are particular to ATVs that I believe should be considered in the development of ORV plans at McLain State Park.

1. General safety. Most motorized recreation is done with equipment that is NOT designed for areas where other, larger transportation is present. Most ATV fatalities occur on road accidents according to the Consumer Public Safety Commission. ATVs are smaller and with less protection than the cars and trucks also involved in accidents. Any connection from McLain to current ORV systems would include at least some road travel.

2. Specific safety. ATVs are designed to skid around corners and the firmer the road the more likely the ATV will tip (see On-Road Operation of ATVs, 2009, but the Wisconsin Department of Transportation). Asphalt is worse than gravel, but a road-quality gravel surface is still much more of a problem than the typical ATV trail. Again, an ORV location at McLain would not be linked to a system and this would be a safety problem.

3. Numerous studies show that ORV use is not compatible with many recreational areas. Higher speeds and noise disrupt hiking, cycling, and quiet family recreational activities. McLain is not large enough to handle both types of recreation.

4. The final problem I would identify is the uncontrolled use of motorized recreation. It is unfortunate, but a small portion of the motorized recreation population is disruptive. This includes snowmobiling on posted ski trails and ORVs and off-road cycles on posted hiking and biking trails. Both of these cause damage (at least in skiing it only takes a regrooming). High speed, off-limits use can be disruptive on a narrow beach or through a picnic area. Illegal use of private property is too common. Given that McLain would have no reasonable connected trail system one can reasonably predict that these problems will occur. The counter-argument is that most ORV users should not be “punished” for the actions of a few. I would agree with this except that the alternative is that many non-motorized people will be punished by the few who disregard the proper use of ORVs.

It seems strange that the ORV proposal would be considered, given the safety concerns involved. I would imagine a private organization would be considering the liability in a case like this. If there really is enough demand for increased ATV recreational areas I believe DNR would be better off improving and expanding other areas, such as the Baraga Plains, where there is more space for compatible development. The Upper Peninsula is a big place and there is room for everybody, but this particular ORV proposal is located in the wrong place.

Sincerely,

Blair Orr

Public Input Received on the Project Website:

Adam Hammerstrom says:
Would like to be notified when public comment and input is available for McLain Park

Lillian Hall says:
The shower building needs to be replaced with a modern one. We love the campground where it is with the view of Lake Superior and wish that you would not even consider moving it.

Carl Walby says:
State parks in the UP are the best

Pam Christensen says:
Thank you for your attempts to improve McLain State Park. It is our favorite park, and its popularity has grown. I would like to see the good things preserved and improvements made that do not damage the shoreline, lake and bluff.

David and Cindy Bradley says:
Additional paved sites would also be nice. Extend camping towards the canal.

Mike Walimaki says:
This is a beautiful park with views from most campsites that cannot be matched by any other park in the Upper Peninsula. Providing access to the beach from the campsites needs to be engineered so as to reduce erosion caused by people using the sand cliffs to jump or climb down. I know there other environmental reasons for the erosion, but this is one factor which can be mitigated. Denying access to the beach would destroy a top reason for camping here. The campground restrooms are in great need of upgrading similar to the modern ones in a lot of other parks. This can, and should, be a jewel in the park system which should be promoted statewide. With upgrades this park can be that.

Doug Welker says:
My PhD in Geology is not required to understand that the major problem with shoreline erosion at McLain is that sand is not being carried to the McLain shoreline because the breakwalls to the west trap sand that is being carried toward McLain by prevailing longshore currents. As long as the breakwall is there, we are going to need lots of taxpayer dollars to fix a problem that was caused by human activity. We must not blame natural factors for this problem. No one-time remedy will fix this problem because if sand is being blocked from reaching the McLain shoreline whatever sand washes in or is placed there by us will get washed out into deeper water by wave action faster than new sand will be arriving. The DNR needs to point out that if the current shoreline and any existing beach is to be maintained it will require perpetual “bandaiding” of the problem, at considerable expense.

McLain State Park Comment Card Remarks
Through September 2014

- The new showers are awesome!
- We need a big play structure in the main area entrance of the park like Copper Harbor.
- More bathroom showers further down in the campground. Have to wait too long for shower and walk too far from the end of campground.
- Very nice! I'm disabled and use a power chair scooter and you have done a nice job making things accessible. Very clean!
- Cool Park!
- Company here from St. Paul, Minnesota. This is a lovely park. Great showers and friendly people. We would stay here again! Thanks for being here.
- I like the way the park has modified the showers to accommodate a wider, compliant handicapped stall. Two suggestions;
  1, add more hooks low enough for a handicapped people to reach; and 2, find a way for a handicapped person to reach the shower head handle when it is resting in the high holder, out of reach for a chair-bound person. On the other stalls, add more hooks, some lower for children, and just more for pairs of users, etc. (Big service for small bucks!)
- Climbing and jumping in dunes. I know jumping kids are only one cause of cliff loss but the park might consider more directly addressing parents to keep their kids off the cliffs. They are a huge temptation to kids who don't understand the negative effect. Talk to parents at check-in, perhaps.
- Keep up the good work!
  - Hand sanitizers in the outhouses.
  - Trash receptacles in outhouses so there is a place to dispose stuff that is requested not to throw in toilet.
  - More showers.
  - Nice park otherwise.
  - Nice and informative camp host.
- Add distance information onto maps. More space between sites with privacy bushes/trees.
- A cooking grate on fire pit. Level area for tent placement.
- Put some resources into this Michigan Treasure (i.e., don't hesitate to "spend money to make money.")
- Preserve the mini-cabins as they are.
- If possible, pave the new road when the old road in front of cabins is eliminated.
- Camp Store seems to be benefitting from increased signage. WiFi would sure make it popular.
- Nice new vault toilets at SE side of campground. Women prefer gender-designated separation.

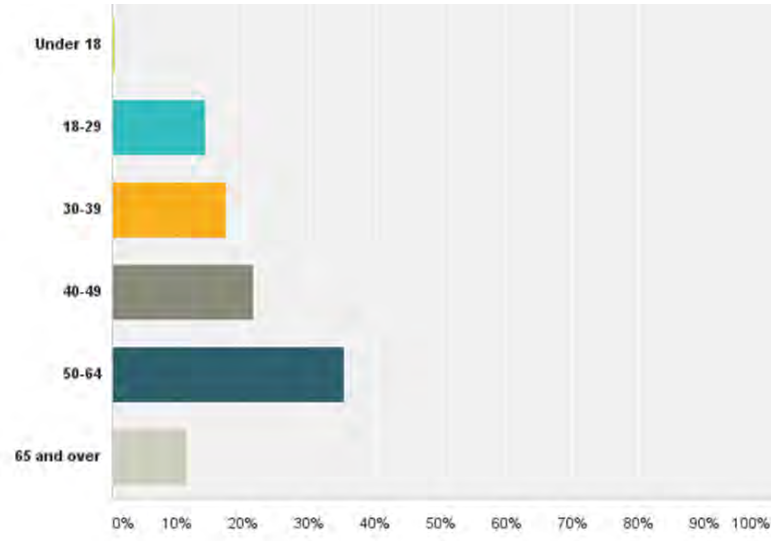
- Maintenance of vault toilets in mini-cabin area is excellent!
- Sand bank erosion: Hand a small slip to every camper who registers explaining the erosion and rules. Ex: "Campers who receive two warnings about jumping off the cliffs will be asked to leave." More brush piles in jumping areas. Perhaps one more staircase.
- We notice many from Wisconsin (including ourselves) and from Minnesota, who are driving past their own state parks to spend their money in Michigan.
- The long view says: Keep supporting Michigan's natural areas!

F.J. McLain State Park

Public Input Survey Results

Q1: What is your age?

Answered: 420 Skipped: 2

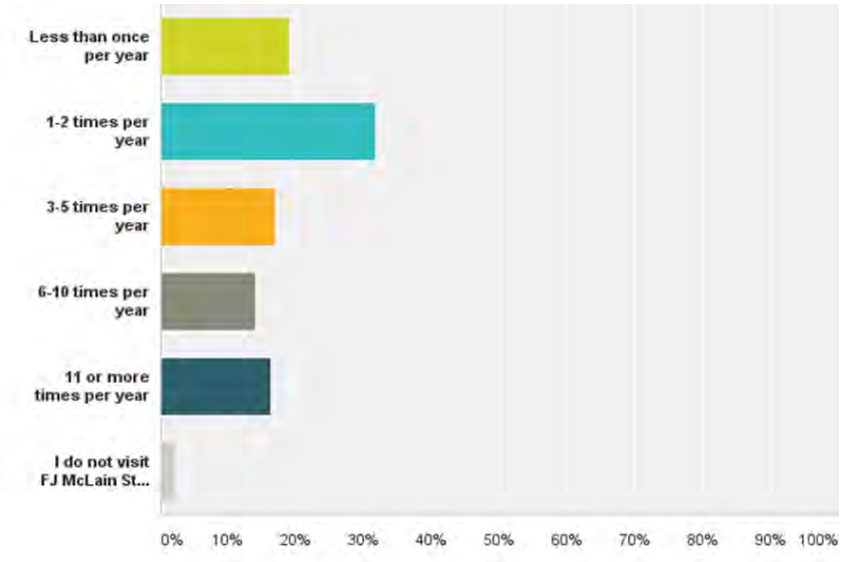


Q2: What is the zip code of your primary address?

Answered: 378 Skipped: 2

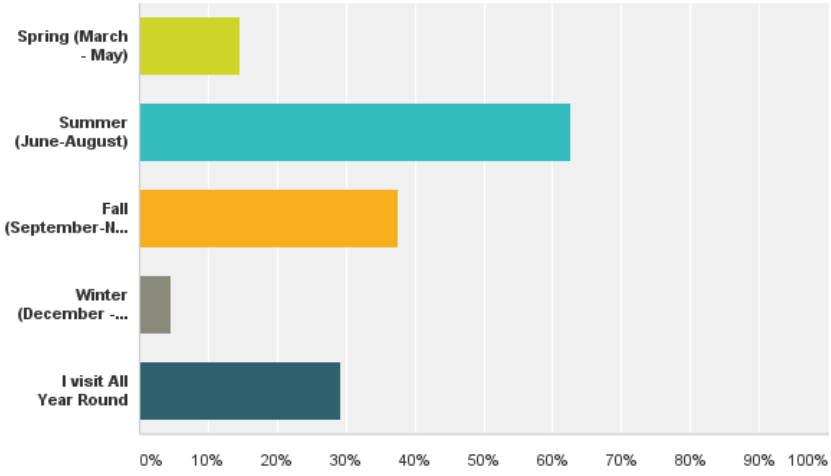
Q3: How many times per year do you visit F.J. McLain State Park?

Answered: 420 Skipped: 2

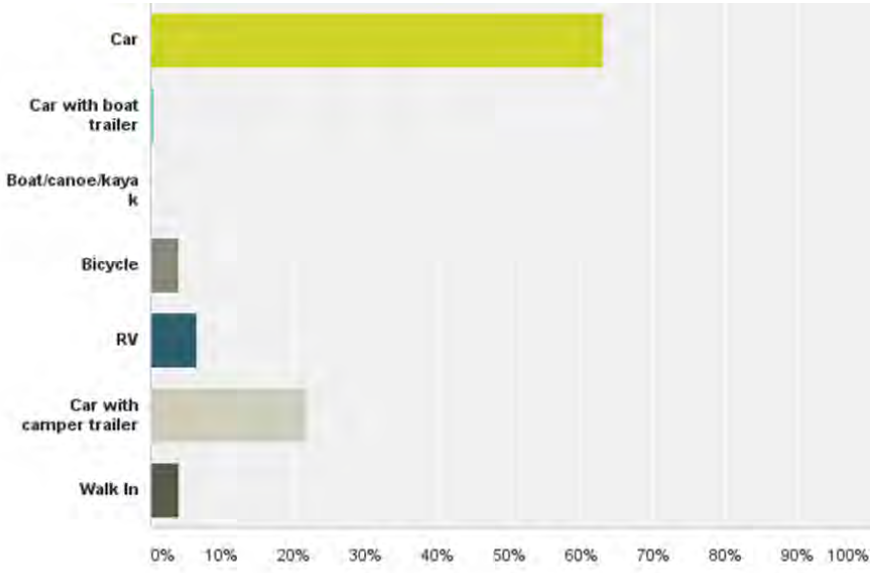


Q5: During what season do you visit F.J. McLain State Park?

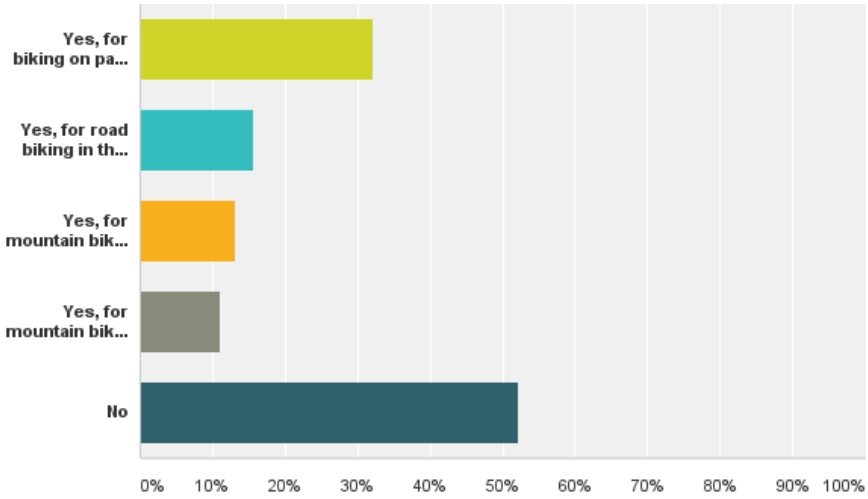
Answered: 405 Skipped: 17



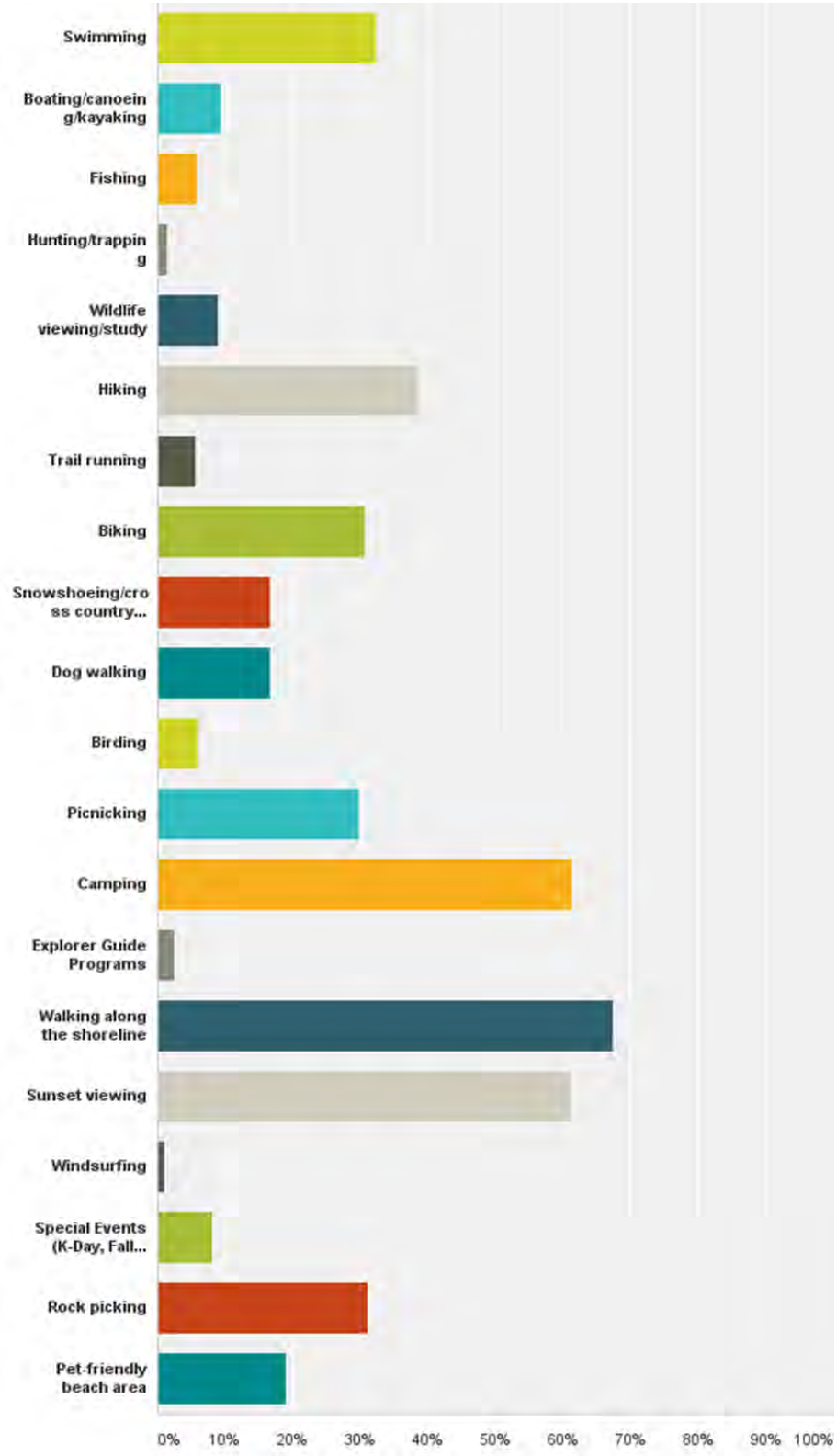
Q5: How do you typically access the park?
Answered: 400 Skipped: 22



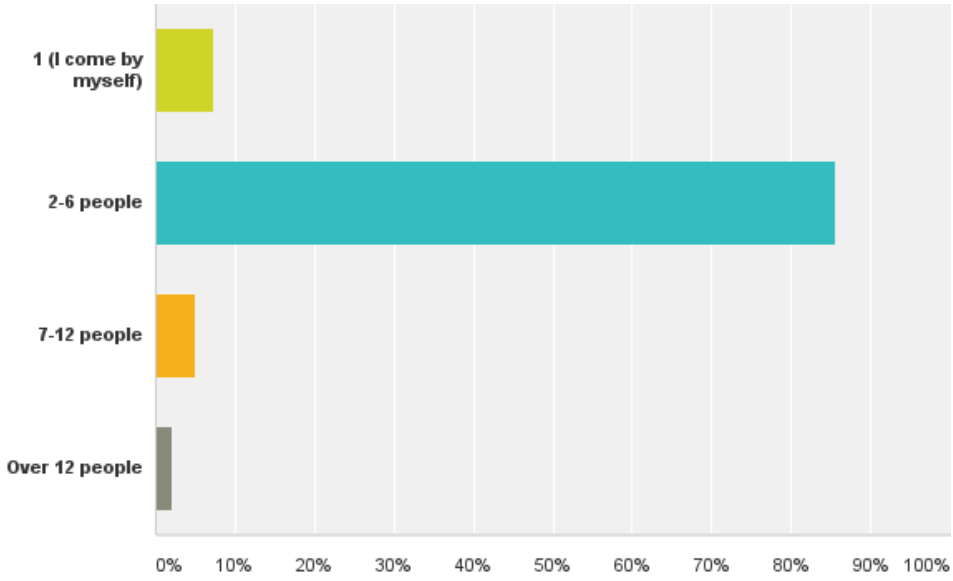
Q8: Do you typically bring a bike to the park when you visit?
Answered: 385 Skipped: 37



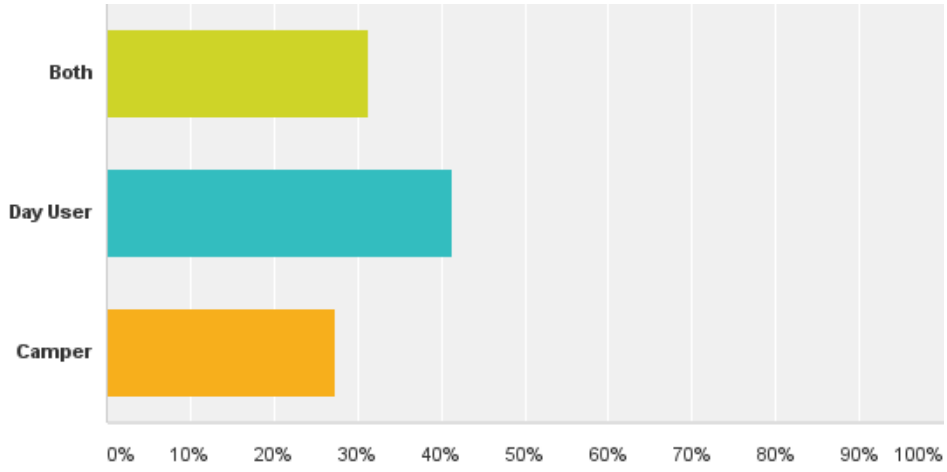
Q7: What are your five favorite activities within F.J. McLain State Park? Please check only 5 choices. Answered: 393 Skipped: 29



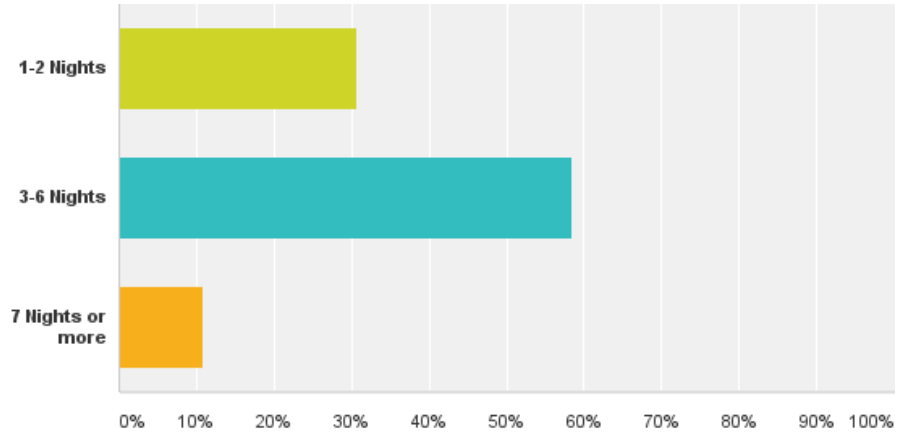
Q9: When you visit the park, what is the typical size of your group?
Answered: 393 Skipped: 29



