

## 4.19 MA 19 – Lake Michigan Shoreline Management Area

### Summary of Use and Management

Vegetative management in the Lake Michigan Shoreline management area (MA) (Figure 4.19.1) will emphasize protection of the unique character of the area and all of the threatened, endangered and special concern species while providing recreational opportunities, forest products and wildlife habitat. Timber management activities include improving the age-class diversity of many even-aged cover types and providing for regeneration of cedar and paper birch stands. The Simmons Woods Special Management Area is located within this management area. Little Brevort Lake Dedicated Natural Area is one of several high conservation value areas. Special conservation areas within the management area include: Seiner's Point, Point Detour, the Crow River Mouth non-dedicated natural areas and extensive wintering deer habitat. This management area contains critical habitat designation for the federally endangered piping plover. This management area will be managed to preserve these biodiversity attributes, threatened and endangered habitats, natural communities and natural areas. Expected issues in this 10-year planning period are increased recreational pressure and illegal off-road vehicle use; invasive species including *Phragmites*; and introduced pests and diseases, including beech bark disease and emerald ash borer.

### Introduction

The Lake Michigan Shoreline management area is located along the southern edge of the eastern Upper Peninsula in Schoolcraft, Mackinac and Delta Counties. It has 46,790 acres of state-owned land. The primary attribute of this management area is the landforms and associated plant communities of the Lake Michigan shoreline. Additional attributes which were important in identifying this management area include:

- The management area falls within the St. Ignace Lake Plain sub-section of the eastern Upper Peninsula ecoregion (Albert, 1995).
- The major landform in this management area is the Niagaran escarpment, an outcrop of dolomitic limestone that rings the Great Lakes basin. Other landforms include limestone bedrock pavement, cobble beach and sand dunes.
- Sand dunes, cobble beaches and bare rock are unique cover types in this management area.
- Many special conservation areas, high conservation value areas and ecological reference areas as well as many rare plant and animal occurrences are found along the lakeshore.
- Recreation along the lakeshore including sightseeing, camping and trout fishing.

Within this management area are traditional fishing villages, and areas of pre-historic, historic and current Native American Indian use. In the pre-settlement period of history the shoreline was important to the early French trappers and the fur trade. This was the historical eastern treaty boundary in the Wisconsin acquisition. Just west of Naubinway the trading sloop *Ranger* was unearthed by archeologists in the early 1990s. Simmons Woods, an area south of Gould City, was associated with the Blaney Park tourist community and was a lumbering town of the early 1900s.

This management area covers a large area geographically. It comprises the state-owned portions of the Lake Michigan shoreline from Mackinac County to the Garden Peninsula in Delta County. The management area falls within the Sault and Shingleton Forest Management Units. The current predominant cover types, acreages and projected harvest acres for the management area are shown in Table 4.19.1.