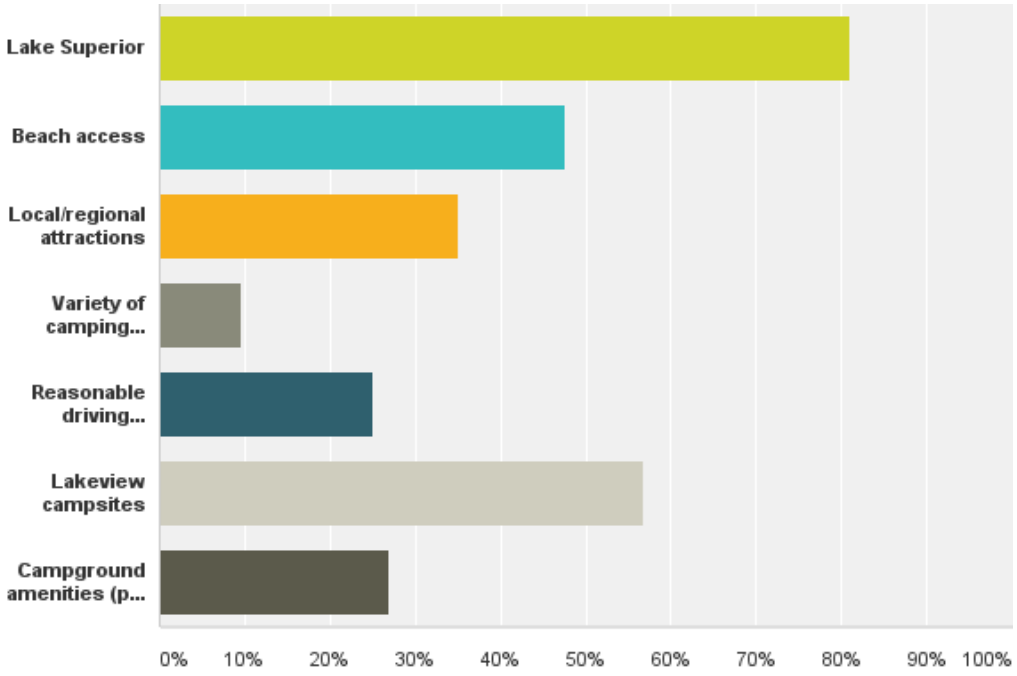
Q10: Do you typically visit the park as a day user or overnight camper?
Answered: 394 Skipped: 28



Q11: As a Camper, what is your typical length of your stay?
Answered: 231 Skipped: 191

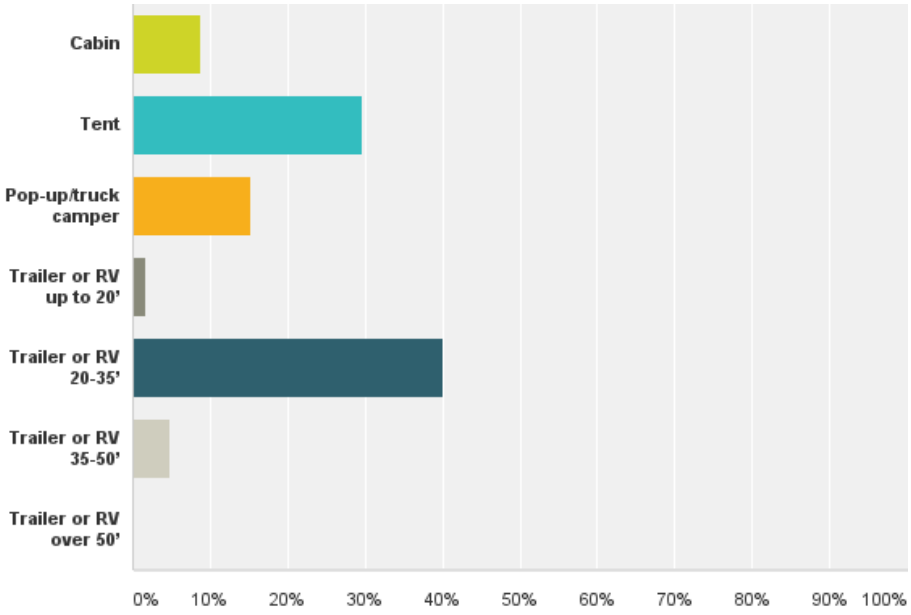


Q12: Why do you choose to camp at F.J. McLain State Park?
Answered: 231 Skipped: 191



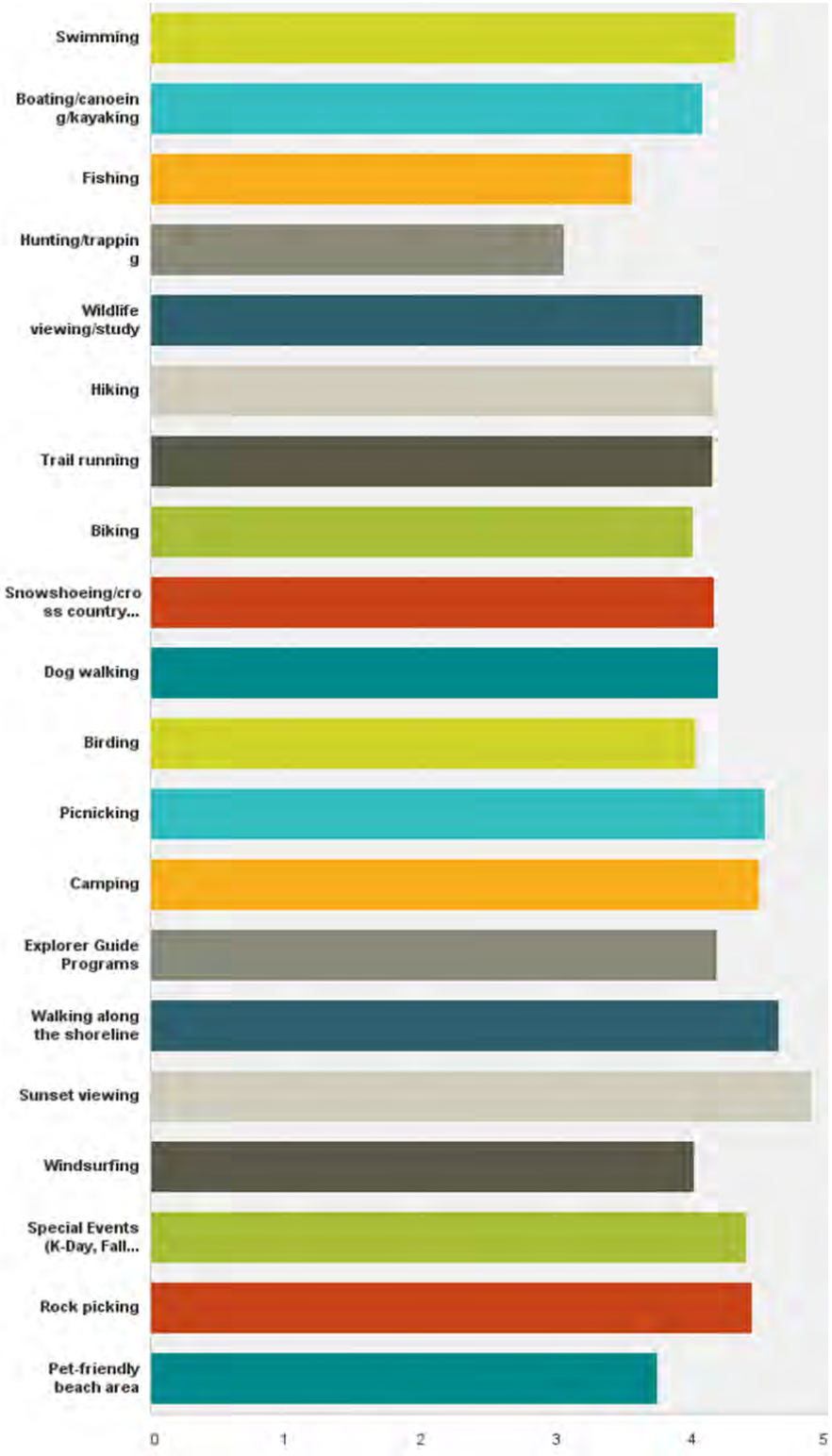
Q13: As a camper, what are your primary accommodations?

Answered: 230 Skipped: 192



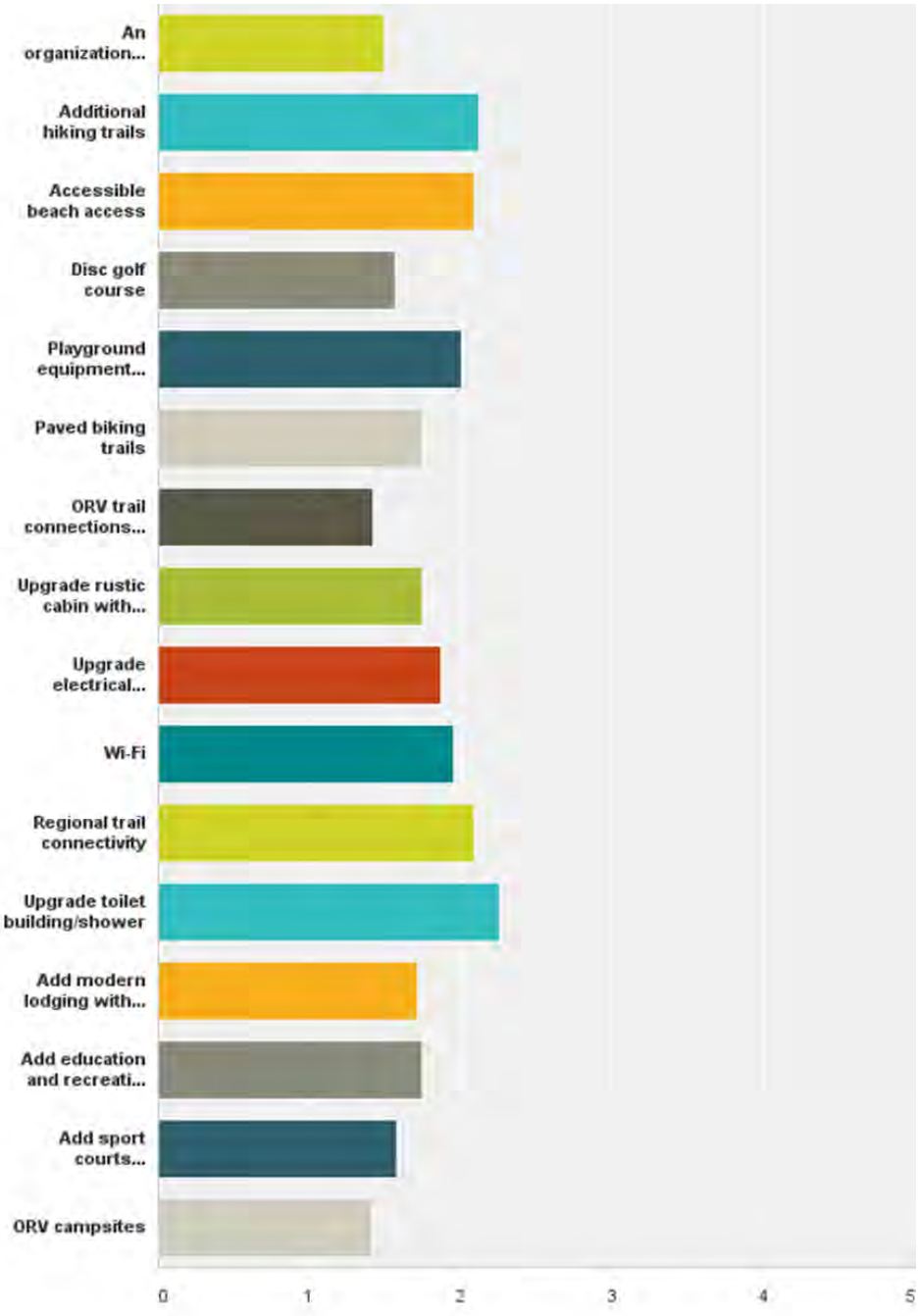
Q14: How would you rate the following facilities and recreational opportunities at F.J. McLain State Park?

Answered: 369 Skipped: 53



Q15: What, if any, additional opportunities or enhancements would you like to see at F.J. McLain State Park?

Answered: 370 Skipped: 52



Appendix C – Planning Team Meeting Summary

Over the duration of the General Management Planning process, the Planning Team held four meetings at or near F.J. McLain State Park and two virtual meetings. These meetings were critical to the development of the General management Plan and particularly the creation of the 20-Year Management Zones and the 10-Year Action Goals. Additionally, the meetings were an opportunity to review input received from stakeholders and the public.

Overview of Planning Team Meetings

Team Meeting #1 (April 15, 2014) – Located at the Department of Natural Resources, Marquette Field Office, the kick-off meeting was an opportunity for Planning Team members to introduce themselves to one another, review the General Management Plan schedule, discuss the park, review the resource maps, and discuss the issues with shoreline erosion. In addition, the Planning Team reviewed the supporting analysis, discussed possible stakeholders, public survey questions and participated in a significance statements exercise.

Team Meeting #2 (May 21, 2014) – Located at the F.J. McLain State Park Office, Unit Supervisor, Leland VerBerkmoes led the team on a tour of McLain State Park. The Planning Team reviewed the statements of significance, supporting analysis and, stakeholder list. Additionally, the Planning Team began development of the Management Zone Map and 10-Year Action Goals.

Team Meeting #3 (June 25, 2014) – Located at the F.J. McLain State Park Office, the Planning Team reviewed the Management Zones, Statements of Significance, and Draft Action Goals.

Team Meeting #4 (August 14, 2014) – The Planning Team, through a virtual meeting, reviewed the Bluff Erosion and Geophysical Survey Reports. Eric Cadeau, Regional Planner, presented a summary of the information. The Planning Team also revised the Statements of Significance, stakeholder list, and reviewed the Management Zones and Draft Action Goals.

Team Meeting #5 (September 10, 2014) – Immediately following the Stakeholder Input Open House held at the Portage Lake District Library, the Planning Team discussed the input received from the attendees. Additionally, the team discussed the survey results. The Planning Team used the input to inform and revise the 10-Year Action Goals as deemed necessary.

Team Meeting #6 (December 1, 2014) – The Planning Team, through a virtual meeting, discussed the input received at the Public Open House held on October 29, 2014 at the Keweenaw National Historical Park. The Planning Team used the input to inform and revise the 10-Year Action Goals as deemed necessary.

F.J. McLain State Park

Planning Team Meeting #1
F.J. McLain State Park
April 15, 2014
9 a.m. – 3 p.m.
Marquette Field Office

Attendees – Leland VerBerkmoes (Unit Supervisor), Eric Cadeau (Regional Planner), Bill Doan (District Supervisor), Matthew Eberly (Conservation Officer), Sherry MacKinnon (Wildlife Ecologist), Lt. Peter Wright (W. UP Supervisor), Matt Lincoln (PRD Planning Analyst), Debbie Jensen (Management Plan Administrator), Susie Roble (Clearzoning). Dave Birchler and Jill Bahm (Clearzoning) participated via web conference.

1. Welcome and Introductions
2. Debbie Jensen provided an overview of the General Management Planning Process (powerpoint presentation)
    a. Debbie asked if we have the ability to track the number of hits on the project website
3. Dave Birchler reviewed the GMP schedule and work program for the park
    a. This is a CZM-funded project and therefore the General Management Plan must be complete by March 31, 2015
4. Leland VerBerkmoes provide an overview of the park (powerpoint presentation)
    a. Discussion regarding the coast guard station. The Planning Team should determine if acquiring the coast guard station property is still an opportunity? Eric pointed out that in the past, the DNR was reluctant to acquire the property due to hazardous material on the site. There is an old barracks and officer quarters building at the coast station (as well as a pole barn). Matt Eberly suggested keeping the boat house for conservation officer use, but removing the other buildings. The site is currently in the process of an environmental clean-up.
    b. Hunting is allowed on the south side of M-203.
    c. Bear Lake water level is low. There was a dam but it has been breached and there is free flowing water. Bear Lake is not a good location for fishing.
    d. Lily Pond boat landing and pier (which is on Army Corps of Engineers property) is a really good fishing area.
    e. The popularity of the beach area has decreased over the years due to the stamp sand, which can get very hot and is not aesthetically pleasant.
    f. The shoreline is very shallow. Swimmers must walk out 100-150 feet in order to swim.
    g. Popular park activities include camping, biking, sunset and scenic views, wind surfing,
    h. Events at the park include K-Day, fall festival, school picnics, St. John's Day
    i. The cabins are open year-round

j. Attendance peaked from late-1970's to late-1990's with a high of 245,000 annual visitors in 1999.

k. The primary issue at the park is the shoreline erosion. During winter 1982-1983 five feet of shoreline was lost due to the winter storms. A gabion wall was built in 1986 to control erosion. The wall has worked for the most part, but there is continued erosion west of the wall. There are signs located near the erosion areas notifying visitors. The shoreline erosion has resulted in a re-route of the road, which led to the removal of additional campsites.

5. Review of the Resource Maps
    a. Lily Canal should be changed to Portage Canal
    b. The 2004 dedicated boundary west of the canal (including the Township park) should be recommended for removal
    c. The small parcel shown as park land on the west side of the canal should be removed
    d. On the east side of the canal, the proposed boundary should only extend to the road abutting the coast guard station
    e. Show the team's proposed boundary as well as the 2004 boundary on Aerial Map
    f. On the Location Map, zoom out to show City of Hancock and highlight the cities
    g. Recreation Resources Map – the team determined that the Unit Map should be used
    h. Trails Map – refer to the Unit Map (note: all Michigan roads are open for biking, but M-203 is not a designated bike trail)
    i. Recreation Opportunities Map – show the BAS access sites, the Township Park on the west side of the canal. Zoom out to shows the Calumet Waterworks Park and the City of Hancock. Highlight in color the Hancock-Calumet (Jack Stevens) ORV Trail.
6. Shoreline Erosion Discussion – presented by Eric Cadeau
    a. 2001 Erosion Study called for more research
    b. Current efforts focus on understanding where the key erosion occurs
    c. A geological survey is underway; funded by CZ. The task of the survey is to identify bedrock and high/low risk erosion areas. The study will begin between the first and second week of May and will be completed by August 15, 2014.
        i. Consult with state geologist and DEQ (Matt Warner)
        ii. Seismic data to reveal depth of bedrock (structures are more appropriate on areas that are deepest)
        iii. Michigan Tech's geophysics class performed same type of test but on a smaller scale (1/4 mile). They produced a cross-sectional model of what the bedrock looks like.
        iv. The DNR is proposing a grid (multiple lines) for all of McLain State Park (to east and west of M-203). The priority is headland where the bedrock is visible at the surface.
    d. Matt Lincoln commented that he reached out to the Army Corps of Engineers (ACOE) and hopes to identify an opportunity for the ACOE to assist with planning/structural development and/or funding.

7. Review of the Supporting Analysis
    a. Revise the Setting section (and include in the GMP) to show how the park fits into the community
    b. Eric would like to see demographics provided beginning in the 1960s.
    c. Western U.P. Planning and Development has community recreation plans
    d. Reverse order of funding section
    e. Debbie will try to break-down the Funding Source Map by parcel and include dates

8. Stakeholder List – the Planning Team recommended various stakeholders that should be invited to the Stakeholder Input Workshop.

9. Public Input Survey Exercise. The Planning Team discussed what info they would find helpful in developing the General Management Plan.
    a. Are people using the park for wildlife purposes?
    b. How many people do/would bring boats (with trailers)?
    c. Biking-related questions
        i. Do you bring a bike?
        ii. Where do you park?
        iii. Interested in paved or mountain bike trails?
    d. Why do you camp here?
        i. Lake Superior
        ii. Beach access
        iii. Regional attractions (a second question should ask respondent to list specific regional attractions)
    e. Improvements (prioritize future improvements)
        i. Toilet building
        ii. Toilet shower
        iii. Wi-fi
        iv. Upgrade electrical system
        v. Accessible beach access
        vi. Playground equipment upgrade
        vii. Paved vs. mountain biking trails
        viii. ORV trail connections (designate trailhead)
        ix. Additional day-use parking
        x. Dog park
        xi. Disc golf
        xii. Upgrade rustic cabin
    f. Typical type of camping
        i. Tent
        ii. Cabin
        iii. Modern campground
        iv. RV
        v. Rustic
        vi. Semi-Modern
        vii. Modern
        viii. Are you interested in an organizational campground?