# Lake Michigan Shoreline

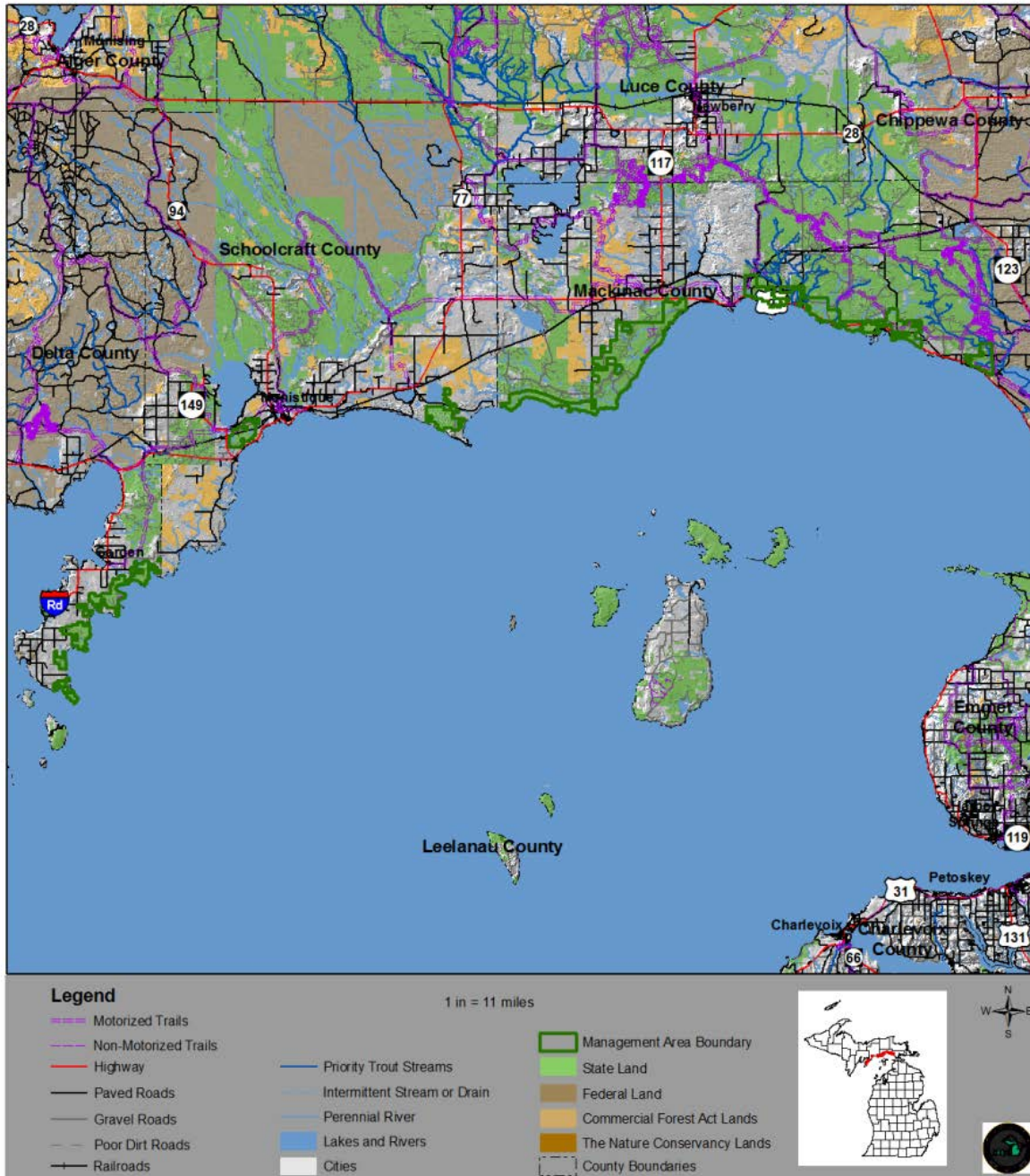


Figure 4.19.1. Location of the Lake Michigan Shoreline management area (dark green boundary) in relation to surrounding state forest lands, other ownerships and Lake Michigan.

Table 4.19.1. Current cover types, acreages, projected harvest acres and projected ten-year cover type acreage for the Lake Michigan Shoreline management area, eastern Upper Peninsula ecoregion (2012 Department of Natural Resources inventory data).

Cover Type	Cover %	Current Acreage	Hard Factor Limited Acres	Manageable Acres	10 Year Projected Harvest (Acres)		Projected Acreage in 10 Years	Desired Future Harvest (Acres)	
					Final Harvest	Partial Harvest		Final Harvest	Partial Harvest
Cedar	25%	11,925	606	11,319	0	0	11,925	708	0
Northern Hardwood	13%	6,307	645	5,662	0	3,242	6,307	0	2,742
Aspen	12%	5,567	241	5,326	55	0	5,567	888	0
Lowland Open/Semi-Open	6%	2,691	0	2,691	0	0	2,691	0	0
Upland Spruce/Fir	6%	2,619	637	1,982	251	0	2,619	283	0
Lowland Conifers	5%	2,418	719	1,699	189	0	2,418	189	0
Paper Birch	4%	2,094	1,790	304	27	0	2,094	51	0
Red Pine	4%	2,041	457	1,584	0	576	2,041	176	576
Upland Conifers	3%	1,343	0	1,343	576	647	1,343	149	647
Upland Mixed Forest	3%	1,206	218	988	223	390	1,206	110	390
Upland Open/Semi-Open Lands	2%	961	0	961	0	0	961	0	0
Misc Other (Water, Local,	3%	1,635	0	1,635	0	0	1,635	0	0
Others	13%	5,983	1,051	4,932	820	978	5,983	539	998
<b>Total</b>	<b>100%</b>	<b>46,790</b>	<b>6,364</b>	<b>40,426</b>	<b>2,140</b>	<b>5,833</b>	<b>46,790</b>	<b>3,093</b>	<b>5,353</b>

Others include: white pine, mixed upland deciduous, lowland deciduous, natural mixed pines, hemlock, jack pine, lowland aspen/balsam poplar, lowland mixed forest, tamarack, lowland spruce/fir, and oak.