10. Significance Statements Exercise – what makes F.J. McLain State Park significant?
    a. Erosion Issue
        i. Change in use of land
        ii. Loss of infrastructure
        iii. Loss of acreage
        iv. High risk erosion areas
        v. Partnership opportunities
        vi. Research opportunities
        vii. Education/interpretation opportunities
        viii. Lake access
    b. Location
        i. Sunsets
        ii. Northern gateway to Keweenaw water system
        iii. Camp on shoreline
        iv. Along the M-route
        v. Attracts U.P. tourists
        vi. Base for Keweenaw exploration
        vii. Proximity to surrounding communities
        viii. Quiet and isolated area of the county
        ix. 2 miles of Lake Superior shoreline
    c. Recreation Opportunities
        i. Beach walks
        ii. Picnicking
        iii. Hunting/trapping (agate hunting)
        iv. Hiking and walking
        v. Biking
        vi. Kayaking
        vii. Wildlife viewing
        viii. Wind surfing
        ix. Lighthouse viewing
        x. Shoreline camping
        xi. Swimming/wading
        xii. Sunset viewing
    d. Scenic
        i. Sandy bluff
        ii. Accessible scenery (roads provide access which isn't true of all parks in the area)
        iii. Named as "Best spot on the lake" for 2013 from Lake Superior Magazine
        iv. Views of the lakeshore
        v. Amenities near lakeshore

11. Meeting Adjourned – Planning Team Meeting #2 scheduled for May 21, 2014; Planning Team Meeting #3 scheduled for June 25, 2014

F.J. McLain State Park

Planning Team Meeting #2
FJ McLain State Park
May 21, 2014 - 9 a.m. – 3 p.m.
FJ McLain State Park Office

Attendees – Leland VerBerkmoes (Unit Supervisor), John Codere (Park Ranger), Eric Cadeau (Regional Planner), Bill Doan (District Supervisor), Matthew Eberly (Conservation Officer), Debbie Jensen (Management Plan Administrator), Jill Bahm (Clearzoning)

1. Welcome and review of Kick-off meeting minutes. A few minor changes were discussed and the minutes will be updated.
2. Park Tour. Lee provided a park tour. Notes of the tour are attached.
3. Finalize Statements of Significance. The team discussed the draft statements of significance and a few changes have been made.
4. Review Supporting Analysis & Stakeholder list. Supporting analysis – DNR staff to refine analysis; Stakeholder list – additional groups/representatives were discussed by the team; Review of the Resource Maps – a few changes were suggested.
5. Management Zone Map Development. The team discussed management needs and priorities in the context of the statements of significance and the park tour. The map will be assembled for discussion at the next meeting.
6. 10-year Action Needs/Wants. The following list was generated by the team and will be discussed and refined at future meetings:
    a. Boat house for conservation officer use at Coast Guard site
    b. Transition campground towards day use area if shown to be better site from erosion perspective
    c. Retain lake view campsites
    d. New office/HQ/Service at old Coast Guard site
    e. Potential for organizational campground and OR campground south of Bear Lake Road
    f. ORV Trail connection
    g. Add/improve non-motorized multi-use trails within park (trail could be groomed in the future for cross-country skiing if desired)
    h. New toilet buildings and new shower buildings
    i. Accessible fishing pier on canal
    j. Day use boat mooring on canal
    k. Accessible canoe/kayak launch (look to see if there are any others in the area and/or if this is a good site)
    l. Accessible lake viewing
    m. Accessible beach access near west break-wall or at west day use area that includes access to water (See Wells SP)
    n. 50 amp service and pull-through sites
    o. Wi-fi service
    p. Accessible campsites
    q. Cabins with water/sewer

r. Modern lodging
s. Interpretive kiosks for local and regional features, geological processes, history, etc.
t. New playground equipment

7. Public Input Survey Review. The team reviewed and refined the draft survey.

Next Meeting: June 25th

F.J. McLain State Park

Planning Team Meeting #3
F.J. McLain State Park
June 25, 2014 - 9 a.m. – 3 p.m.
F.J. McLain State Park Office

Attendees – Leland VerBerkmoes (Unit Supervisor), John Codere (Park Ranger), Eric Cadeau (Regional Planner), Lisa Gamero (Cultural Stewardship Specialist), Bill Doan (District Supervisor), Debbie Jensen (Management Plan Administrator), David Birchler and Sheila Sparks (Clearzoning)

1. Review of Meeting #2 summary
2. Review of Statements of Significance – several revisions were recommended by the Planning Team. The team revised the significance statements pertaining to Shoreline Erosion.
3. Management Zone Review
    a. Extend zones to proposed boundary
    b. Extend cultural overlay
    c. Match shoreline to existing
    d. Need DNR/DEQ detail for the depth of the High Risk Erosion area (by year)
    e. Text needs to note that access to high risk shoreline, within the Developed Recreation Zone, needs to be controlled access to protect the shoreline and limit the speed of erosion
    f. Text needs to reflect the scenic quality of the shoreline and needs to control access to protect that scenic quality.
    g. Visitor Services is incorporated within Developed Recreation Zone (cover this in the text)
    h. Text should cover reasoning for proposed boundaries:
        i. Management west of canal is impractical
        ii. Incorporating Bear Lake is consistent with protecting natural community
        iii. Coast Guard Station would provide connection to Portage Waterway (there is still land owned by USACE around base of breakwall)
4. Draft Action Goals Review
    a. Clearzoning presented sample draft action goals (General and zone-specific)
    b. Additional General Action Goals:
        i. Develop Master Plan for relocation of park infrastructure
        ii. Develop Transition Plan for relocation of park infrastructure
        iii. Continue to support Keweenaw Water Trail
        iv. Relocate or maintain park facilities and infrastructure consistent with Master Plan and Transition Plan

c. High Risk Erosion Zone – Debbie will provide revisions for zone description
    i. Lake viewing, swimming, beach walking, and the bike, consistent with the zone (Recreation Opportunities)
    ii. Control access to beach in a way that protects the resources and minimizes further shoreline erosion (Management Focus)
    iii. Continue to implement management strategies that minimize erosion, such as no-mow zones and the like (Management Focus)
    iv. Building structures designed to minimize shoreline erosion, while balancing the public's access to Lake Superior and the shoreline (Management Focus)
d. Backcountry Zone – the Team recommended revisions to the zone description
    i. Perform Phase 1 archeological survey (History/Cultural Resources)
e. Developed Recreation Zone – revisions were made to the Recreation Opportunities goals, including the addition of a goal regarding pursuing acquisition of Coast Guard Property. Keep the Development action goals as goals that are high on list of desirable improvements that are dependent upon the Master Plan and Transition Plan or acquisition of Coast Guard site. They should go in the GMP as a bulleted list.
f. Cultural Landscape Overlay Zone – if PRD acquires the Coast Guard Station, a maritime interpretation of the life-saving station would be an appropriate action (add to desirable improvements bulleted list)

5. Planning Team Meeting #4 (which is a Go-To-Meeting) was scheduled for July 30th from 9 a.m. – 12 p.m
6. The Stakeholder Input Open House will be on September 10th

F.J. McLain State Park

Planning Team Meeting #4
August 14th, 2014
9:00-12:00 AM
Go-To-Meeting

Attendees: Debbie Jensen (Management Plan Administrator), Eric Cadeau (Regional Planner), Leland VerBerkmoes (Unit Supervisor), Bill Doan (District Supervisor), Lisa Gamero (Cultural Resource Analyst), David Birchler and Mardy Stirling (Clearzoning)

1. Bluff Erosion and Geophysical Survey Reports (Eric Cadeau)
   - A. Bluff Recession Rate Analysis (DEQ)
     - a) Reports used a combination of GPS, known control points and historical aerials (1938-2014). Established 17 control points and measures from the bluff line to shoreline
     - b) Authors recommend we use bluff recession rates for planning because shorelines change with lake levels
     - c) Reports suggest using 60-year rate, with a conservative buffer for planning purposes
     - d) Anticipate the final report on or about September 6, 2014
   - B. Geophysical Survey Report
     - a) Electric resistivity testing and 75' soil borings
     - b) Michigan Tech and Geophysical report both identified a bedrock peak under the point where day use area is located
   - C. Need to add a graphic representation of the recession rates (need DEQ input on how the study will inform their high risk erosion zone line)
   - D. D. Jensen wants Management Zone map to use narrow boundary line, 100 ft. buffer parallel to shore unless we can get a detailed shape file from the DEQ
2. Team Meeting Summary of June 25, 2014

Corrections or additions were noted:

Add Lisa Gamero to the list of attendees

2. Change team to Planning Team

3a. Changed NRC to Proposed Boundary

4.c.iv. Add "while balancing the public's access to Lake Superior and the shoreline"

3. Significance statements revised during meeting
4. Stakeholder Review
   - a) Try to get email addresses
   - b) Send out invitation next week (Portage district Library)

c) Prepare “poster” invite

5. Management Zone Map
    a) Discussed whether proposed boundary should exclude homes and private properties. Discussed whether they should be removed or added to stakeholders
    b) L. VerBerkmoes will email plat book
    c) Requested that the map be similar in style to the Brighton Recreation Area Map (“existing”, “NRC approved” and “Team – recommended”)
6. Action Goals revised during meeting
7. Public Input Survey: M. Stirling reported 289 responses to date. She highlighted the survey results.
8. Discuss Stakeholder Input Open House scheduled for September 10, 2014 from 2:00-4:00 PM and the Planning Team Meeting – Debriefing from 4:00-5:00 PM. D. Jensen will forward information about the room. Requested that the reservation details be handled through her office.

(Revised per 9/10

F.J. McLain State Park

Stakeholder Input Review Meeting #5
Wednesday, September 10, 2014
4:00 PM
Portage Lake District Library

Attendees – Debbie Jensen (Management Plan Administrator), Eric Cadeau (Regional Planner), Leland VerBerkmoes (Park Supervisor), John Codere (Park Ranger), Bill Doan (District Supervisor), Lisa Gamero (Cultural Resource Specialist), Dave Birchler and Mardy Stirling (Clearzoning)

1. Review Draft 10-Year Action Goal Comments and Priority Activity. The Planning Team revised specific goals based on their priority ranking and recommendations/input from stakeholders.

   General Action Goals:

   a. Revised Management Focus #1 and #2 by combining the development of the Master Plan and Transition Plan for relocation of infrastructure into one goal. Modified the target completion date for the revised goal from 3-5 Years to **1-3 Years**.
   b. Incorporate comment that the DNR should work with the National Park Service to coordinate efforts in the region. Revised Education/Interpretation Opportunities #2 by adding "in conjunction with regional partners."

   Developed Recreation Zone:

   a. Revised Recreation Opportunities #1 by adding "and support facilities at the park."
   b. Modified the target completion date under Development #1 to relocate or maintain park facilities and infrastructure from 5-10 Years to **3-10 Years**.

   Cultural Overlay Zone:

   a. Comments were received regarding the cultural significance of the Coast Guard property and how it would interface with the plan and what protection measures would be instituted. There was additional discussion regarding the condition of the buildings and future use in the brainstorming session (Agenda Item #3). A general comment was added under General Action Goals to consider the regional partners.
   b. High Risk Erosion Zone designation – discussion regarding the extent of the zone and the recent analysis completed by the DEQ. E. Cadeau described the information obtained from the DEQ and how it informs the extent of the High Risk Erosion Zone. Discussed the use of a buffer along the shoreline versus trying to replicate one of the study zones. It was determined that D. Jensen and E. Cadeau would review the information and provide Clearzoning with a final determination for displaying/mapping the zone.

2. Review of comments received at Stakeholder Input Meeting
   The Planning Team discussed the following comments which were noted during discussion/ brainstorming session at the Stakeholder's Public Input Open House. There were three general categories: Campsites, Coast Guard Station structures, and private property surrounding Bear Lake.

3. Review of Survey Results
    a. Dave commented that the survey results were provided to the team members by email. The survey will officially close to participants on 9/15/14.
    b. Discussion regarding the various uses within the park and the survey results.

F.J. McLain State Park

Stakeholder Input Review Meeting #6
Monday, December 1, 2014
1:00 PM – 4:00 PM
Go-To-Meeting

Attendees – Debbie Jensen (Management Plan Administrator), Eric Cadeau (Regional Planner), Jamie Metheringham (Park Supervisor), John Codere (Park Ranger), Ray Fahlsing (Stewardship Unit Manager), Matt Lincoln (Planning Assistant), Lisa Gamero (Cultural Resource Specialist), Dave Birchler and Mardy Stirling (Clearzoning)

1. Review of Planning Team meeting #5, Summary of September 10, 2014. The Planning Team had no revisions to the Summary. M. Stirling noted that the team had not reviewed Planning Team meeting #4 Summary and will send that following the meeting with recommended changes submitted by December 3, 2014.
2. Review comments received at the October 29, 2014 Public Input Open House. In addition comments received by email and through the website were reviewed. The Planning Team reviewed the public's prioritization and comments.
    a. D. Jensen commented that she had received several responses from a single user group with interest in the Swedetown trail system. The general sentiment was in opposition to allowing motorized/ORV use on the trail system and the support of maintaining the non-motorized trails.
    b. E. Cadeau commented that many of the comments received in the emails were directed toward existing conditions in the park such as erosion concerns and the natural setting. He noted that, if desired, consideration may be given to separating the non-motorized and motorized trails, e.g. locating the ORV near the Coast Guard Station.
    c. The Planning Team discussed the existing trails and whether the current ORV trails provided enough options or if there was a need to consider additional trails. It was noted that the Twin Lake and Baraga State Parks have snowmobile camps.
    d. R. Fahlsing noted that if an ORV trails/campground connection there are concerns about the tranquility of FJ McLain State Park and the motorized use. Segregating the uses is one option that could be considered but questioned whether there is a demand for the activity.
    e. E. Cadeau noted that the distance to connect to other trails makes it difficult and noted that the County roads can be used by ORVs.
    f.
3. Review of 10-Year Action Goals for General Management Plan (final version). The Planning Team made the following comments and ***revisions*** to the Action Goals:

    <u>General Action</u>

    a. The Planning Team discussed the Action Goals in relationship to the comments received from the public.
    b. Under Management Focus, add the following *Action Item:* ***Continue to plan and support connections to non-motorized trail systems throughout the region by engaging with our local recreation partners*** – *Target Completion:* ***Ongoing*** – *Program Input From:* ***Park***

Manager, Regional Planner, Local Partners – *Responsible Program Position:* ***Park Manager****.*

c. Under Development, revise *Action Item:* ***Strive to achieve universal accessibility compatible with the character of the zone.***

Backcountry Zone

a. Under Natural Resources, revise *Action Item: perform threatened and endangered species survey,* ***on newly acquired parcels*** *– Target Completion:* ***Ongoing*** *(Changed from 1-3 Years).*
b. Under Development, revise *Action Item:* ***Strive to achieve universal accessibility compatible with the natural character of the zone.***

Developed Recreation

a. Under Recreation Opportunities, revise *Action Item:* ***Evaluate the need and appropriateness of an ORV trail connection to Hancock/Calumet Trail and support facilities at the park appropriately separated from non-motorized activities*** *– Program Input From (add):* ***Local Partners.***

4. The Planning Team will provide comments and suggested changes to the Draft General Management Plan to D. Jensen by December, 3, 2014 at 5:00 p.m. Clearzoning will provide all revisions by December 8, 2014.
5. D. Jensen reviewed the next steps to the process.

Appendix D – Summary of Geotechnical Study: Geophysical Survey Report

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GEOPHYSICAL SURVEY REPORT
F.J. MCLAIN STATE PARK
HOUGHTON COUNTY, MICHIGAN

Prepared For:

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
Baraga, Michigan

Prepared By:

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Materials Testing Consultants, INC.

TABLE OF CONTENTS

LIST OF TABLE AND FIGURES

Materials Testing Consultants, INC.

REPORT OF GEOPHYSICAL SURVEY
F.J. MCLAIN STATE PARK

1.0 INTRODUCTION

F.J. McLain State Park is a 418-acre State park with approximately two miles of shoreline along Lake Superior situated in T56N, R34W, Sections 21, 22 and 23 in Houghton County, Michigan. The Park is accessed from M-203 near its midpoint with modern and rustic campsites from the midpoint to the east, and road access from the midpoint to the west to a bathhouse and shelter structure. A toilet building is located in the middle of the park in an area referred to as the headland with a sanitary station also located in this area.

The Park is bordered by the Keweenaw Waterway upper entrance (aka Portage Canal) at its southwest corner and was opened in 1938. The Park shoreline along Lake Superior has experienced high rates of soil erosion to the point where portions of campground infrastructure (roadways, campsites, utility lines) have been undermined or are in jeopardy of being eroded in the near future. Master planning at the Park is challenging due to the uncertainty of future shoreline erosion. The Keweenaw Waterway was constructed in or around 1890 interrupting the alongshore transport of sand from south of the waterway to the Park. For many years this natural beach replenishment process was artificially replicated by manual placement of dredged sand particularly stamp sand. Placement of dredged sand was discontinued in the late 1970s believed to have resulted in increased erosion rates along the lakeshore.

1.1 Objectives

The DNR was awarded a 2014 Coastal Zone Management Grant for the purpose of developing a Management Plan for the Park. Completion of a geophysical survey to collect pertinent subsurface data will aid in the management plan development. The geophysical survey will collect data on the depths to bedrock and establish the general subsurface soil profile for the overburden at selected locations across the study area which will include 264-acres of the existing Park generally north and west of M-203 extending to Lake Superior. This data will be useful in future master planning activity for infrastructure relocation.

1.2 Literature Review

Various background data and studies have been reviewed by our office in preparation for our geophysical survey investigation and report. Summaries of this review follow.

1.2.1 *NOAA National Data Buoy Center, Station PCLM4*

This weather buoy is located along the Keweenaw Peninsula along Lake Superior northeast of F.J. McLain State Park near 47.276N, 88.528W. Wind speed is recorded at this buoy but not wave height. Historical data is provided on the NOAA website dating back to 2006. We reviewed the historical monthly data from June 1, 2006 to May 31, 2007 for various sustained wind speeds and wind directions through these monthly time periods. The purpose of this review was to provide maximum wind speeds and directions in a randomly selected year since the prior studies did not provide a very detailed accounting of recorded storm events. This review resulted in the following data sets:

Month	***Date(s)***	***Wind Speed, mph***	***Wind Direction, °***
June 2006	22nd	9.5 to 13.6	45 to 75
July 2006	4th	11.3 to 17.8	340 to 355
	9th	11.6 to 30.5	290 to 5
	9th	13.3 to 27.0	30 to 50
August 2006	7th	11.6 to 22.7	300 to 0
	15th	12.8 to 24.3	305 to 340
September 2006	19th	14.2 to 22.7	350 to 20
	25th	11.6 to 24.7	300 to 330
	28th	14.7 to 24.1	30 to 55
October 2006	9th	13.8 to 25.6	0 to 45
	11th to 15th	14.5 to 37.7	300 to 5
	18th	15.8 to 29.9	290 to 350
	29th	14.0 to 28.5	290 to 10
November 2006	Oct 31st to 3rd	20.5 to 39.2	260 to 330
	29th to 30th	16.5 to 33.0	290 to 330
December 2006	6th to 7th	19.9 to 29.0	310 to 10
	17th	18.9 to 32.3	285 to 330

January 2007	1st	19.2 to 30.1	10 to 40
	8th	18.7 to 29.0	315 to 330
February 2007	11th	18.1 to 24.1	305 to 325
March 2007	2nd to 3rd	12.2 to 29.6	10 to 70
	4th to 5th	15. 1 to 34.5	275 to 20
	19th	18.2 to 34.1	300 to 20
April 2007	4th	26.5 to 38.5	5 to 60
	7th	23.4 to 30.1	350 to 20

Table 1: Wind Event Summary from 2006 to 2007 (NOAA Station PCLM4)

Of the 25 recorded events throughout the year (May did not produce a significant wind event), 13 produced winds between a NW to N (315° to 360° DTN) bearing and 7 events were within a N to NE (0° to 45° DTN) bearing. A wind direction perpendicular to the shoreline southwest of the headland peninsula is approximately 316° and perpendicular to the shoreline east of the headland is approximately 348°. The average wind direction was within 10° of being perpendicular to the shoreline southwest of the headland in 10 of the storm events but was within 10° of perpendicular east of the headland in 3 of the 25 events.

1.2.2 *1982 The Bedrock Topography of the Keweenaw Peninsula, Michigan*

Elmer J. Warren presented this dissertation in partial fulfillment for his Doctor of Philosophy degree to Michigan Technological University in 1981. The F.J. McLain Park is located in an area of Precambrian Freda Sandstone generally dipping 25° or less from the Keweenaw Fault (located south and east of the Park) to the Lake Superior basin. Bedrock is estimated to be near el 600 at the McLain State Park headland.

1.2.3 *1997 McLain State Park Erosion Study*

This study was completed by the U.S. Army Corps of Engineers (USACE), Detroit District in 1997. The study concluded that the Keweenaw upper entrance navigational structures (breakwalls) constructed around 1890 have acted to block the longshore transport of sand from the south and that this material was replaced for many years after the Park was constructed in 1938 by placement of dredged sand consisting of a mining by-product called stamp sand north of the breakwalls along the Park shoreline. The process was discontinued in the late 1970s leaving the Park bluffs more exposed to erosion from wind and wave energy. It was estimated the beach

recession rate from 1938 to 1991 (1971?) averaged around 3 feet per year and in a more recent period of 1978 to 1996 averaged around 8 feet per year with a rate of 7.5 ft per year from 1995 to 1997. Periods of record or near record lake levels were also stated as a contributing factor causing erosion of the offshore. It was estimated a beach recession rate of 7.5 feet per year will continue over the next 50 years. The sandstone was reported as being very near the surface near the Keweenaw Waterway sloping up to an outcropping 4000 ft northeast (the Park headland).

The report concludes with a summary of recommended erosion protection alternatives including "structural", "beach nourishment" and "no action." Structural erosion protection (groins, revetment, seawalls, etc.) were not recommended due to overall construction and maintenance costs as well as the inevitable loss of Park recreational area. Short reaches of structural erosion protection were mentioned as a method to protect existing facilities where relocation was not possible, however, no such facilities were noted in the report. Beach nourishment was described as a practical method to reduce future erosion rates to approximately 3 ft per year. Taking "no action" against the shoreline erosions at the Park and allowing the erosion process to proceed without interruption was selected as the preferred option by the USACE. Relocating/reconstructing endangered facilities considering projected erosion rates along with the acquisition of additional property to replace that lost along the Park shoreline due to erosion was recommended.

1.2.4 *2001 Shoreline Stability Study*

Prepared by W.F. Baird & Associates in July 2001, this study used computer modeling, sediment budgeting and GIS Analysis to predict future shoreline recession rates. Recession rates predicted were lower than reported in the U.S. Army Corps of Engineers 1997 study. Shoreline change from 1938 to 1998 along the beach southwest of the headland was reported at 4.1 ft per year and east of the headland over this period, an accretion of 0.2 ft per year. It was stated the shoreline southwest of the headland is converging to a stable orientation and may currently be close to stable. The report reasoned an azimuth perpendicular to the beach of 290° or possibly higher would represent a stable beachfront. The current azimuth for this beach is approximately 316°.

The report concludes that future shoreline recession rates on the order of 0 to 3.3 ft per year are expected with the east fillet beach continuing to converge towards a more stable orientation (and may currently be close to stable). Decreasing recession rates have been measured east of the headland, however, a decreasing sediment supply from the west may affect this rate in the future

due to stabilization of the east fillet beach. Additional recommended investigation tasks were outlined at the conclusion of the report which are summarized below:

- A detailed hydrographic survey of the area in the nearshore
- A detailed geologic survey of the area including type and elevation of bedrock
- Additional land surveying to provide greater erosion rate accuracy
- Consolidation and clarification of Keweenaw Waterway dredging records
- Use of aerial photographs taken between 1986 and 1998 to confirm GIS analyses
- A complete two dimensional wave transformation to estimate revised sand transport estimates
- A longer and more current wave hindcast

1.2.5 *2013 MTU Geophysics Class reports*

Three separate groups from Michigan Technological University's Geophysics 3900 Field Geophysics class presented reports dated July 18, 2013 and July 22, 2013 primarily using gravity and seismic geophysical techniques to estimate the bedrock elevation at select locations within the Park. Four seismic locations were selected in these field investigations to determine bedrock elevations with all the points located along the Park drive which parallels the shoreline between the breakwall and headland. Points A and B were located within the headland with points C and D located west of this area. These reports concluded the bedrock depth was at approximately 16 ft (el 600) at Points A and B, 43 ft (el 582) at Point C and at a depth of 72 ft (el 551) at Point D.

1.2.6 *Recorded Bluff Recessions by Park Personnel*

Recession rates from 1995 to 2013 were obtained from DNR Park Administrators consisting of ground measurements from 17 locations extending from the headland approximately 4000 ft east along the Park shoreline. Points 15 and 16 are located in the headland area and Points 3 through 13 are located along the existing modern campground facilities. Cumulative recession rates at Points 15 and 16 were 7 to 54 ft and east of the headland vary from 2 ft to the full amount (>45 ft) at point 11. Point 17 located southwest of the headland recessed 17 ft over this period. This data is presented in more detail in Section 2.2.

1.2.7 *2014 DEQ Bluff Recession Rate Analysis at F.J. McLain State Park – Final Report*

Based on aerial imagery and global positioning system data, shoreline recession rates between 1938 and 2014 were estimated to decrease from 4.3 ft/yr to 0.5 ft/yr along the length of shoreline extending east from the Keweenaw Waterway to the headland (0.5 ft/yr to 1.4 ft/yr at the headland). Shoreline recession east of the headland was measured to range from 0.5 ft/yr to 1.4 ft/yr between the same time period. Bluff recession rates between 1938 and 2014 were estimated to range from 1.3 ft/yr to 2.3 ft/yr east of the Keweenaw Waterway, approximately 0.5 ft/yr to 2.2 ft/yr at the headland and 0.6 ft/yr to 2 ft/yr east of the headland.