#### 4.19.1 Forest Cover Type Management Direction

The following sections contain information on vegetation management direction in the form of Desired Future Conditions, 10-Year Management Objectives and Long-Term Management Objectives for each of the major cover types or forest communities within the management area. This information applies to those portions of the forest where active management (i.e., timber harvest, prescribed fire, planting and mowing) will be conducted. In other portions of the state forest, passive management resulting in natural succession will achieve ecological objectives. While most stands have a variety of tree species and other vegetation, they are classified by the predominant species.

All of the following cover types are valued commercially for their timber products; ecologically as sources of habitat for numerous species; and for the variety of recreational opportunities they provide. Harvesting these cover types will provide for a continuous flow of forest products and values.

##### Section 4.19.1.1 Forest Cover Type Management - Cedar

###### Current Condition

Cedar occurs on 11,925 acres (25%) of the management area (Table 4.19.1). The alkaline conditions caused, in part, by the limestone bedrock create favorable conditions for cedar. There are several deer wintering habitat special conservation areas in this management area. Maintaining a closed canopy structure provides important cover for deer by reducing the snow depth within the stands. There was some harvest and regeneration work over 30 years ago in northern white cedar (Figure 4.19.2). Increased deer numbers have limited regeneration success since then.

There is a need to address future cedar cover within the deer wintering complexes. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

Currently there are six acres of cedar with a partial harvest prescribed. There are 606 acres with site conditions limiting their harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

###### Desired Future Condition

- In areas where deer browse is a concern, these stands may not be actively harvested at this time.

###### 10-Year Management Objectives

- The 10-year projected final harvest of cedar is zero acres due to the wintering deer complexes.

## Long-Term Management Objectives

- Within the deer wintering areas, focus cedar management on winter habitat for deer; and
- Outside of the deer wintering areas, look for opportunities to regenerate cedar providing for a regulated harvest of approximately 708 acres per decade (red line in Figure 4.19.2).