Although the estimated recession rates are based upon linear regression and, therefore, provide average recession rates over the 76 year monitoring period, the data appears to indicate that the shoreline immediately southwest of the headland is remaining fairly stable. Bluff recession between the Keweenaw Waterway and the headland appears to continue at an aggressive pace, however, the rate of shoreline recession has decreased significantly since 1938.

Partial summaries of prior reports and provided data sets have been presented in the above Sections 1.2.1 through 1.2.7. For detailed report methodologies and conclusions, copies of the individual reports and any particular report attachments should be reviewed.

2.0 COASTAL ZONE GEOLOGY

2.1 Park Geology

The Keweenaw Peninsula consists predominantly of Upper Precambrian volcanic and clastic sedimentary rocks. In general, Portage Lake Volcanics are overlain by the Copper Harbor Conglomerate, the Nonesuch Shale and the Freda Sandstone. The more recently formed Jacobsville Sandstone is generally present along the south side of the peninsula although faults are common throughout the area, the Keweenaw Fault is the most significant fault, bisecting the Keweenaw Peninsula for approximately 100 miles from the Porcupine Mountains to the Keweenaw Point (Figure 1). The Keweenaw Fault is a reverse fault whereby the Portage Lake Volcanics are thrust southeast over the younger Jacobsville Sandstone (Figure 2).

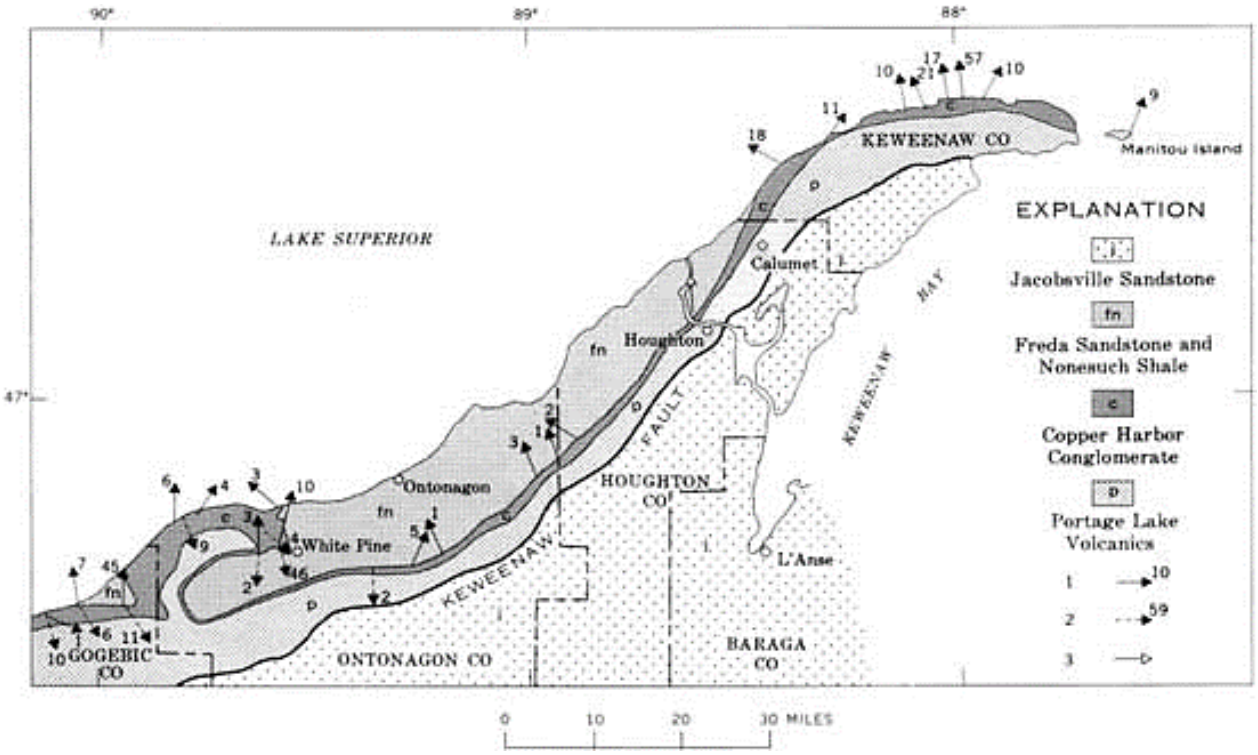

Figure 1: Generalized Geologic Map of the Keweenaw Peninsula (Wolff and Huber, 1973)

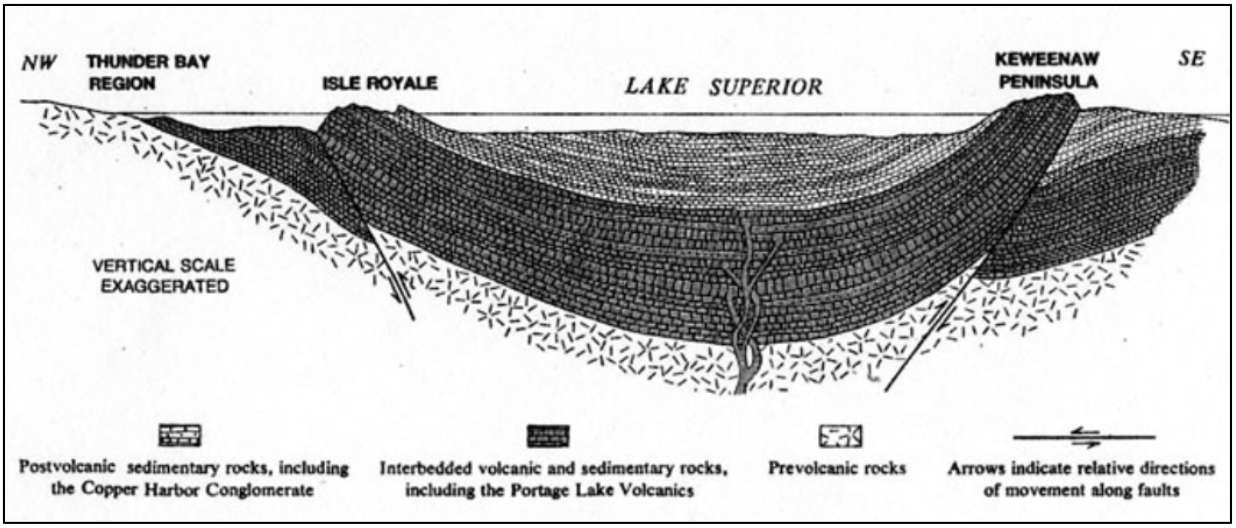

Figure 2: Cross Section of the Lake Superior Basin (USGS Bulletin 1309, Figure 38)

Much of the jointing of the Keweenaw Peninsula bedrock is tectonic in origin rather than glacial, especially along bedrock valleys. Bedrock valleys are common in the Keweenaw Peninsula ranging from 150 to 600 ft deep generally orientated northeast-southwest parallel to the Keweenaw Fault or north-south parallel to the western shore of the Keweenaw Bay. It is likely

that bedrock valleys follow zones of structural weakness (fault zones) formed due to a combination of fluvial (river and stream) forces with subsequent glacial modification.

The Keweenaw Peninsula has been subjected to several periods of continental glaciation resulting in erosion of the bedrock surface as well as transport and deposition of geological material due to ice sheet advance and retreat. Abrasion and plucking (quarrying) are the two fundamental glacial erosion processes acting upon bedrock. The most recent major glacial advance occurred during the Wisconsinan Stage glaciation whereby ice sheets over 10,000 ft thick advanced over the Keweenaw Peninsula into central Illinois and Ohio. The final glacial advance was made by the Keweenaw Bay Lobe with southern extents marked by an end moraine which fills the Bear Lake bedrock valley. Glacial lake drainage during the retreat of the Wisconsinan ice sheet resulted in significant flow through the Portage Gap, erosion of the end moraine and the formation of the Keweenaw Waterway.

McLain State Park is located northeast of the Keweenaw Fault in an area underlain by the Freda Sandstone formation. The Freda Sandstone consists of layers of reddish, medium-to-fine grained, weakly cemented sandstone, siltstone and silty shale estimated to be at least 12,000 ft thick (Hite, 1968) commonly underlying lowland and valley areas indicative of their relatively low resistance to erosional forces relative to more resistant volcanic rocks (rhyolite, basalt, felsite, etc.). Glacial drift consisting of till clay typically overlies the sandstone bedrock over which lacustrine deposits of sand and gravel are present deposited as a series of recessional beach ridges. Although the ground surface elevation within the Park is relatively uniform, the variable top of bedrock elevation results in varying thicknesses of overlying unconsolidated material.

The surface of the Freda Sandstone below McLain State Park varies considerably based on geologic data collected by Warren (1981) from geophysical measurements as well as outcrops, water wells and diamond drill holes. The surface of the bedrock west of the Keweenaw Waterway along the shoreline of Lake Superior is estimated to be near el 600, sloping down to els 400 to 540 near the west side of the Keweenaw Waterway. Bedrock is estimated to be near els 500 to 560 along the east side of the Keweenaw Waterway sloping up to approximately el 600 at the McLain State Park headland located approximately 3600 ft east of the east upper entry Keweenaw Waterway breakwall forming a bedrock ridge extend north below Lake Superior and south towards the Bear Lake bedrock valley. Outcropping of the bedrock ridge can be observed immediately north of the headland within Lake Superior. The bedrock surface slopes down from the headland going east along the Lake Superior shoreline to approximately el 400 near the east

end of the Park. Bedrock elevations south of the Park slope down to a low near el 100 at the Bear Lake bedrock valley.

2.2 Coastline Geomorphology

Appendix C contains shoreline photographs. Coastlines are dynamic environments shaped by a number of factors including underlying geology, physical processes (erosion) as well as human interaction and development. A coastline's geology controls the overall coastline geometry as well as sediment type and availability. Erosion from wave or wind energy and human effects acts to further shape the coastline beyond boundary conditions established through geological means.

Geologic factors affecting the erosion potential of a shoreline include, but are not limited to, the presence, type and condition of bedrock with relation to the shoreline as well as the composition of unconsolidated sediment. Sediment with a high silt content tends to be highly erodible while sediment containing a high clay content tends to be less erodible. Granular soil consisting of sand can be very erodible if composed predominantly of fine sand particles.

The primary erosional force for a coastline is derived from wave energy which is a function of wind energy and the length of water over which a given wind has blown (fetch length). Higher winds and larger fetch lengths result in larger waves with more erosion potential. Wave energy dissipating upon the beach and nearshore areas of a coastline result in the transport and deposition of sediment onshore, offshore and longshore.

Wave direction is a function of wind direction which fluctuates considerably across the Park shoreline. Based on University of Michigan's *Numerical Simulation of Nearshore Processes*, included as part of the *McLain State Park Erosion Study* (U.S. Army Corps Of Engineers, 1997) and a 32 year hindcast of wave conditions collected at Station S33, the Park is exposed to waves predominantly from the north and west with significant fetch distances ranging from approximately 50 to 150 miles resulting in average wave heights of 2 to 3 ft and maximum wave heights on the order of 15 to 30 ft. The most frequent wave direction is approximately 270º DTN (degrees true north) acting upon a shoreline orientated approximated normal to 340º DTN (west of waterway), 310º DTN (east of waterway to headland), and 350º DTN (east of headland). The largest wave heights were found to occur from approximately 270º to 292.5º DTN. The cumulative effect is wave energy concentrated offset from normal to the shoreline resulting in a net longshore transport of sediment towards the northeast.

The Park shoreline extends from the east entry breakwall of the Keweenaw Waterway northeast approximately 2 miles. The majority of the shoreline at the Park can be described as an unconsolidated shoreline, comprised of unconsolidated materials consisting of sand and gravel with a relatively high susceptibility to erosion forces. The Park headland, however, contain shallow bedrock very near the Lake Superior water level and is, therefore, less susceptible to erosion.

Lake Superior bathymetry (Figure 3) suggests water depths of 40 to 50 ft approximately one mile north of the Park shoreline between the Keweenaw Waterway and the Park headland. Approximately 2000 to 2500 ft north of shore, water depths gradually decrease from approximately 35 ft to 10 ft at a distance of 500 ft from shore where relatively shallow water resides adjacent to shore. Bathymetry data near the Park headland provides further evidence towards the presence of a shallow submerged bedrock ridge extending northeast below Lake Superior from the headland based on a shallow lake bottom on the order of 10 ft deep extending approximately 3000 ft north from shore. The shallow ridge transitions into a flat plane approximately 20 ft deep extending approximately 5000 ft north-northeast from shore. The west extent of the ridge is marked by a sharp downslope to depths of approximately 40 ft while the east extent of the ridge contains a much more gradual lake floor downslope.

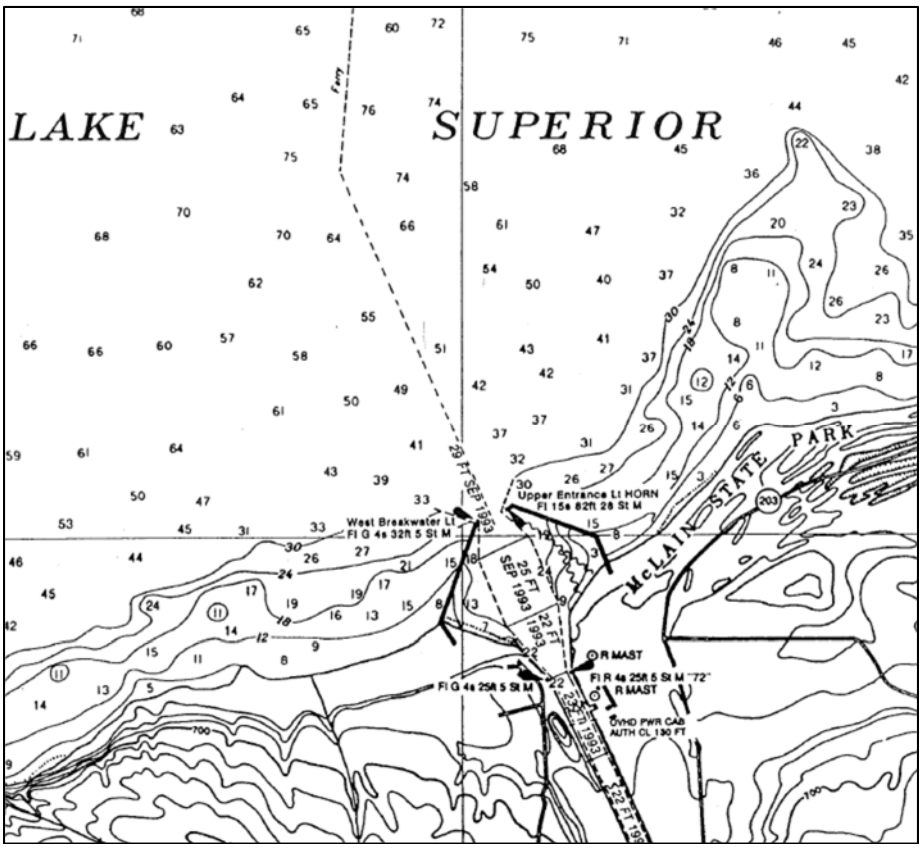

Figure 3: Lake Superior Bathymetry Data (USACE, 1997)

The Keweenaw Waterway upper entry navigational structures were constructed around 1890 and have created a man-made barrier to the natural longshore transport of sediment along the Lake Superior shoreline as is evident from deposition of sediment along the west breakwall. Dark grey sand generated from the processing of copper containing rock in the region known as "stamp sand" was commonly deposited southwest (updrift) of McLain State Park along the Lake Superior shoreline until 1976 when environmental concerns discontinued the continued placement of stamp sand. The combination of longshore sediment transport blockage from the Keweenaw Waterway breakwalls and the lack of shoreline regeneration through material deposition (both man-made and natural) have resulted in accelerated erosion of the McLain State Park shoreline beyond that which would naturally occur (U.S. Army Corps Of Engineers, 1997).

Maximum longshore sediment transport (LST) modeling was performed by W.F. Baird & Associates with predicted transport rates summarized below in Figure 4. The modeling was based upon wave statistics obtained near the Park.

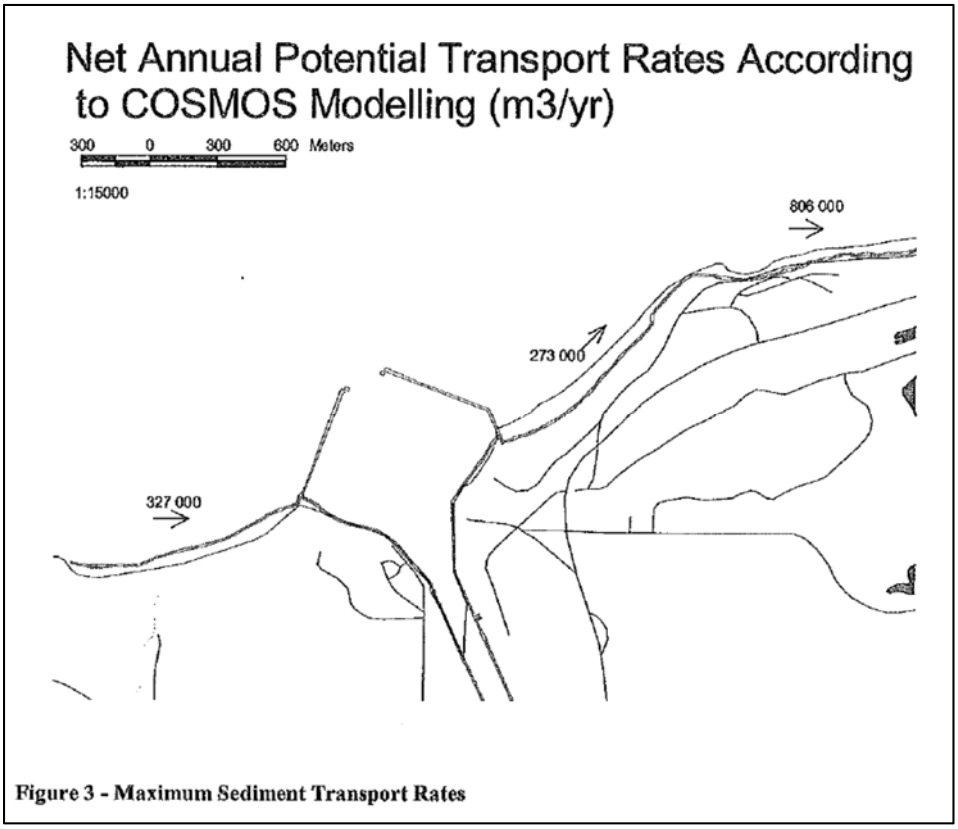

Figure 4: Maximum Longshore Sediment Transport Rates (W.F. Baird & Associates, 2001)

The results of the modeling concluded a majority of the 327,000 m³/yr predicted to move across the shoreline west of the Keweenaw Waterway is blocked by the breakwall system resulting in the theoretical accretion of sediment west of the waterway. Sediment availability from longshore transport is, therefore, limited east of the breakwall system where 273,000 m³/yr of transport is predicted resulting in sediment supply primarily though erosion within this area. Sediment transport modeling immediately east of the headland predicts 806,000 m³/yr of transport with 987,000 m³/yr predicted further east still, indicating net erosion rates of 533,000 m³/yr immediately east of the headland decreasing to 181,000 m³/yr further east.

Predicted sediment transport rates support the "stable beach orientation" theory hypothesized by W.F. Baird & Associates (2001) which suggests erosion and sediment transport rates will slow as the shoreline comes to an equilibrium orientation near normal to 290º DTN. The shoreline between the waterway and the headland is the section closest to the suggested "stable orientation" which is also the section of shoreline with the lowest predicted sediment transport rates. Historical photographs depict the shoreline orientation between the waterway and the headland has rotated counterclockwise around the headland towards the suspected equilibrium orientation since 1938.

Recession rates provided by Park administrators at 17 locations from the headland extending east approximately 4000 ft from 1995 to 2013 were evaluated as part of this study. Monitoring locations and recession data are summarized in Figures 5 and 6, respectively. Over the approximate 18 year monitoring period, recession rates at the headland average between 0.4 to 1.0 ft/yr. Immediately east of the headland, average recession rates rapidly increase to between 3.0 and 3.7 ft/yr, likely attributed to the presence of unconsolidated materials susceptible to erosion overlying dipping bedrock east of the described submerged bedrock ridge as well as wave diffraction at the headland resulting in a concentration of wave energy immediately east of the headland. Extending east, average recession rates vary 1.1 to 1.9 ft/yr west of the gabion wall, 0.1 to 0.2 ft/yr at the gabion wall and 0.2 to 1.7 ft/yr east of the gabion wall.

The average recession rate between 1995 and 2013 is approximately 1.3 ft/yr when considering each of the 17 locations. Average recession rates between 1995 and 2000 were measured to be considerably higher (2.9 ft/yr) relative to average recession rates measured between 2000 and 2013 (0.6 ft/yr). It is known that Lake Superior water levels were relatively high during the 1990's which may be a precursor for the observed increased recession rates during this time period followed by decreased recession rates measured since 2000 during which Lake Superior water levels have dropped to below average levels.

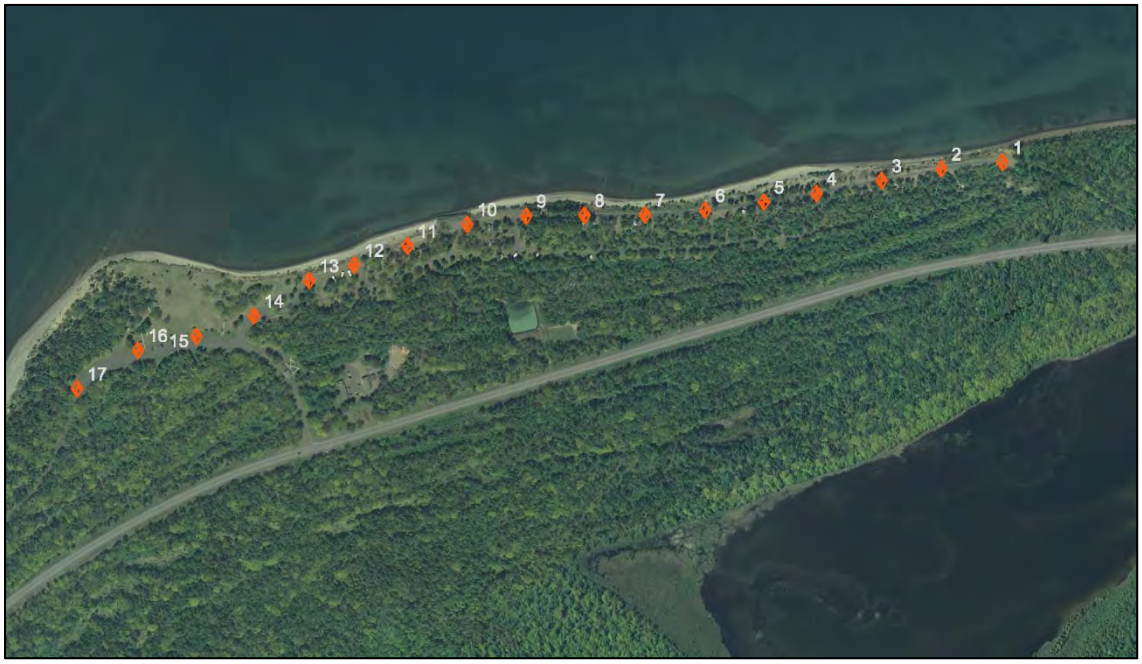

Figure 5: McLain State Park Monitoring Nail Location Plan

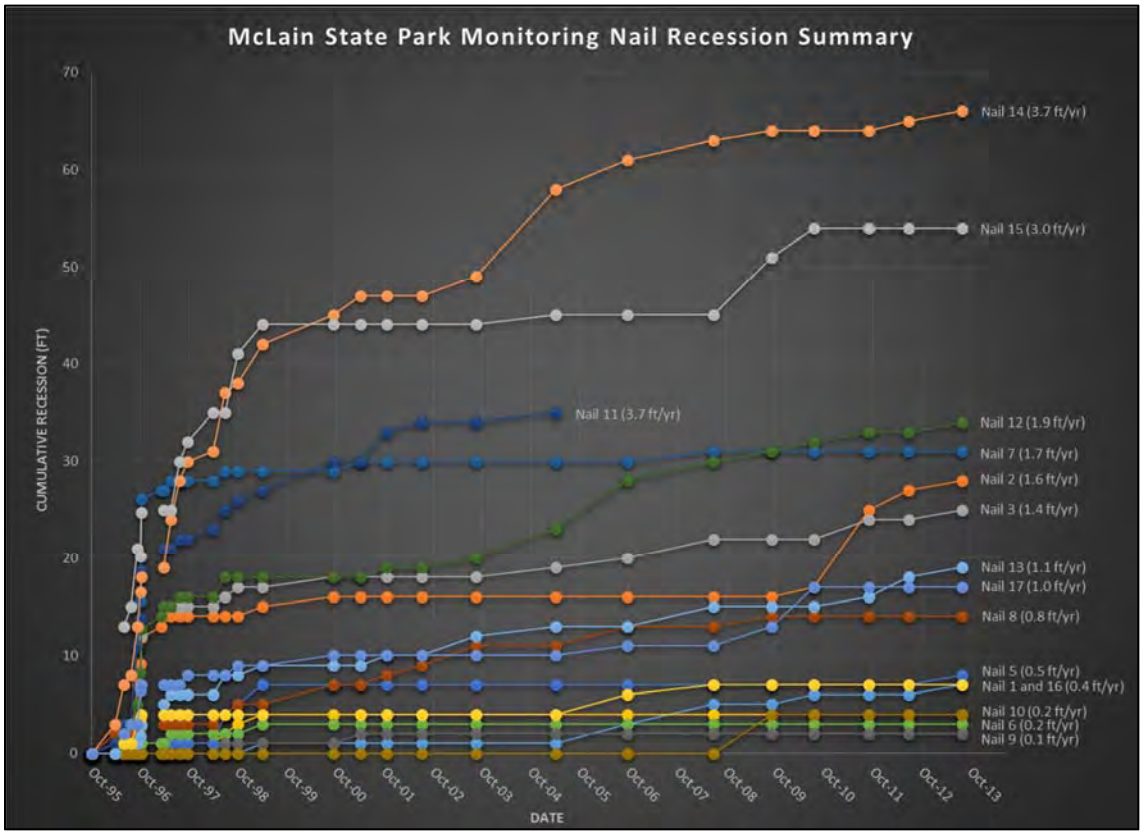

Figure 6: McLain State Park Monitoring Nail Recession Summary

3.0 GEOPHYSICAL METHODOLOGY

Geophysical locating methods are remote-sensing technologies typically requiring verification of results through the direct locating of the object(s) of interest at discrete locations in order to gain a higher level of confidence in the conclusion drawn. Soil borings were selected as our primary method to evaluate the depth to bedrock as well as the secondary objectives (type and depth of soil strata and depth to groundwater) because they are a direct locating technique capable of accomplishing the requested objective with a high level of accuracy and without the need for additional verification testing. Electrical resistivity testing was performed to supplement subsurface information gathered through the performance of soil borings. The methods employed are described herein.

3.1 Electrical Resistivity

Resistivity testing was performed using a SuperSting R1 meter manufactured by Advanced Geosciences, Inc. The testing was performed using a Wenner Array wherein four electrodes are placed in a line at various probe to probe distances (known as the “A” spacing) yielding an aggregate resistivity value to an approximate depth “A”. Data was collected at various “A” spacing’s with the maximum “A” spacing targeted at approximately twice the anticipated depth to bedrock at the test location. Initially four resistivity tests were performed adjacent to Borings B-1 through B-4 for use in validating the resistivity model against a known soil profile. Five additional tests were performed at locations jointly selected by MTC and the DNR. Test locations and orientations are shown on the investigation location plan (Figure 8) contained in the Appendix A.

Resistivity data was analyzed using one dimensional inversion theory using the AGI EarthImager 1D Software package. Results and conclusions of this analysis are discussed in section 4.1.

3.2 Test Borings

Subsurface conditions were investigated by 43 soil test borings (B-1 through B-40), 3 of which were performed in addition to the originally proposed 40 borings due to auger refusal on suspected cobble or boulder. The soil borings were performed using a CME 55 track mounted drill rig and 3¼ inch hollow-stem augers. Soil sampling (where performed) was accomplished through the Standard Penetration Test (ASTM D 1586). Boring locations are shown on the attached plan, Figure No. 8. Borings were drilled and other sampling was conducted solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.

The Standard Penetration Test (SPT) involves the use of a 140 lb hammer with a 30 inch drop to drive a standard 2.0 inch O.D. split spoon sampler. The number of hammer blows required to drive the sampler 12 inches, after seating 6 inches, is termed the soil N-value and provides an indication of the soil's relative density and strength parameters at the sample location. SPT blow counts in 6 inch increments are recorded on the boring logs. The drill rig was equipped with a CME automatic hammer system which delivers a more consistent driving energy to the sampler compared to the rope and cathead system.

Recovered samples were sealed, labeled and transported to our laboratory. The recovered soil samples were reviewed by an engineer and technically classified according to the methods of ASTM D 2488 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)". Estimates of the unconfined compressive strength of the cohesive samples were made using a calibrated penetrometer. A copy of the test boring logs along with a description of the terminology used on the logs and a chart of the ASTM D 2488 group symbol names are provided in Appendix B.

The test borings were performed during two mobilizations with the first mobilization occurring from June 12 through June 18, 2014 and the second mobilization occurring from June 23 through June 30, 2014. During the first mobilization, drilling operations were initially concentrated on collecting soils information, depth to groundwater, and depth to bedrock near the headland in addition to the area of the Park between the headland and Keweenaw Waterway (Borings B-1, B-2, B-3, B-4, B-8 and B-28). Borings B-1, B-2, B-3 and B-4 were located near the previously performed seismic survey locations A, B, C and D as part of the 2013 MTU Geophysics Class study in order to evaluate the reliability of the geophysical data collected and presented in the MTU study. After the completion of the initial borings, additional borings were performed throughout the project limits to gather an understanding of approximate bedrock depths across the project area in addition to a basic understanding of the type and depth of unconsolidated material overlying the bedrock.

During the performance of Borings B-1, B-2, B-3, B-4, B-8 and B-28, our drill rig operator and engineer were in constant communication regarding drilling changes observed (torque, feed pressure, auger advancement rate, chatter, etc.) and the corresponding changes in soil strata observed by the engineer from soil samples retrieved through SPT testing near these drilling changes. The result of this communication was, in essence, a “calibration” of drill rig performance to soil strata type (i.e. surficial granular soil vs. glacial till material), allowing the operator to approximate stratum changes through drill rig feedback. This “calibration” allowed for additional information to be obtained from borings where drilling was performed to only evaluate the whether or not bedrock was presence within the explored depth. Soil sampling was performed infrequently following the performance of Borings B-1, B-2, B-3, B-4, B-8 and B-28, generally only when verification of bedrock was necessary.

Preliminary results were discussed with the DNR after completion of the first mobilization which included a summary of borings completed, encountered bedrock depths, preliminary resistivity results as well as revised locations of soil borings based on access and DNR input regarding desired areas to be developed in the future. It was decided to complete a portion of the proposed borings east of the headland, however, emphasis was to be placed on gathering quality subsurface information from the headland area to the Keweenaw Waterway as this area is most desirable to the DNR for future development. The schedule of borings to be completed during the second mobilization was revised accordingly to meet the DNR objectives.

3.3 GPS Data Collection

Borings and resistivity test locations were determined in the field using GPS observation. GPS Data Collection was performed using a Trimble R6 Instrument coupled with a Trimble TSC 3 data collector. The MDOT CORS network was used as a RTK correction source. The R2K2 Lite RTK mode was used connecting to an aggregate correction source of all nearby reference stations. The Upper Keweenaw station is located at the mouth of the Portage River near the site.

Prior to mobilization several 1 ft georeferenced aerial photo tiles were obtained from the USGS Earth Explorer encompassing the investigation area within the Park. This aerial and the associated georeference information were used for the basis of horizontal control for boring layout and investigation planning. The georeference of the aerial tiles was verified in the field against the GPS location at several points by verifying the coordinates of features in the field that were visible on the aerial photo.

In addition to the investigation layout the GPS was utilized to collect position and elevation data at each soil boring and resistivity location. At locations where direct GPS observation was not possible due to tree cover a nearby location was surveyed and used as a reference point to determine the approximate elevation of the sampling location through differential leveling.

The elevations used in this report are given in feet and are based on the NGVD 88 datum. If more precise location and elevation data are desired, a registered professional land surveyor should be retained to locate the borings and determine their positions and ground elevations.

4.0 GEOPHYSICAL RESULTS

4.1 Electrical Resistivity

Resistivity data collected during the field investigation was analyzed with one dimensional inversion theory using the AGI EarthImager 1D Software package. The software uses an iterative process to resolve a set of resistivity data at different “A” spacing’s (essentially aggregate resistivity values to an approximate depth “A”) into a unified resistivity profile. In the software results are presented as a profile with layers of a predicted depth and thickness with a unit resistivity value assigned for each layer.

Initial verification of the resistivity method was performed by comparing resistivity data collected at the location of Borings B-1 through B-4 (resistivity tests R-1 through R-4) with the soil profile obtained in the borings at these locations. This process was necessary both to ensure accuracy of the data and to determine appropriate assumptions for the modeling software to yield the desired information. In general, the modeling was unable to identify the top of bedrock as desired for the investigation. Typical predicted resistivity profiles consisted of one or more upper relatively high resistivity layers overlying a comparatively lower resistivity layer to the bottom of the predicted profile at approximately twice the "A" spacing. In tests R-1 through R-4 where soil profile information was known the transition to the underlying lower resistivity layer generally appeared to be consistent with the transition from sand to clay and not clay to bedrock (thus no transitions were predicted by the software below the top of clay).

Although some continuity was noted between the expected soil profile and predicted resistivity transition depths there was significant difference from test to test in the predicted resistivity values for the encountered soil profiles making it difficult to utilize the parity between resistivity and soil layer transitions noted in tests R-1 through R-4 where soil boring data was available to analyze the other test locations. For example, predicted resistivity values for the underlying lower resistivity layer varied roughly between 9 and 1800 ohm-meters. This value is approximately between 0.3 and 30.0 percent of the predicted resistivity of the upper sand on a boring by boring basis.

Although it is possible that there is some variability in the resistivity of the soil from boring to boring it is unlikely that this is the only contributing factor. Given that the predicted soil layers are an aggregate value variability in the amount of components with slightly different resistivity is likely also contributing to this disparity. For example, in the underlying lower resistivity layer the predicted value is a combination of clay and bedrock with varying thicknesses between borings. The resistivity of the upper sand layers may also vary naturally due to different densities, amount of fines and organic materials, moisture content, etc. as is inherent in these types of formations.

Another factor likely contributing to the disparity between predicted resistivity values and the inability of the software to detect the clay-bedrock transition is the inability of 1D resistivity modeling to resolve changes in layer transitions and composition (density, degree of weathering, etc.) over the length of the test. Particularly at longer "A" spacing data points the layer boundary depths may vary enough along the length of the test to effect the analysis. Changes in soil profile along the test are detrimental to 1D modeling as they blur the lines between adjacent layers. Given the relatively high degree of horizontal variability encountered between the soil borings consideration should be given to performing a 2D or 3D survey if resistivity testing is performed on this site in the future to account for this variability. It's also possible that the resistivity of the clay is close enough to that of the bedrock that the transition may be difficult to detect even after accounting for layer transition variability with 2D or 3D modeling.

Another potential contributing factor during the field investigation was the relatively high degree of variability in the soil at the immediate ground surface which the test probes were driven into. This soil consisted of a mixture of dry beach sand, topsoil and road gravel. Nearby utilities and other subsurface structures may also have affected the testing by providing a less restrictive path for the test current than the surrounding soil. Care was given in selecting the test locations to avoid known utilities however unknown utilities, past structures, areas of past excavation/fill, etc. may exist in the vicinity of the testing. Especially given the high resistivity of the surface material variability's such as these are of particular concern.

Results of the resistivity testing are included in Appendix B. For each test location both a worksheet presenting the collected resistivity data in tabular form and a predicted resistivity profile are included. Care should be taken in the future use of the profile data with respect to the assumptions inherent in their development.

4.2 Test Borings

The borings in general encountered brown poorly graded sand (SP) overlying glacial till material classified (at borings where sampling was performed) as *silty sand* (SM), *sandy silt* (ML), *silt* (ML), *sandy lean clay* (CL) and *lean clay* (CL) overlying reddish brown weathered sandstone bedrock (Freda Sandstone). Coarse gravel and cobble were frequently noted within the soil borings immediately above and within suspected glacial till material.

The thickness of the soil strata described varied considerably across the project limits. At the headland, the surficial granular soil was typically encountered to depths ranging from 13 to 18 ft below the ground surface underlain either directly by weathered bedrock or several feet of glacial till material overlying weathered bedrock. Coarse gravel and cobble were frequently noted within the soil borings immediately above and within suspected glacial till material.

The granular soil was observed within the soil borings to increase in thickness gradually from the headland to depths over 50 ft below the ground surface near the Keweenaw Waterway underlain consistently by glacial till material consisting typically of silt and clay overlying weathered sandstone bedrock. The top of bedrock was observed to dip more severely from the headland to Borings B-4 where it was encountered at depth of 75 ft. Bedrock was again encountered at Boring B-8 near 70 ft below the ground surface, indicating a flattening bedrock surface immediately east of the waterway.

East of the headland, the granular soil is anticipated to extend to depths of approximately 20 to 30 ft below the ground surface underlain by glacial till and a dipping bedrock surface. The surficial granular soil thickness, however, is expected to be variable east of the headland based on observations of glacial till clay exposed within the face of eroded bluffs immediately above the shoreline. In general, bedrock was not encountered in a majority of the borings performed east of the headland with the exception of Boring B-28 where sampler refusal at a depth of 89.8 ft may be an indication of weathered bedrock material.

Groundwater was generally encountered at or above depths corresponding to the Lake Superior water level, ranging from approximately els 601 to 620. Higher groundwater was typically perched in areas of higher glacial till/bedrock.

At borings where bedrock was encountered within the exploration depth the encountered bedrock surface elevation and boring coordinates were utilized in the development of an approximate bedrock surface topography map. Contouring was accomplished using the Surfer 12 software package. Results of this contouring are presented in Figure 9 contained in Appendix A. The presented contours are based on an approximate bedrock elevation in each boring as determined by review of all available information such as the reported drilling resistance, sampler resistance/refusal, auger refusal, recovered cuttings, etc. Contours are presented on 1 ft intervals in areas of higher boring density where the bedrock surface is close to the ground surface and at 5 ft intervals outside of this area. The points used in the contouring process are shown on the contour map for perspective.

As opposed to contouring the ground surface, the bedrock topography cannot be observed directly complicating the contouring process somewhat. A judgment call needs to be made with respect to decisions such as if high points are located along a ridge or represent isolated outcroppings. In this case, the contours have been developed to provide relatively smooth transitions based on the collected data without distinct ridges or valleys. For this reason, the contours should be considered approximate with respect to how they depict the transitions between the data points used in contouring. Particularly at the edges of the contoured area where bedrock is deeper, there may be significant variability between the presented contours and actual conditions due to the limited sample size in these areas.

5.0 CONCLUSIONS

The bedrock topography is shown in Figure No. 9 in Appendix A based on data collected in our field geophysical investigation. The highest bedrock is located just south of the existing Park entrance and headquarters building rising to el 608 along M-203 dipping gently down toward the headland point to el 593, and dipping approximately 5% from the high point to the southwest and northeast. Borings B-9, B-11 and B-40, completed near the Keweenaw Waterway, did not encounter bedrock and did not find evidence of bedrock being close to the surface as stated in the U.S. Army Corps of Engineers report.

Borings with soil sampling were completed in the headland (Borings B-1 and B-2), in a line from the headland to the southwest (Borings B-3, B-4 and B-8), and along the bluff east of the headland (Boring B-28).

Headland

Brown to light brown poorly graded sand (mostly medium to fine-grained sand) with a loose grading to medium dense relative density was encountered in the upper 14 to 15 ft. Till material consisting of very dense sandy silt with gravel, cobble and sandstone fragments was encountered in Boring B-1 from 14 ft to 21 ft and hard sandy lean clay in Boring B-2 with gravel and cobble from 15 ft to 17.5 ft. Standard Penetration Test refusal was encountered at depths of 21.5 ft and 17.5 ft in Borings B-1 and B-2, respectively, on sandstone bedrock corresponding to els 594 and 598.3. Groundwater was encountered at els 608.2 and 610.8 at the time of drilling.

Southwest of Headland to the Keweenaw Waterway

Granular soil strata were encountered in the upper 21 ft to 52 ft with the granular soil depth increasing with distance from the headland. The relative density of the sand was loose to medium dense within approximately 20 ft of the ground surface grading to dense to very dense. Gravel and cobble were noted during the drilling in the granular soil within primarily 10 ft to 25 ft of the ground surface. The sand was typically underlain by very stiff to hard brown lean clay extending to sandstone bedrock at a depth of 40.5 ft in Boring B-3, 75 ft in Boring B-4 and 71.5 ft in Boring B-8. In Boring B-4, a medium dense to dense silt stratum was encountered from 26.5 ft to 45 ft. Groundwater was encountered at the time of drilling at els 612.6, 612.8 and 610.9 in Borings B-3, B-4 and B-8, respectively.

East of Headland

Light brown poorly graded sand with a medium dense relative density was encountered in the upper 15 ft of Boring B-28 overlying a hard sandy lean clay stratum from 15 ft (el 602.4) to 25 ft. Loose to dense sand strata were encountered form 25 ft to the 90 ft exploration depth. Groundwater was encountered at the time of drilling at a depth of 11 ft (el 606.4).

The poorly graded sand encountered within our field investigation below the ground surface was comprised predominantly of fine to medium grain sand particles indicating a grain size generally ranging from 0.074 to 2 mm (0.0029 to 0.0787 inches). Generally, for a constant flow velocity, the erosion and transport potential of sediment will increase with decreasing grain size (neglecting intergranular forces such as cohesion). The relatively small grain size for the encountered sand indicates the poorly graded sand is susceptible to erosion.

Bedrock elevations encountered in our investigation correspond closely to the elevations predicted in the MTU seismic surveys conducted at Points A, B, C and D as well as the gravity survey data presented. Our limited electrical resistivity testing confirmed the MTU conclusion that resistivity testing is not effective in defining the bedrock elevation.

The McLain State Park shoreline is a product of geological constraints, human development and erosion. Considering the data gathered to-date in conjunction with a review of previously performed studies and data sets provided, evidence points towards the slowing erosion of the shoreline between the headland and the Keweenaw Waterway. The headland area of the Park is the most stable area with the lowest erosion rates due presumably to the presence of relatively high bedrock preventing the erosion of susceptible material both on-shore as well as off-shore. Recession data collected east of the headland predicts an average recession rate of 1.3 ft/yr from 1995 to 2013 with elevated erosion rates occurring from 1995 to 2000 during a period of high water levels in Lake Superior. Fluctuating water levels within Lake Superior are expected to result in fluctuating erosion rates across the Park.

The theory that high bedrock relative to the ground surface is responsible for lower shoreline recession rates is supported by historical aerial evidence as well as recession data recorded over the last 18 years, particularly at the headland where bedrock is known to be high relative to other areas of the Park and where estimated recession rates are the lowest across the Park shoreline.

6.0 RECOMMENDATIONS

In consideration of the construction and/or relocation of existing structures/infrastructure within the Park, future development areas may be divided into four categories defined below:

1. Imminent Hazard Area – Area susceptible to erosion with the next 10 years
2. Intermediate Hazard Area – Area susceptible to erosion within the next 10 to 30 years
3. Longer Term Hazard Area – Area susceptible to erosion within the next 30 to 60 years
4. Low Hazard Risk Area – Area not susceptible to erosion within the next 60 years

Habitable structures and utilities, should not be considered within areas categorized as “imminent hazard” areas. Moveable structures may be considered within “intermediate hazard” areas as well as pavement areas if some risk associated with pavement loss due to erosion can be accepted. Semi-moveable structures may be considered within “longer term hazard” areas while permanent structures may be considered within “low hazard risk.”

It is our opinion that future development should concentrate the construction of permanent structures and infrastructure within the area south of the headland area due to the low rate of erosion expected along the shoreline of this area when compared to the shorelines to the west and east of the headland. A second option for development, and one with more risk associated with future erosion, is development of the Park between the headland and the Keweenaw Waterway. Although a higher risk option, evidence based upon prior studies suggests decreasing erosion rates within this stretch of shoreline as a somewhat stable shoreline orientation is developed with respect to preferential wind and wave direction. In lieu of installing an erosion prevention system (i.e. structural erosion protection), permanent structures may be considered in this area set back a distance from shore corresponding to an agreed upon average erosion rate and the desired design life of the proposed structure or infrastructure. Erosion rates are expected to be significantly less (if not negligible) immediately south and west of the east Keweenaw Waterway breakwall.

Future investigation/research which may be helpful in more accurately predicting future shoreline erosion rates are summarized below:

- The available data and prior reports should be studied to conclude whether the shoreline between the breakwall and headland is stable or approaching stable over the next decade as suggested in the 2001 Baird *Shoreline Stability Study*.

- Further research should be conducted to evaluate the correlation between periods of higher recession rates and lake water elevations.

As discussed previously, coastal systems such as that at McLain State Park are dynamic and as such no guarantee is made here on behalf of Materials Testing Consultants that future bluff recession will occur at historic rates.

REFERENCES

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- U.S. Army Corps of Engineers, Detroit District “McLain State Park Erosion Study”, 1997.