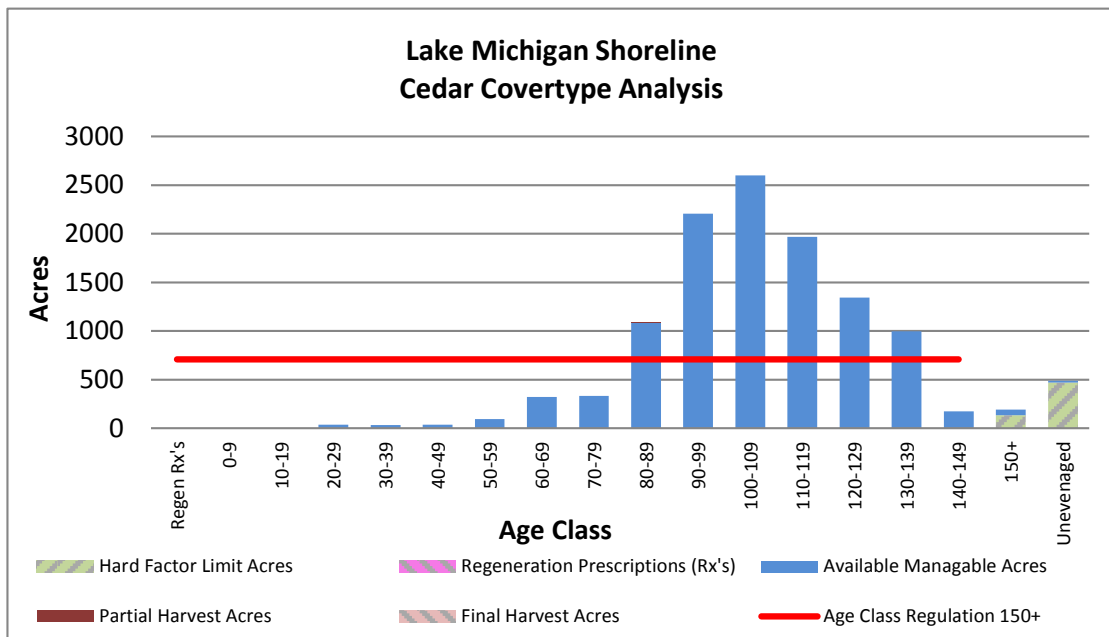


Figure 4.19.2. Age-class distribution of cedar in the Lake Michigan Shoreline management area (2012 Department of Natural Resources inventory data).

### Section 4.19.1.2 Forest Cover Type Management – Northern Hardwoods

#### Current Condition

Northern hardwood stands occur on 6,307 acres (13%) of the management area (Table 4.19.1). The majority of the stands have been managed through individual tree selection to work toward an uneven-aged state. Wind throw due to storms along Lake Michigan has contributed to the uneven-aged structure. Northern hardwood stands are distributed on mesic-poor to rich-nutrient sites with Kotar habitat types of ATFD, AFPo and AFOAs (Appendix E). In northern hardwood stands where quality warrants, stands with a basal area over 120 square feet per acre will be harvested using single tree selection, decreasing stocking levels to a basal area of approximately 80 square feet per acre. In general, this will allow most hardwood stands to be select harvested every 20 years. Where site quality is poor shelterwood and other even-aged harvesting systems will be considered. Recent harvests using even-aged systems are shown in the immature column in Figure 4.19.3. High deer densities may affect the regeneration of some hardwood species.

Beech bark disease is found throughout the management area and salvage of affected beech is ongoing. Northern hardwood stands that had a component of beech now have decreased stocking levels due to beech bark disease mortality and salvage harvesting. Further selection harvesting will be delayed due to resultant lower than normal residual basal area.

Currently there are 1,318 acres with a partial harvest assigned and 11 acres of northern hardwood with a final harvest assigned (Figure 4.19.3). There are 645 acres of northern hardwood that have site conditions limiting their harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

#### Desired Future Condition

- Northern hardwood stands will be maintained on operable sites by using individual tree selection harvesting to provide uneven-aged composition and structurally diverse stands; and
- Harvesting will provide for a continuous flow of timber products and a variety of wildlife habitat and recreational opportunities.

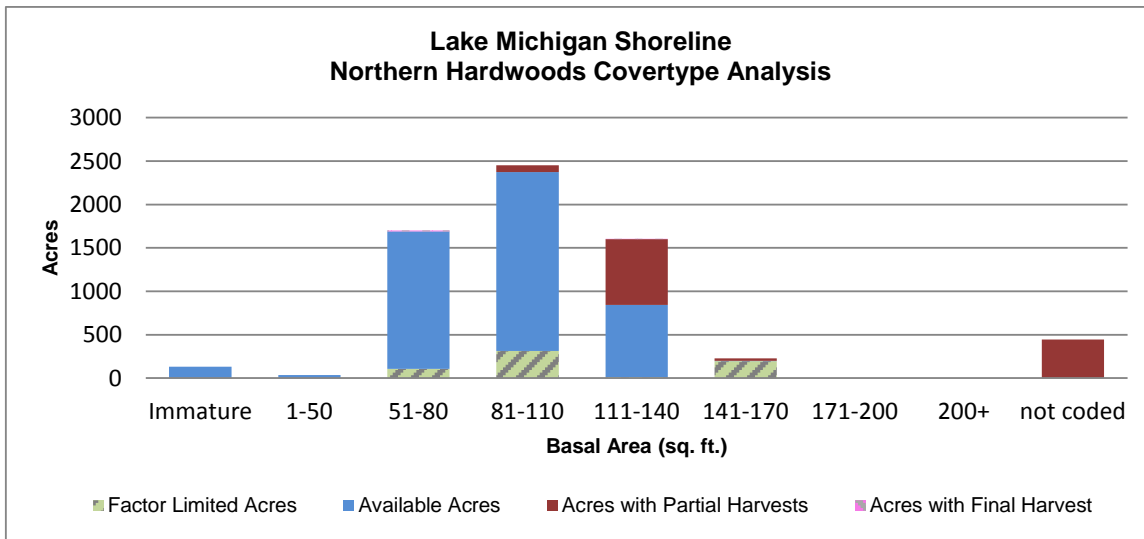


Figure 4.19.3. Basal area distribution of northern hardwood in the Lake Michigan Shoreline management area (2012 Department of Natural Resources inventory data).

#### 10-Year Management Objectives

- The 10-year projected partial or selection harvest of northern hardwood is 3,242 acres;
- Evaluate stands previously dominated by beech dominated forests to determine the impact of beech bark disease on regeneration;
- Track beech regeneration in these stands;
- To favor regeneration of hardwood other than beech, consider herbicide application on beech regeneration to promote regeneration of other species; and
- In areas that are losing beech to beech bark disease, consider planting disease resistant beech or oak after harvesting to increase the availability of hard mast.

#### Long-Term Management Objectives

- Select harvest northern hardwood stands on a 20-year cycle.

### **Section 4.19.1.3 Forest Cover Type Management – Aspen**

#### Current Condition

Aspen stands occur on 5,567 acres (12%) of the management area (Table 4.19.1). Aspen is distributed throughout the management area on outwash plains, lake plains and moraines with dry poor nutrient to mesic medium nutrient sites. Kotar habitat types include PARVAa, ATFD and AFPO. Aspen has been consistently harvested and regenerated resulting in over 85% of the stands being less than 40 years old (Figure 4.19.4).

There are currently 355 acres of aspen prescribed for final harvest. Approximately 48 acres of other cover types are expected to convert to aspen after harvest. These acres are shown in Figure 4.19.4 in the regeneration prescriptions column. There are 241 acres of aspen that have site conditions limiting their harvest this entry period. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Inaccessible aspen areas will eventually succeed to late successional species.

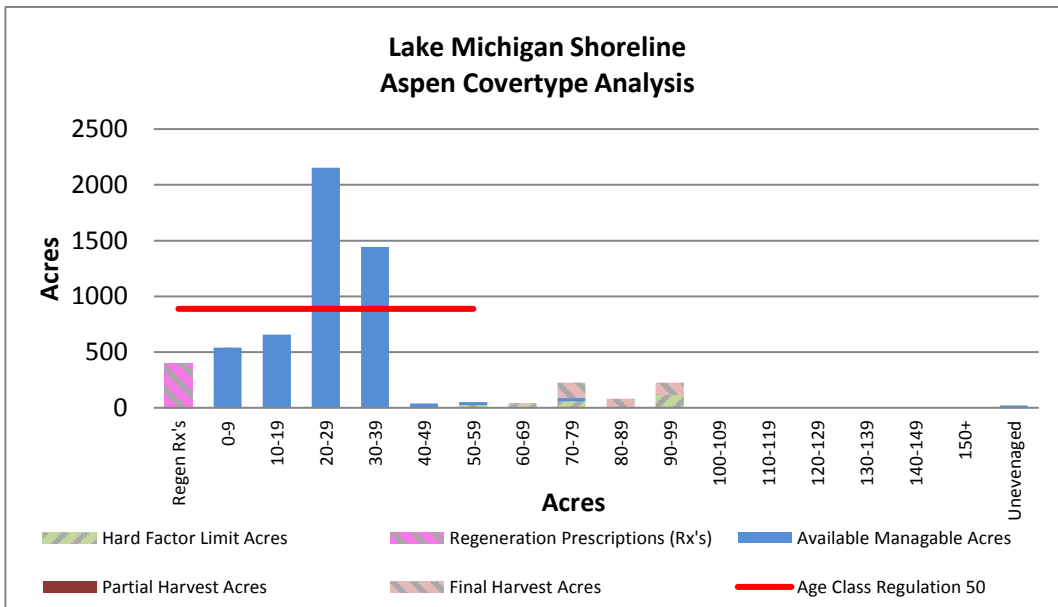


Figure 4.19.4. Age-class distribution of aspen in the Lake Michigan Shoreline management area (2012 Department of Natural Resources inventory data).

#### Desired Future Condition

- Aspen dominated stands will be maintained on operable sites through even-aged management, with acres balanced between 0-59 years of age providing for a regulated harvest, wildlife habitat and recreational opportunities.