- Vergin, Taylor “Gravity and Seismic Survey Report on Erosional Stability” July 2013.

- Warren, E.J. “The Bedrock Topography of the Keweenaw Peninsula, Michigan”, 1981.

- W.F. Baird & Associates “shoreline Stability Study McLain State Park, Michigan”, July 2001.

Appendix E – DEQ Final Report Bluff Recession Rate Analysis

Final Report
Bluff Recession Rate Analysis at F.J. McLain State Park
Houghton County, Michigan

In support of Michigan Coastal Zone Management Program
Project #14-CHaz-002
F.J. McLain State Park General Management Plan and Geological Erosion Impact Study

Michigan Coastal Zone Management Program
Office of the Great Lakes
Department of Environmental Quality

August 15, 2014

Table of Contents

I. Introduction

A. Background

Erosion of the coastal bluff within F.J. McLain State Park has been a management challenge for decades, with several past research and study efforts devoted towards assessing the mechanics and rates of erosion. Continued chronic erosion and threat of additional loss of campground infrastructure prompted the Department of Natural Resources (DNR), Parks and Recreation Division to apply for grant funds from the Michigan Coastal Zone Management (CZM) Program, Office of the Great Lakes, Department of Environmental Quality for an erosion study and general management plan effort for the park. The purpose of the grant project is to determine where future erosion will likely occur versus those stretches of the park's coast that will tend to be relatively stable, thus identifying areas within the park where relocation of infrastructure should and should not occur.

The larger project effort consists of three distinct components. First, a field-based geophysical study is being conducted by Materials Testing Consultants, Inc. (MTC) to analyze the subsurface geology to effectively understand the location of near-surface bedrock and other relatively stable geologic areas along with associated effects these areas may have on shore erosion in the future at the park. Second, the shoreline and bluff recession rate provided for in this document serves as an updated, rigorous evaluation of long-term annualized rates of recession within the park. Finally, a park general management plan will be completed (under contract from DNR to Clearzoning) to develop a full assessment of coastal hazards, current natural, historic, cultural, and recreational resources at F.J. McLain State Park. The general management plan will define the park 'Purpose' and 'Significance' as well as specific 'Management Zones' for the park. This general management plan will consider and incorporate the findings of the first two subtasks to plan for wise and sustainable future use and management of the park with respect to the coastal hazards element.

B. Project Scope

This recession rate analysis at F.J. McLain State Park combines field-collected and remotely-sensed data within a geographic information system (GIS) to calculate updated annualized bluff and shoreline recession rates within the park. Locations of the bluff and shoreline through time are acquired from three sources including: 1) digitized from digital orthoimagery; 2) field-collected using a global positioning system; and 3) interpreted as based on field notes from DNR staff at F.J. McLain State Park. Projected Recession Distances (PRDs) are provided based on the historic recession rates. PRDs for the bluff line foster the mapping of coastal erosion hazard zones, which the general planning effort might accommodate through the relocation of existing infrastructure and appropriate site planning for future infrastructure investments. This effort advances knowledge from past studies by providing an expanded time period of study. Further improvements are realized through the application of field-collected data and advanced photogrammetry techniques.

C. Location and Setting

F.J. McLain State Park contains 432 acres of land and two miles of Lake Superior shoreline in Hancock Township, Houghton County - approximately seven miles north of the City of Hancock (Figure 1). The park is a popular coastal destination with approximately 160,000 visitors annually. The study area is located in T56N, R34W, sections 21, 22, and 23.

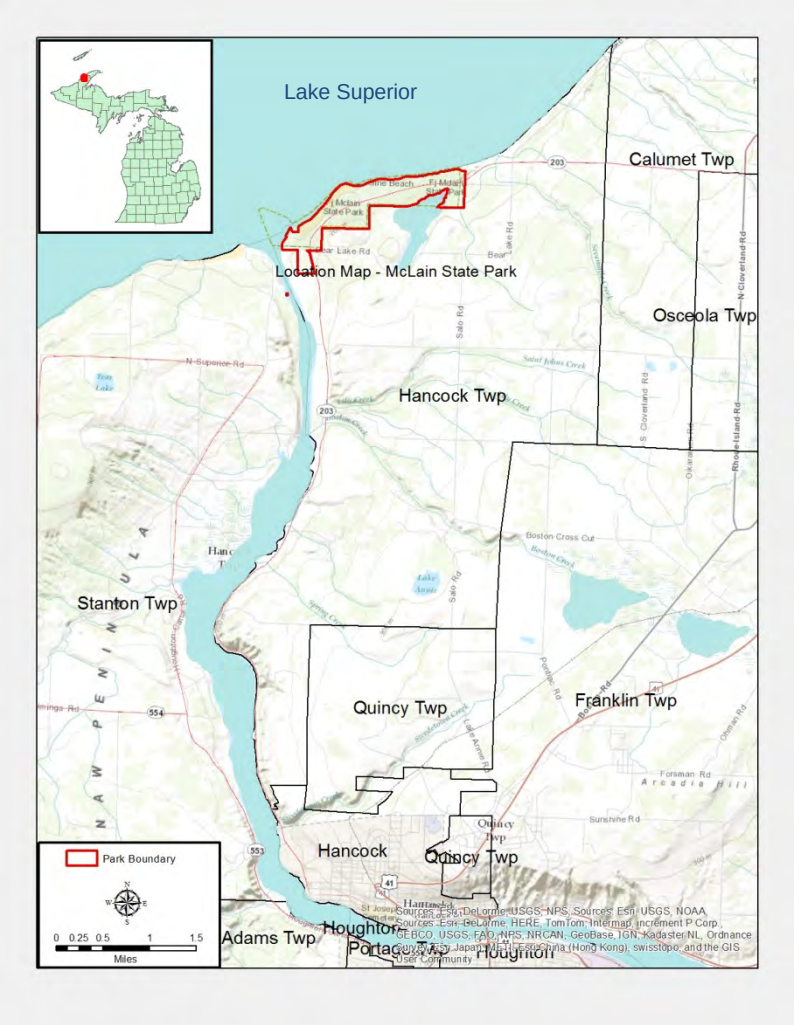

Figure 1. Map showing location of F.J. McLain State Park.

D. Geology

A geologic assessment of the park area is beyond the scope of this effort as the associated geophysical investigation is anticipated to provide insight needed with respect to identification of geomorphic forms within the park that are resistant to coastal erosion. The geophysical study will identify those areas where the underlying sandstone bedrock lies close enough to the ground surface that it will ultimately have an effect on the rates of coastal recession.

Variations in the study site's geomorphology are considered within the context of this recession rate study because a direct relationship exists between the geomorphology of the coast and the type and intensity of erosion, as well as

implications on the approach to be used in identifying an appropriate erosion reference feature.

E. Past Studies

Several past studies at F.J. McLain State Park have been conducted including a July 2001 Master Plan conducted by M.C. Smith Associates and Architectural Group, Inc. The 2001 Master plan included a recession rate study contracted to W.F. Baird and Associates. Other studies include a University of Michigan effort which utilized a numerical model to predict erosion within the park and a 1997 U.S. Army Corps of Engineers (USACE) erosion study. Recession rates within the park were also calculated as part of the 1982 High-Risk Erosion Area study conducted by the Department of Natural Resources for Houghton County. Rates of recession calculated in these past efforts are variable as shown in the following table.

Entity	*Study Title*	*Temporal Period of Study*	*Projected Maximum Bluff Recession Rate (feet/year)*
DNR Division of Land Resource Programs	Bluff Recession Rate Study – High Risk Erosion Area Program	1938 – 1980	2.1
USACE – Detroit District	F.J. McLain State Park Erosion Study	1938 – 1991* 1995 – 1997**	3* 7.5**
W.F. Baird & Associates	Shoreline Stability Study: F.J. McLain State Park, Michigan	1938 – 1998	3.3

*(based on aerial photograph analysis)
**(based on DNR field measurements)

II. Recession Rate Analysis Methods

Recession rates are calculated using two primary sources: 1) a remote sensing approach utilizing primarily aerial imagery, and 2) interpretation and analysis of DNR-collected field data. Both approaches are aided by the field data collection efforts of the CZM Program conducted May 28-29, 2014.

A. Field Data Collection

The CZM Program's Trimble GeoExplorer GeoXT 6000 series differential GPS unit is used to capture the location of the bluff line. Field data collection at F.J. McLain State Park occurred May 28–29, 2014. The bluff line data collection starts near the pier structure at the southwest end of the study area, heading northeast to the opposite end of the study area – stopping short of the eastern park boundary by approximately 900 feet due to accessibility issues. This easternmost portion of the park is not anticipated to be utilized by the DNR and also is not included in the MTC geophysical survey. A GPS location is collected every meter along the top of the bluff.

The shoreline (wetted perimeter) position is collected with the GPS starting at the northeast end of the study area, heading southwest to the opposite end of the study area. A position is collected every five meters along shoreline.

In addition to the GPS data, site photos capturing the general layout of the beach and designated swim area are captured from both ends of the beach, with photographs taken from the shoreline and the landward extent of the beach area. Photographs of the bluff are taken approximately every 200 meters along shore.

Trimble TerraSync software is used to manage field data collection. GPS Pathfinder Office Software Version 5.30 is used for development of the data dictionary used for data collection and also to post-process collected GPS data.

B. DNR Field Measurement Analysis

DNR field notes (Appendix B) documenting bluff recession within F.J. McLain State Park contain recession measurements at 22 different sites in the park from 1976 through 2013. The measurements are documented as a measured distance from benchmark features. The majority of the features are nails that have been driven into the road surface; however, landmarks such as the picnic/toilet building and swing in the picnic area are also used. Geographic positions of the benchmark features were collected on-site with the GPS unit fostering the mapping of these benchmarks within the geographic information system (GIS).

Measurements based on the nail benchmarks are represented in Appendix A – Sheet 1. A transect is placed from the benchmark to the oldest recorded position of the bluff/shoreline at each location. The direction of transects from benchmarks is constructed in a direction that is the least distance to the bluff line. A line feature from the oldest recorded position to the most recent field measurement is then created in the GIS to display the total distance of change at each transect. Each feature is attributed with the calculated end-point recession rate.

The GPS-acquired location of the five landmark features from which the DNR measures bluff and shoreline change is shown in Appendix A – Sheet 2. Measurements at the landmark features have been acquired over a variety of time frames and thus the period of data collection is shown along with the calculated end-point rate of recession for each landmark feature.

C. Photogrammetry-based Analysis

The photogrammetry-based analysis uses digital imagery within a GIS to track past movement of bluff and shoreline features.

Aerial Photograph Acquisition

An assessment of available shoreline aerial prints and digital images is conducted and photo sets utilized determined based on photo scale, season (leaf-on vs. leaf-off conditions), time period represented, associated water level conditions, and quality of the photograph. Recent data sources are available in

the form of digital orthoimages, which are geometrically corrected images such that the scale is uniform and the photo has the same lack of distortion as a map. Unlike an uncorrected aerial photograph, an orthophotograph can be used to measure true distances, because it is an accurate representation of the Earth's surface, having been adjusted for displacement errors that may result from topographic relief, lens distortion, and camera tilt. Aerial photographs for the study area are available dating back to 1938. Photographic prints are the common format for the older historic data sets, which are scanned on a high-resolution flatbed scanner. More recent data sets are available as digital orthoimages. Figure 2 provides details for the aerial photographs and images used in this study.

Date of Photograph / Imagery	Entity for Photograph Origin	Photo Numbers	Acquired as Photograph or Digital Image	Image Ground Resolution (ft.)	Estimated Error (Total Root Mean Square error)	Lake Superior Water Level at Time of Photo Acquisition (Feet)*
9/17/2008	Department of Homeland Security (DHS)		Digital Image	1		601.61
5/19/1992	National Aerial Photography Program	4906-133	Photograph	4	0.005	601.44
5/14/1984	Farm Service Agency	789-11	Photograph	5	0.0018	602.00
4/27/1980	USACE	241-3, 241-5, 241-6, 241-8	Photograph	0.49	241-3: 0.0096 241-5: 0.0057 241-6: 0.0047 241-8: 0.0039	601.54
5/8/1977	DNR	544, 545, 548, 549	Photograph	0.81	544: 0.0055 545: 0.0059 548: 0.0053 549: 0.0055	601.28
8/10/1963	DNR	167, 171	Photograph	1	167: 0.0041 171: 0.0053	601.84
7/22/1954	Farm Service Agency	4N-153, 5N-02	Photograph	1	153: 0.0049 02: 0.0038	602.43
6/22/1938	National Archives	A-4-96, A-4-92	Photograph	2	96: 0.0044 92: 0.004	602.75

Figure 2. Aerial photographs and images used in recession rate analysis.
*This column shows monthly lake-wide average water levels of Lake Superior at the month of photo acquisition. Vertical reference datum is the International Great Lakes Datum, 1985. Data are from The Great Lakes Water Level Dashboard (http://www.glerl.noaa.gov/data/now/wlevels/dbd/) (Gronewold et al. 2013).

Rectification of Aerial Imagery

Accurate orthoimages are necessary prior to extraction of the bluff and shoreline features as this causes all historic images to align geospatially and fosters accurate measurements and change detection. Digital aerial images not orthorectified when acquired are orthorectified in Erdas Imagine 2014 software.

This process applies a digital elevation model along with photo-identifiable ground control points to remove the elevation and radiometric distortions inherent in aerial photographs, thereby resulting in a geospatially-accurate photographic base.

To conduct the image orthorectification, a projective transformation is performed with reference to a 10-meter digital elevation model and the 2013 ortho-images of the study site. On average, approximately 15 Ground control points (GCPs) were selected for each image. The selection of GCPs are mostly based on man-made structures where the location of these structures have not changed and can be identified through visual inspection between the 2013 orthoimage and older aerial images, such as road intersections, buildings, or parking lots. Few GCPs are selected based on natural features on the landscape, such as trees or the edge of forest. The location of each GCP is regularly checked for the root mean square (RMS) error, which is the distance between the source GCP and its corresponding transformed GCP. If RMS error of a particular GCP is significantly higher than others, the location of that GCP is re-selected; or the GCP is deleted to ensure the quality of orthorectification. After the selection and validation of GCPs, resampling is applied to produce orthoimages of available photo year.

To assess the consistency of GCPs with reference to the 2013 ortho-images after orthorectification, the total RMS error of an image is calculated based on the X residual (the distance in the X direction between source GCP and transformed GCP) and Y residual (the distance in the Y direction between source GCP and transformed GCP) as follows. Figure 2 includes the result of total RMS error of each image.

$$Total\ RMS\ error = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(XR_i^2 + YR_i^2)}$$

RX_i = The X residual of GCPi
RY_i = The Y residual of GCPi

Extraction of Bluff and Shoreline Features

Heads up digitizing is conducted using ArcGIS version 10.1 to trace the interpreted bluff and shoreline features. Orthoimages from various years are examined under map scales ranging from 1:200 to 1:1000 depending on image ground resolution. The shoreline is identified as the wetted perimeter on the beach; the line demarking the maximum uprush of waves in the swash zone. This boundary can be distinguished based on color differences between land and lake surface.

The bluff line is interpreted as the boundary line where the upland or “table” land has a distinct break, sloping steeply lakeward toward the open beach. The bluff line may refer to the top of a “high bluff” or “low bluff” (Figure 3) depending on the height of the bluff. The former is often more than 10 feet high from toe to top, occurring mostly on the east to central portion of the park’s shoreline; while the latter is often less than 5 feet high, predominately west of the stable headland.

The high bluff line often coincides with the edge of vegetation, so there is usually a clear boundary on the aerial images separating the beach and the vegetation areas. Image interpretation of the high bluff line is thus based primarily on the identification of the vegetation line and/or the existence of a shadow that occurs due to the sharp slope break. The low bluff line is usually on the beach, so the location of low bluff line may be less clear depending on the quality of aerial imagery. We do not digitize or utilize for purpose of calculating recession rates the location of low bluff lines if there is insufficient information in the aerial image for proper feature interpretation.

Figure 3. Photographs showing typical "high bluff" (left) and "low bluff" shore types at F.J. McLain State Park.

The "low bluff" shoretype at F.J. McLain State Park complicates feature tracking and calculating reliable recession rates because this multi-tiered terrain makes it difficult to consistently choose an erosion reference feature. Figure 4 provides an example where the low bluff or berm is lakeward of the forested area. Topography in the forested area resembles a rolling dune and contains no distinct and continuous slope break that can be tracked over time. Consideration is given to the nature of the modern feature tracked in the field with the GPS unit for a given stretch to ensure that feature extraction from the historic aerial imagery is interpreting the same geomorphic feature. An 800 foot stretch of coast - heading west from the central point of the headland – has no distinct bluff line causing the lakeward extent of perennial vegetation to be collected as the reference feature.

Figure 4. Photograph taken at west end of the study area showing low bluff or berm. Topography toward the right of the photograph in the forested area is rolling with no distinct slope break.

Calculation of Recession Rates

Historic bluff and shoreline positions are analyzed within a GIS using the Digital Shoreline Analysis System (DSAS), version 3.2 from the United States Geological Survey and Woods Hole Oceanographic Institute. The DSAS is a software extension to ESRI ArcGIS that enables calculation of shoreline rate-of-change statistics from multiple historic shoreline positions. Shore-normal transects are created at 150-foot intervals along the study area shoreline intersecting all mapped recession reference features. DSAS calculates a full suite of rates based on various analytical approaches including end point recession rates and linear regression rates. Resultant rates are incorporated into the attribute table for the transects layer within the GIS.

Maps and rates calculated for the long-term analysis are based on the linear regression rate-of-change statistics as are determined by fitting a least squares regression line to all shoreline points for each transect. The rate is the slope of the best-fit line. Crowell, et. al. (1998) identified the linear regression approach as the most reliable predictor of shoreline trends for extended periods (30+ years). Advantages of linear regression include: 1) all the data are used, regardless of changes in trend or accuracy; 2) the method is computational; 3) it is based on accepted statistical concepts; and 4) it is easy to employ (Thieler, et. al).

PRDs for 30-year and 60-year planning horizons are calculated for reaches based on the reach's average recession rate. PRDs are calculated per standard DEQ process under the High-Risk Erosion Area Program. The area average recession rate is multiplied by the number of years (30 & 60), value rounded to

the nearest 5 feet, and 15 feet is added to account for potential loss due to storm events.

III. Results

A. DNR Field Measurement Analysis

Recession distances and resultant end-point rates based on field measurements taken by DNR-Parks and Recreation Division staff are depicted in Appendix A – Sheet 1. These rates are based on measurements taken from nail benchmarks driven into the road and reflect recession over a shorter record (1995 – 2013) than calculations from the aerial image analysis. Rates range from 0.2 feet per year (multiple locations) to 3.7 feet per year measured at benchmark number 14 located approximately 100 feet east of the day use restroom building. Recession hotspots such as the 1,500 foot stretch immediately east of the headland mimic the results of the aerial analysis; however, the field measurements reveal relatively stable stretches in recent times that are masked in the results of the longer study. The first 700 feet of coast east of the gabion shore protection structure (at benchmark N10) has receded less than one foot per year on average since 1995; however this same stretch averages 1.5 feet per year of recession since 1938.

DNR-Parks and Recreation Division staff measures bluff recession from landmark features in addition to the nail benchmarks. Locations of the five landmarks along with dates of available data records and calculated end-point recession rates are displayed in Appendix A – Sheet 2. Rates are highly variable and appear to correlate with the available dates of data capture. Points with high rates (> 4.0 feet per year) captured the record high-water level period of the mid-1980's while data capture for the lower rates (< 1.0 feet per year at landmarks L2 and L5) did not commence until the 1990's, which coincides with the beginning of the decade-plus long low-water period. This map reveals the potential for rates over a short-term period to significantly exceed those rates calculated over the longer term.

B. Photogrammetry-based Analysis

Results for both shoreline and bluff line change are detailed in the sections to follow. The bluff line feature as the landward-most break in terrain from the table land down to the beach deserves highest consideration because it is this feature which presents the first hazard in terms of potentially undermining infrastructure. Change in the shoreline position may corroborate findings of the bluff analysis and provide insight on locations where beach width is changing at rates that differ from those of the bluff line; however, the shoreline will not be the first feature to cause harm to park infrastructure and, as will be detailed below, Lake Superior water levels may cause false "change" indications if water level variations are not considered in a shoreline change analysis.

Shoreline Change

Extracted shorelines for eight dates between 1938 and 2014 are shown in Appendix A – Sheet 3. A southerly, or landward, movement over time is the general trend for the shoreline; however, lower water levels and resultant accretion of the beach does show up from time to time as a temporary lakeward-movement of the shoreline feature. Dramatic landward-movement of the shoreline occurred during the early 1938 to 1954 time period, especially toward the western extent of the study area. As much as 320 feet of shoreline recession occurred during this 16 year time period at a location 575 feet east of the eastern navigation jetty. An artificial influence may well have contributed to this 20 foot per year rate such as the placement of fine, non-beach compatible dredge materials that are easily eroded.

Appendix A – Sheet 4 shows shoreline recession rates for the 1938 through 2014 time period as calculated through a linear regression approach. Rates are displayed as a heat map with reaches having higher recession rates in hotter (red to orange) colors. The first 2,500 feet of shore east of the navigation jetty has the highest shoreline recession. These rates are certainly influenced by the erosion that occurred during the 1938 to 1954 time period outlined previously. The next reach toward the east, extending almost 1,200 feet to the apex of the headland, conversely has receded on average only half a foot per year during this same time period.

Water level variations on the Great Lakes require user-caution when comparing shoreline positions over time. At an elevation of 602.75 feet (IGLD ’85) the June 1938 shoreline was taken during the highest average monthly water level of all shoreline data presented, and thus the position change between the 1938 date and other time dates including the June 2014 (601.93 feet) would actually be increased somewhat if water levels in the modern time frame returned to the 1938 level. Thus the shoreline recession depicted is somewhat underestimated given that the lake level is currently lower than the historic record. It is possible to adjust and calibrate the rates to a common lake elevation using the beach profile; however, the results would be only slightly altered with a slight increase in the shoreline recession rates. Such adjustments are not conducted here because shoreline recession rates provide additional insight but should not be the primary basis for planning construction setbacks. Bluff line recession rates, which are less affected by water levels and also pose the first threat to park infrastructure, should be the basis for planning future siting of infrastructure.

Bluff Line Change

Bluff line positions for nine dates between 1938 and 2014 as extracted from aerial imagery and collected via GPS are displayed in Appendix A – Sheet 5. Areas with widely spaced bluff lines indicate significant change in bluff position over time and higher rates of recession (see map insets).

Grouping similar bluff recession rates and calculating area rate averages results in delineation of twelve distinct reaches with calculated annualized rates of recession and projected recession distances (Appendix A – Sheet 6). Reach

average rates range from 0.5 feet per year to 2.3 feet per year. Rates of 2.0 feet per year or more occur at reaches B2, B6 and B8 and, in total, extend slightly more than 1,100 feet or 10% of the study area shore. Approximately 3,800 feet (35%) of the shoreline reach length is at or below 1.0 feet per year, leaving 55% percent of the shoreline in the range of 1.1 to 1.9 feet per year.

Examination of statewide recession rates provides context to those calculated within the park. Approximately 233 miles (6%) of Michigan's Great Lakes coast has been documented as receding at a rate of one foot per year or greater. The highest documented long-term rate of recession is 17 feet per year at a location east of Grand Marais, Burt Township, Alger County, Michigan. The table below provides a breakdown of the relative intensity for statewide erosion areas.

Coastal Recession Vulnerability Ranking	Length (miles)	Percentage of Michigan's Great Lakes Coast	Percentage of High-Risk Erosion Area coast (receding greater than one foot per year)
Very High (>3.0 ft/yr)	28	1%	12%
High (2.0 – 2.9 ft/yr)	47	1%	20%
Moderate (1.0 to 1.9 ft/yr)	158	4%	68%
Low (<1.0 ft/yr or not studied)	3608	94%	-

Relatively high recession rate reaches are spread amongst the study area rather than being clustered along one stretch of shore that could easily be planned around. Some of the highest long-term recession rates exist to the east of the eastern navigation jetty (Reach B2), immediately east of the headland (Reach B6), and in the campground from the approximate area of campsite number 79 to campsite number 83 (Reach B8).

Relatively low bluff recession rates occur at the headland and immediately to the west for a distance of approximately 800 feet (Reach B4) and along the shore adjacent to the mini-cabins (Reach B10). While rates at reach B10 are relatively low over the long-term, this stretch near the mini-cabins has receded at a higher rate in the recent past two decades than in previous times (see Figure 5).

Figure 5. Bluff recession over time toward eastern end of road that serves the mini-cabins. Note relatively large change in bluff position between 1992 and 2008 bluff lines.

Both 30-year and 60-year PRD's are displayed by reach in Appendix A – Sheet 6. PRD's may be considered as **minimum** recommended setback values. Exceeding these minimum recommendations for planning purposes at McLain is strongly advised due to the uncertainty of future conditions and influences on coastal recession. The placement of beach nourishment is one such influence occurring in the past as the U.S. Army Corps of Engineers periodically placed dredged material from the Portage Waterway Entry onto the beach east of the eastern navigation jetty until this practice ceased in 1976 (W.F. Baird & Associates, 2001). Lack of any beach nourishment efforts in the future, along with decreased sediment supply, may cause rates of erosion to increase. Water levels provide another unknown variable into the future as a prolonged high-stand could increase future recession rates.

IV. Discussion – Application of Projected Recession Distances

Crowell, et. al. (1993) outlined the reasons long-term recession rate data is preferable to short-term data. Historic recession rates should be projected into the future no longer than the period of duration they cover and hence the DNR field measurements should be projected into the future no further than 18 years (2032). Longer term planning efforts should utilize the longer term rates calculated through the aerial image analysis, which may support as long as a 76-year projection. Variability shown through shorter term values provided in this

report (through DNR field measurements and otherwise) along with future uncertainties with respect to variables including water levels and sediment supply, should prompt a more conservative application of the PRDs to the extent possible and increased construction setbacks for future park infrastructure.

Data presented herein should be integrated with results from the on-going geophysical survey being conducted by Materials Testing Consultants, Inc. prior to the development of any final coastal construction setback distances and/or identification of any “no-build” areas within the park. Recession rate data and associated guidance presented in this report are based on historic conditions. As discussed previously, coastal systems such as that at F.J. McLain State Park are dynamic and as such no guarantee is made that future bluff recession will occur at historic rates.

Data presented in this report, including rates of recession and projected recession distances, do not affect the property’s current status or designation under the High-Risk Erosion Area Program administered by the Water Resources Division, Department of Environmental Quality under Part 323, Shorelands Protection and Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Additional information regarding the current designation under the High Risk Erosion Area Program is available at www.mi.gov/shorelands.

V. References

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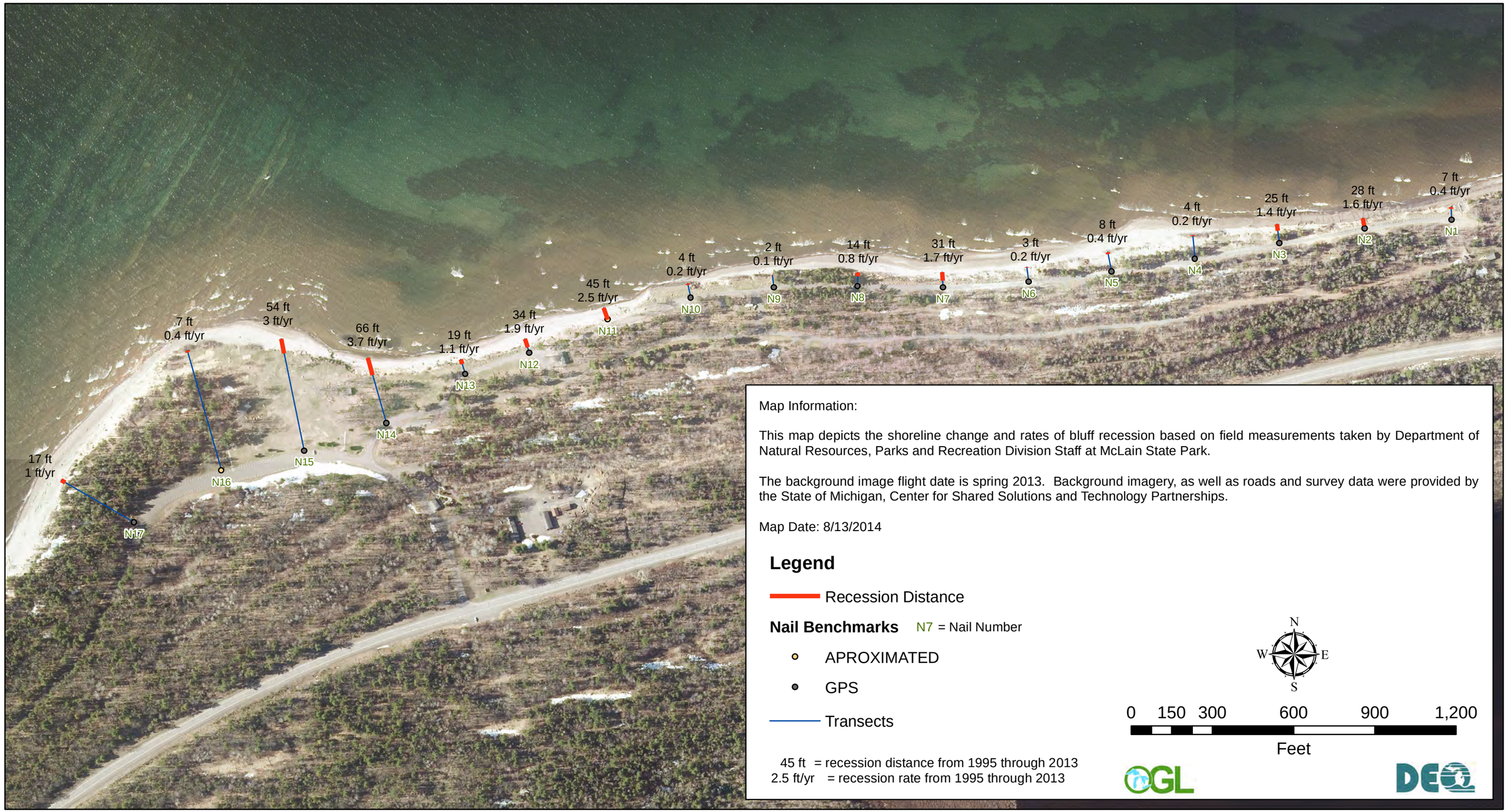
Appendix A – Map Sheets

Bluff Recession Rates (1995 - 2013) Based on DNR Field Measurements
McLain State Park



Map Information:

This map depicts the shoreline change and rates of bluff recession based on field measurements taken by Department of Natural Resources, Parks and Recreation Division Staff at McLain State Park.

The background image flight date is spring 2013. Background imagery, as well as roads and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.

Map Date: 8/13/2014

Legend

Recession Distance

Nail Benchmarks N7 = Nail Number

- APROXIMATED
- GPS

Transects

45 ft = recession distance from 1995 through 2013
2.5 ft/yr = recession rate from 1995 through 2013

N
W E
S

0 150 300 600 900 1,200

Feet

Bluff Recession Rates (Various Time Periods) Based on DNR Field Measurements from Landmarks
McLain State Park

Map Information:

This map depicts the shoreline change and rates of bluff recession based on field measurements taken by Department of Natural Resources, Parks and Recreation Division Staff at McLain State Park.

The background image flight date is spring 2013. Background imagery, as well as roads and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.

Map Date: 8/13/2014

Legend

- Landmarks

Sample Label
L2
10/17/1997 - 08/13/2013
0.8 ft/yr

- Landmark Identifier
- End Dates of Measurements
- Recession Rate

N
W E
S

0 100 200 400 600
Feet

Shoreline (1938 - 2014) Based on Aerial Imagery and Global Positioning System Data
McLain State Park

Map Information:

This map depicts shorelines from each year based on orthorectified aerial imagery and field-based global positioning system data.

The bluff lines from each year are shown in different colors. The three inset maps with larger map scales show locations with relative high recession rates.

The background image flight date is spring 2013. Background imagery, as well as roads and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.

Map Date: 7/10/2014

Legend

6/22/1938	4/27/1980
7/22/1954	5/14/1984
8/10/1963	5/19/1992
5/8/1977	5/29/2014

N
W E
S

0 350 700 1,400 2,100
Feet

Shoreline Recession Rates (1938 - 2014) and Associated Projected Recession Distances
Based on Aerial Imagery and Global Positioning System Data
McLain State Park

Map Information:

This map depicts the shoreline change and rates of bluff recession based on orthorectified aerial imagery and field-based global positioning system data.

Recession rates shown indicate the average for the shoreline reach. Rates are based on a linear regression calculation that considers all available photo dates for which the bluff line feature was extracted.

Projected Recession Distances are calculated as follows: The area average recession rate is multiplied by the number of years (30 & 60), value rounded to the nearest 5 feet, and 15 feet is added to account for potential loss due to storm events.

The background image flight date is spring 2013. Background imagery, as well as roads and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.

Map Date: 8/13/2014

Legend

Shoreline Recession Rate (Feet/Year)

0.5	1.4
0.9	1.6
1	3.4
1.1	4.3

30-Year Projected Recession Distance

60-Year Projected Recession Distance

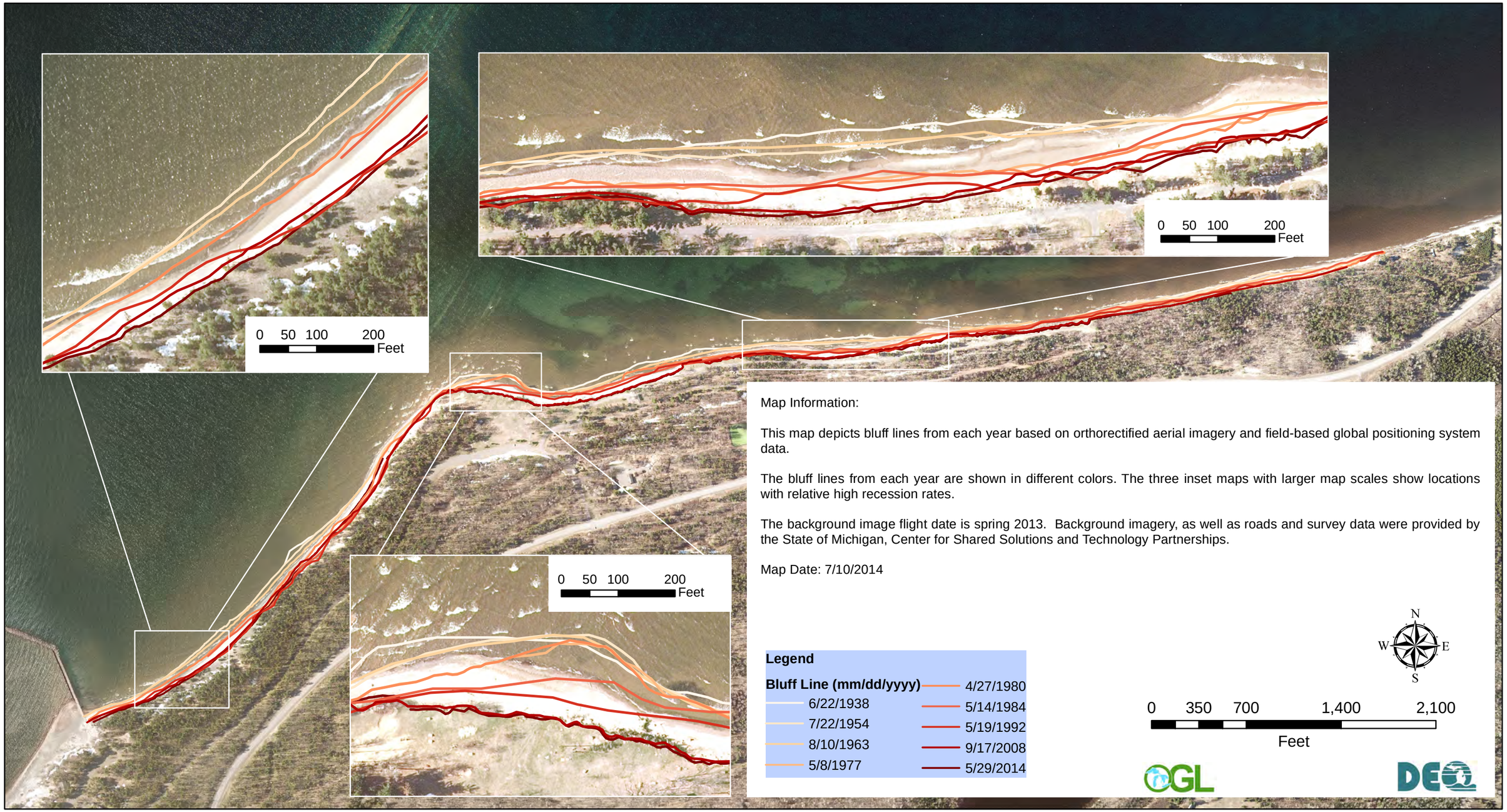
65' / 110'

N
W E
S

0 350 700 1,400 2,100

Feet

Bluff Line (1938 - 2014) Based on Aerial Imagery and Global Positioning System Data
McLain State Park



Map Information:

This map depicts bluff lines from each year based on orthorectified aerial imagery and field-based global positioning system data.

The bluff lines from each year are shown in different colors. The three inset maps with larger map scales show locations with relative high recession rates.

The background image flight date is spring 2013. Background imagery, as well as roads and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.

Map Date: 7/10/2014

Legend

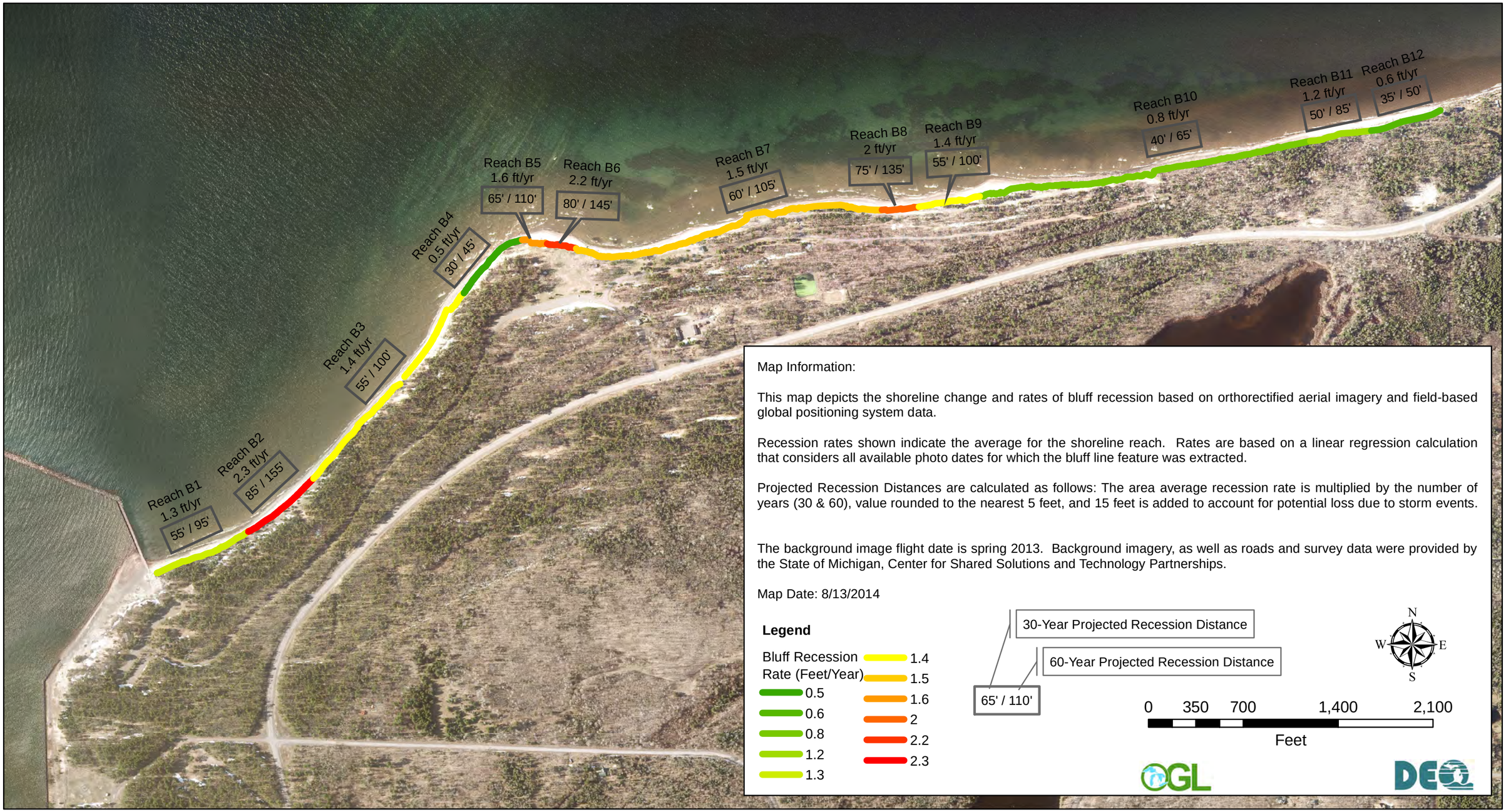
Bluff Line (mm/dd/yyyy)

- 6/22/1938
- 7/22/1954
- 8/10/1963
- 5/8/1977
- 4/27/1980
- 5/14/1984
- 5/19/1992
- 9/17/2008
- 5/29/2014

N
W E
S

0 350 700 1,400 2,100
Feet

Bluff Recession Rates (1938 - 2014) and Associated Projected Recession Distances
Based on Aerial Imagery and Global Positioning System Data
McLain State Park



Map Information:

This map depicts the shoreline change and rates of bluff recession based on orthorectified aerial imagery and field-based global positioning system data.

Recession rates shown indicate the average for the shoreline reach. Rates are based on a linear regression calculation that considers all available photo dates for which the bluff line feature was extracted.

Projected Recession Distances are calculated as follows: The area average recession rate is multiplied by the number of years (30 & 60), value rounded to the nearest 5 feet, and 15 feet is added to account for potential loss due to storm events.

The background image flight date is spring 2013. Background imagery, as well as roads and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.

Map Date: 8/13/2014

Legend

Bluff Recession Rate (Feet/Year)

- 0.5
- 0.6
- 0.8
- 1.2
- 1.3
- 1.4
- 1.5
- 1.6
- 2
- 2.2
- 2.3

30-Year Projected Recession Distance

60-Year Projected Recession Distance

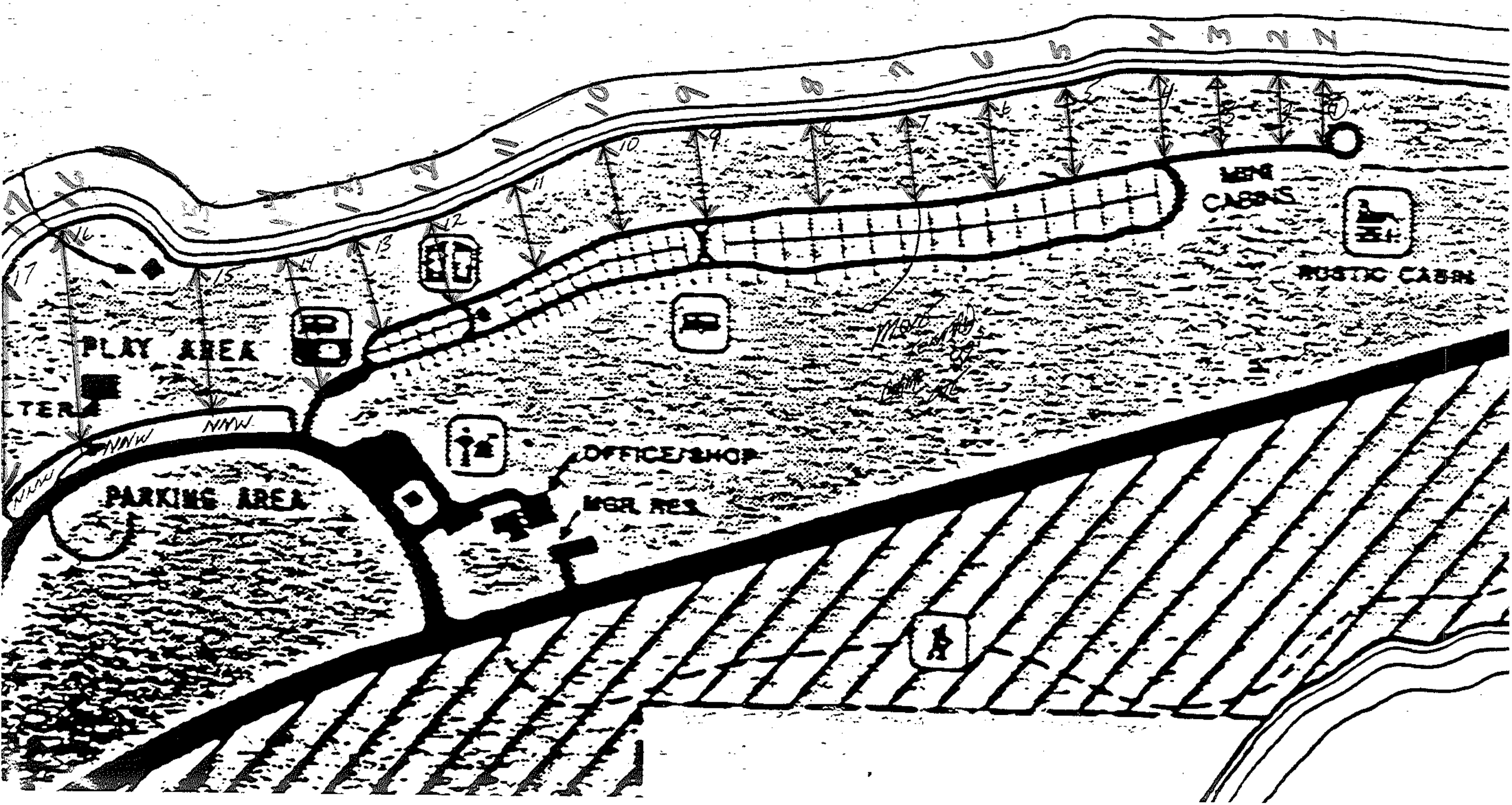
65' / 110'

N
W E
S

0 350 700 1,400 2,100

Feet

Appendix B – DNR Field Recession Measurements


PLAY AREA
PARKING AREA
OFFICE/SHOP
MGR. RES.
MINI CABINS
RUSTIC CABIN

MCLAIN PARK EROSION CHART						Data Input from sheets (Some Years have multiple measurements).						
DATE	10/30/1995	4/23/1996	6/27/1996	8/16/1996	10/3/1996	10/29/1996	11/4/1996	4/4/1997	4/21/1997	6/14/1997	8/14/1997	10/17/1997
NAIL #												
1	48	48	48	48	48	48	48	48	48	48	48	48
2	39	39	38'	38	32	30	27	26	25	25	25	25
3	72	72	72'	72	70	69	60	*	57	57	57	57
4	88	88	88	88	88	88	88	*	88	88	88	87
5	73	72	72	72	72	72	72	72	72	72	72	72
6	56	56	55	55	55	55	55	55	55	54	54	54
7	57	56	55	54	44	40	31	30	30	29	29	29
8	52	50	50	50	49	49	49	*	49	49	49	49
9	46	46	46	46	46	46	46	46	46	46	46	46
10	54	54	54	54	54	54	54	54	54	54	54	54
11	45	44	42	42	34	31	26	*	24	24	23	23
12	56	56	54	53	51	48	43	42	41	41	40	40
13	58	58	57	57	57	56	55	*	53	52	52	52
14	251	248	244	243	238	234	233	*	232	227	223	221
15	422	*	409	407	401	401	397	*	397	397	392	390
16	454	*	453	453	451	450	450	*	450	450	450	450
17	312	*	310	309	309	306	305	*	305	305	305	304
***SNOW COVERED NAILS - COULD NOT GET TO**												

McLAIN PARK EROSION CHART						Data Input from sheets (Some Years have multiple measurements).											
DATE	4/20/1998	7/22/1998	10/21/1998	4/26/1999	10/5/2000	4/26/2001	11/5/2001	7/24/2002	9/2/2003	4/21/2005	10/5/2006	7/8/2008	9/15/2009	7/26/2010	9/6/2011	8/13/2012	8/13/2013
NAIL #																	
1	48	48	48	47	47	47	47	47	47	47	45	43	43	42	42	42	41
2	25	25	25	24	23	23	23	23	23	23	23	23	23	22	14	12	11
3	57	56	55	55	54	54	54	54	54	53	52	50	50	50	48	48	47
4	87	86	85	84	84	34	84	84	84	84	84	84	84	84	84	84	84
5	72	69	68	66	66	66	66	66	66	66	66	66	66	66	66	66	65
6	54	54	54	53	53	53	53	53	53	53	53	53	53	53	53	53	53
7	29	28	28	28	28	27	27	27	27	27	27	26	26	26	26	26	26
8	49	48	47	47	45	45	44	43	41	41	39	39	38	38	38	38	38
9	46	45	45	45	45	44	44	44	44	44	44	44	44	44	44	44	44
10	54	54	54	54	54	54	54	54	54	54	54	54	50	50	50	50	50
11	22	20	19	18	15	15	12	11	11	10	ROAD GONE	XX	XX	XX	XX	XX	XX
12	40	38	38	38	38	38	37	37	36	33	28	26	25	24	23	23	22
13	52	50	50	49	49	49	48	48	46	45	45	43	43	43	42	40	39
14	220	214	213	209	206	204	204	204	202	193	190	188	187	187	187	186	185
15	387	387	381	378	378	378	378	378	378	377	377	377	371	368	368	368	368
16	450	450	450	450	450	450	450	450	450	450	448	447	447	447	447	447	447
17	304	304	303	303	302	302	302	302	302	302	301	301	299	295	295	295	295

McLAIN PARK EROSION CHART COMBINED ALL DATA																		
	Nail #	**10/30/1995**	**8/16/1996**	**8/14/1997**	**7/23/1998**	**4/26/1999**	**10/5/2000**	**4/26/2001**	**7/24/2002**	**9/2/2003**	**4/21/2005**	**10/5/2006**	**7/8/2008**	**9/15/2009**	**7/26/2010**	**9/6/2011**	**8/13/2012**	**8/13/2013**
	1	48	48	48	48	47	47	47	47	47	47	45	43	43	42	42	42	41
	2	39	38	25	25	24	23	23	23	23	23	23	23	23	22	14	12	11
	3	72	72	57	56	55	54	54	54	54	53	52	50	50	50	48	48	47
	4	88	88	88	86	84	84	84	84	84	84	84	84	84	84	84	84	84
	5	73	72	72	69	66	66	66	66	66	66	66	66	66	66	66	66	65
	6	56	55	54	54	53	53	53	53	53	53	53	53	53	53	53	53	53
	7	57	54	29	28	28	28	27	27	27	27	27	26	26	26	26	26	26
	8	52	50	49	48	47	45	45	43	41	41	39	39	38	38	38	38	38
	9	46	46	46	45	45	45	44	44	44	44	44	44	44	44	44	44	44
	10	54	54	54	54	54	54	54	54	54	54	54	54	50	50	50	50	50
	11	45	42	23	20	18	15	15	11	11	10	ROAD GONE	XX	XX	XX	XX	XX	XX
	12	56	53	40	38	38	38	38	37	36	33	28	26	25	24	23	23	22
	13	58	57	52	50	49	49	49	48	46	45	45	43	43	43	42	40	39
	14	251	243	223	214	209	206	204	204	202	193	190	188	187	187	187	186	185
	15	422	407	392	387	378	378	378	378	378	377	377	377	371	368	368	368	368
	16	454	453	450	450	450	X	450	450	450	450	448	447	447	447	447	447	447
	17	312	309	305	304	303	302	302	302	302	302	301	301	299	295	295	295	295
Campground Toilet Building	**18**	108	95	85	81	77	77	77	77	75	X	67	65	X	X	63	63	61
Manhole South of Campground	**19**	X	X	X	14	14	12	12	12	10	X	10	10	X	X	10	10	10
Picnic Toilet Building	**20**	125	118	106	106	105	X	103	103	101	X	95	88	X	X	70	66	64
Picnic area Swing NW corner	**21**	X	X	31	25	24	X	24	23	23	X	22	22	X	X	22	22	22

SHORELINE EROSION

FOLLOWING GROUND CONTOURS

L3

WELL #2
POINT #1

DATE	MEASUREMENT
11/5/1984	131
9/11/1985	127
5/14/1991	117
10/19/1992	113
11/4/1993	107
9/15/1994	103
11/30/1994	103
4/5/1995	103
7/18/1995	103
9/14/1995	103
11/2/1995	103
10/29/1996	86
8/14/1996	75
SAME MEASUREMENT	
AS POINT NUMBER 7	
ON CHART	

L4

CAMPGROUND TOILET BLDG
POINT #2 (18 on chart 4)

DATE	MEASUREMENT
4/28/1978	225
11/5/1984	137
9/11/1985	134
5/14/1991	120
10/19/1992	119
11/1/1993	118
9/15/1994	118
11/30/1994	111
4/5/1995	111
7/18/1995	108
9/14/1995	107
11/2/1995	106
10/29/1996	95
8/14/1997	85
10/17/1997	85
4/20/1998	84
7/22/1998	81
10/21/1998	81
4/26/1999	77
10/5/2000	77
4/26/2001	77
11/5/2001	77
7/24/2002	77
9/2/2003	75
10/5/2006	67
7/8/2008	65
9/6/2011	63
8/13/2012	63
8/13/2013	61

L5

MAN HOLE BY END
OF CAMPGROUND (19 on chart 4)

DATE	MEASUREMENT
10/21/1998	14
4/26/1999	14
10/5/2000	12
4/26/2001	12
11/5/2001	12
7/24/2002	12
9/2/2003	10
10/5/2006	10
7/8/2008	10
9/6/2011	10
8/13/2012	10
8/13/2013	10

SHORELINE EROSION

FOLLOWING GROUND CONTOURS

L1

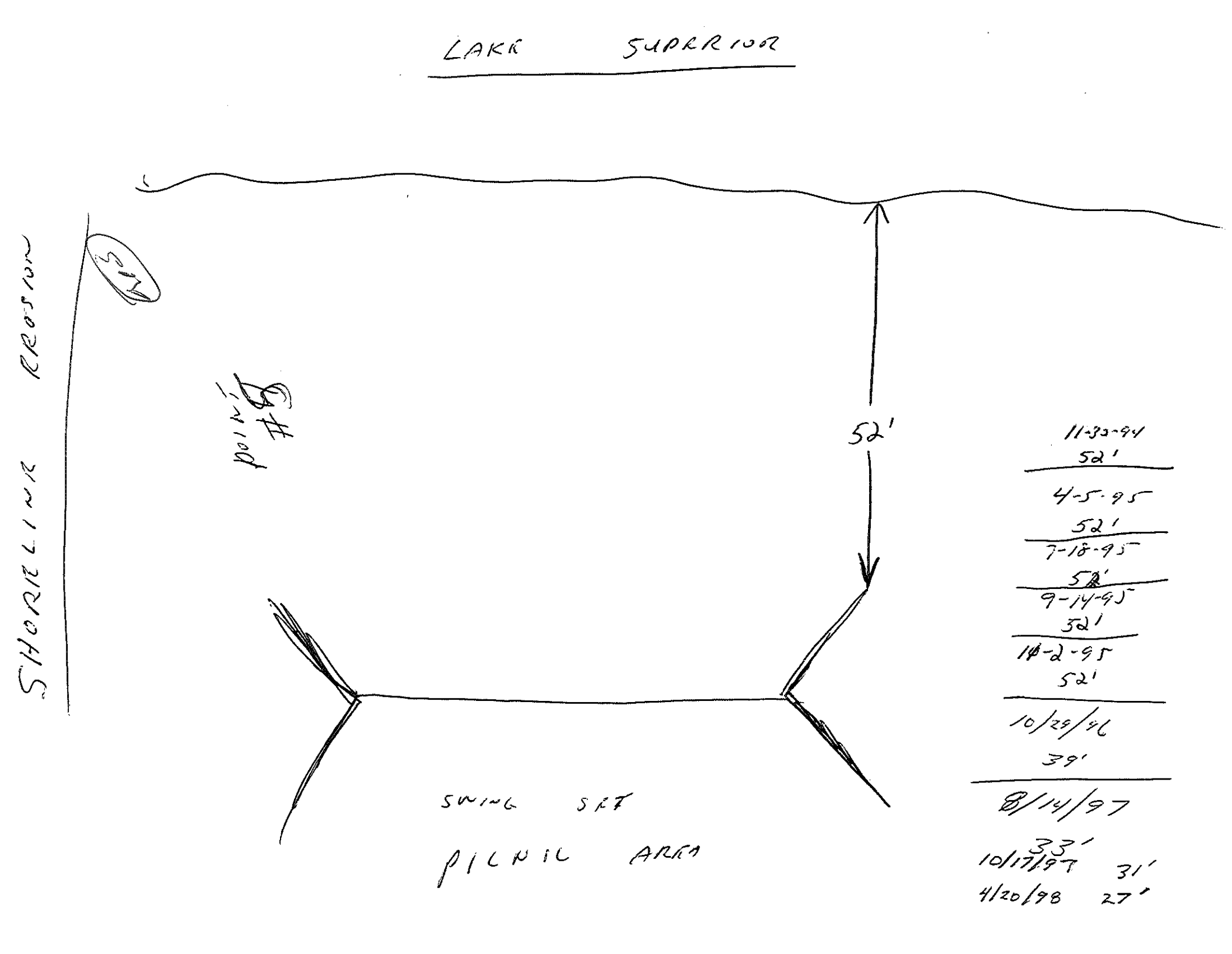
PICNIC TOILET BUILDING
POINT #3 (20 on chart 4)

DATE	MEASUREMENT
4/22/1976	225 /65
10/19/1992	123/33
11/4/1993	123/26
9/15/1994	120/33
11/30/1994	118/30
4/5/1995	118/37
7/18/1995	118/37
9/14/1995	125/37
11/2/1995	125/37
10/29/1996	118
10/17/1997	106
4/20/1998	106
7/22/1998	106
10/21/1998	105
4/26/1999	105
4/26/2001	103
11/5/2001	103
7/24/2002	103
9/2/2003	101
10/5/2006	95
7/8/2008	88
9/6/2011	70
8/13/2012	66
8/13/2013	64

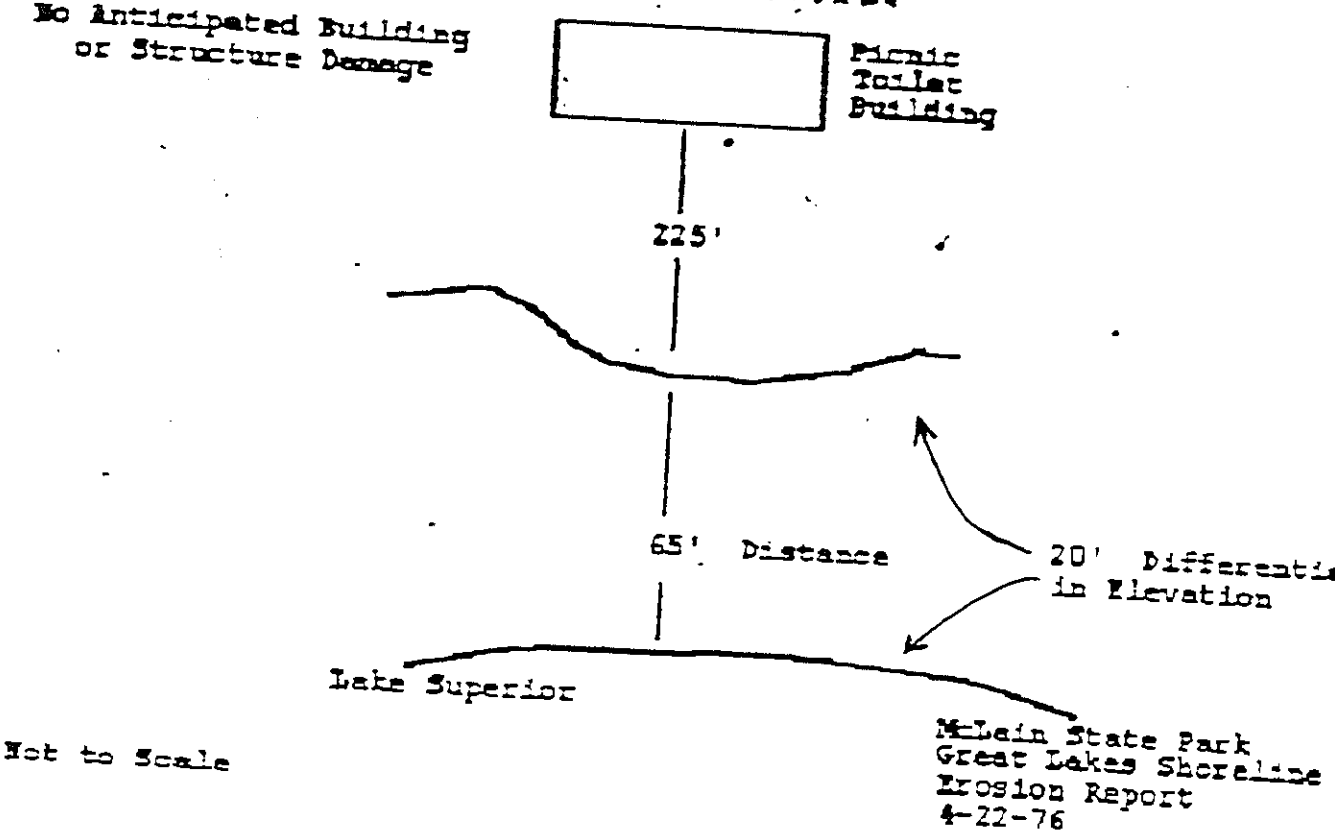
L2

FROM SWING IN PICNIC AREA (21 on chart 4)

DATE	MEASUREMENT
10/17/1997	31
4/20/1998	27
7/22/1998	25
10/21/1998	25
4/26/1999	24
4/26/2001	24
11/5/2001	23
7/24/2002	23
9/2/2003	23
10/5/2006	22
7/8/2008	22
9/6/2011	22
8/13/2012	22
8/13/2013	22


LAKE SUPERIOR
SHORELINE EROSION
S1
POINT #3
52'
SWING SET
PICNIC AREA
11-30-94
52'
4-5-95
52'
7-18-95
52'
9-14-95
52'
10-2-95
52'
10/29/96
39'
8/14/97
33'
10/17/97
31'
4/20/98
27'

MCLAIN STATE PARK



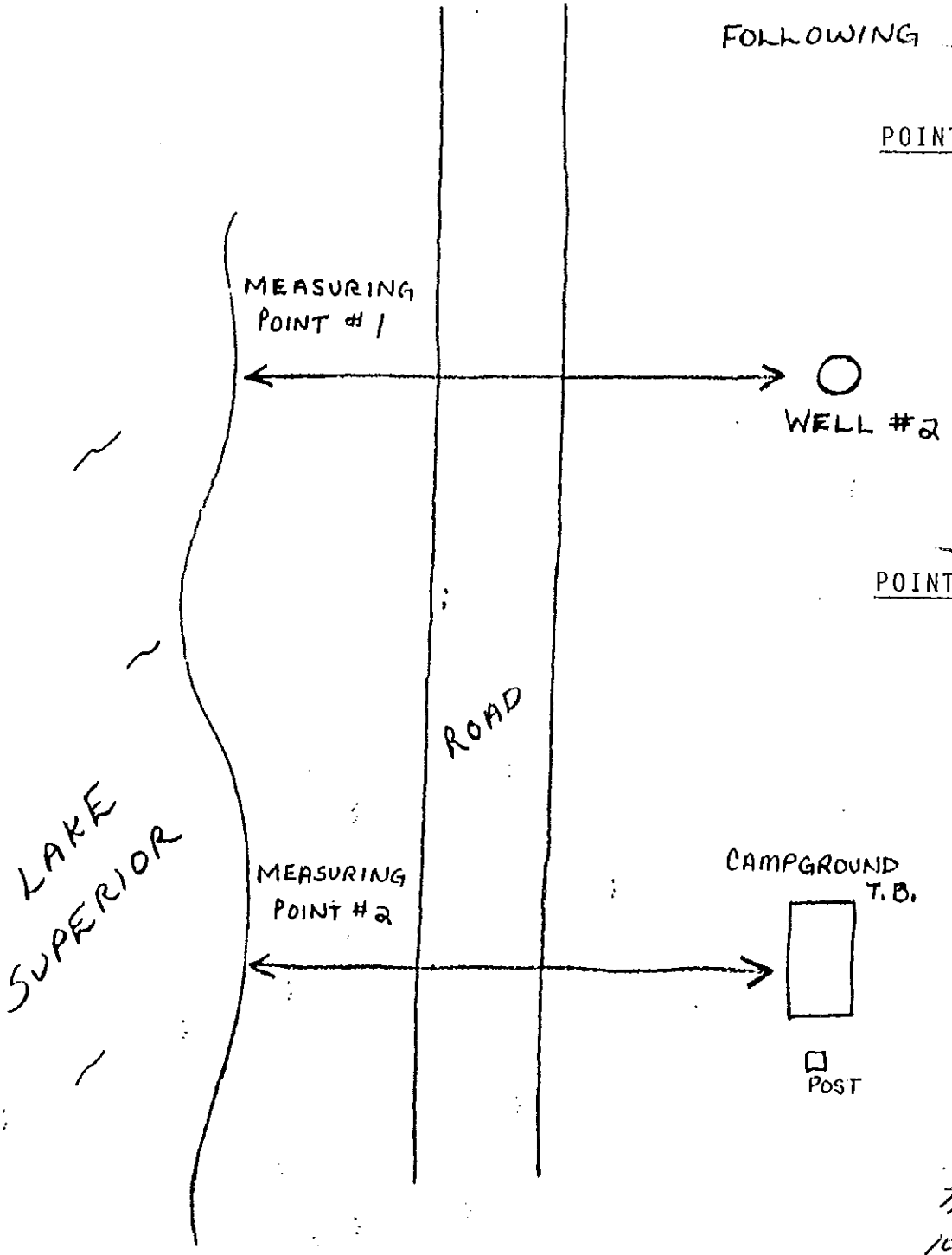
4-22-76	225'/65'
10-19-92	123'/33'
11-04-93	123'/26'
9-15-94	120'/33'
11-30-94	118'/30'
4-05-95	118'/37'
7-18-95	118'/37'
9-14-95	125'/37'
11-02-95	125'/37'
10-29-96	118'
08-14-97	109'
10/17/97	106'
4/20/98	106'
7/22/98	106'
10/21/98	105'
4/26/99	105'
4/26/01	103'
11/5/01	103'
7/24/02	103'
9/2/03	101'

FROM SWING IN PICNIC AREA

10/17/97	31'
4/20/98	27'
7/22/98	25'
10/21/98	25'
4/26/99	24'
4/26/01	24'
11/5/01	23'
7/24/02	23'
9/2/03	23'

SHORELINE EROSION

FOLLOWING GROUND CONTOURS



POINT #1

11-05-84	131' 6"
09-11-85	127'
05-14-91	117'
10-19-92	113'
11-04-93	107'
09-15-94	103'
11-30-94	103'
04-05-95	103'
07-18-95	103'
09-14-95	103'
11-02-95	103'
10 - 29-96	86'
08 -14-96	75'

SAME AS POINT NUMBER 7

POINT #2

04-28-78	225'
11-05-84	137'
09-11-85	134' 6"
05-14-91	120'
10-19-92	119'
11-01-93	118'
09-15-94	118'
11-30-94	111'
04-05-95	111'
07-18-95	108'
09-14-95	107'
11-02-95	106'
10-29-96	95'
08-14-97	85'
10/17/97	85'
4/20/98	84'
7/22/98	81'
10/21/98	81'
4/26/99	77'
10/5/00	77'
4/26/01	77'
11/05/01	77'
7/24/02	77'
9/2/03	75'
4/21/05	71'

MHI MOVED BY END OF CAMPGROUND

10/21/98	14'
4/26/99	14'
10/5/00	12'
4/26/01	12'
11/05/01	12'
7/24/02	12'
9/2/03	10'