#### 10-Year Management Objectives

- The projected 10-year final harvest for aspen is 55 acres which is a decrease from the regulated amount due to the current age-class structure where the majority of trees are not yet merchantable.

#### Long-Term Management Objectives

- Balance the age classes of available aspen providing for a regulated harvest of approximately 888 acres per decade.

### **Section 4.19.1.4 Forest Cover Type Management – Lowland Open/Semi-Open Lands**

#### Current Condition

Lowland open/semi-open lands occur on 2,691 acres (6%). This category is a combination of lowland shrub (1,696 acres), marsh (793 acres), bog (160 acres) and treed bog (42 acres). These cover types function ecologically as sources of habitat for numerous species of wildlife. These stands are found in association with creeks, rivers and lowland forested stands. Some of these stands fall within the special conservation area deer wintering area.

#### Desired Future Condition

- Lowland open/semi-open lands will be retained in their current state to ensure an adequate level of wildlife habitat and recreational opportunity as well as to protect the special conservation area values found in these cover types.

#### Long-Term Management Objectives

- Within these stands allow natural processes to occur while protecting their ecological values from man-made disturbances.

### Section 4.19.1.5 Forest Cover Type Management – Upland Spruce Fir

#### Current Condition

Upland spruce/fir stands occur on 2,619 acres (6%) of the management area (Table 4.19.1). Due to past harvesting and regeneration efforts there are stands in most age classes of upland spruce/fir in this management area (Figure 4.19.5).

Currently there are 37 acres of upland spruce/fir prescribed with a final harvest. There are 637 acres of upland spruce/fir that have site conditions limiting their harvest this entry period. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Upland spruce/fir stands that are unavailable for harvest will be subject to natural processes, eventually succeeding to late successional species.

#### Desired Future Condition

- Upland spruce/fir will be maintained on operable sites through even-aged management, balancing acres between 0-69 years of age providing for a regulated harvest, wildlife habitat and recreational opportunities.

#### 10-Year Management Objectives

- The projected 10-year final harvest is for 251 acres of upland spruce/fir which is a slight reduction from the regulated harvest amount is due to the current age-class structure where the majority of available stands are not merchantable.

#### Long-Term Management Objectives

- Balance the age classes of available upland spruce/fir stands providing for a regulated harvest of approximately 283 acres every ten years.

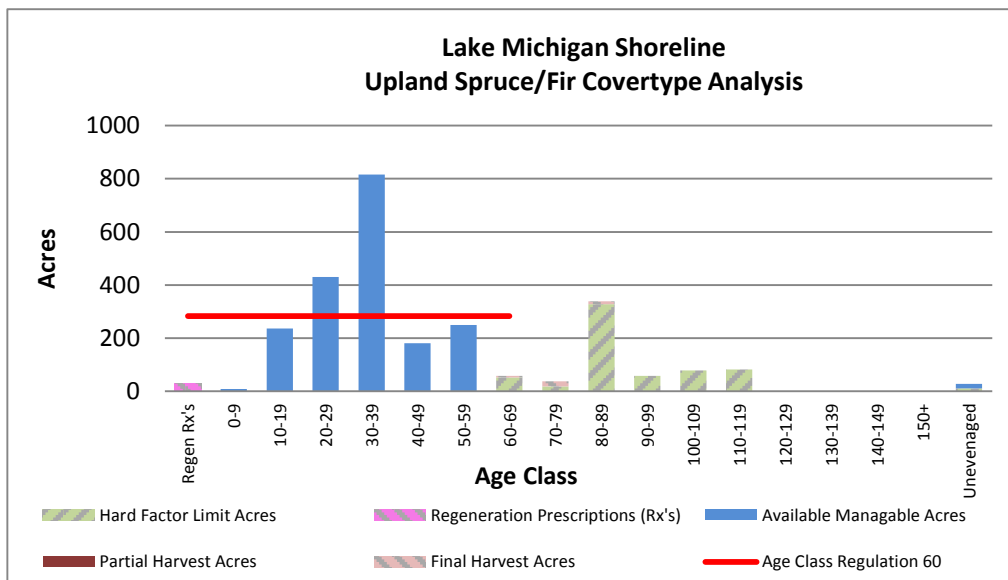


Figure 4.19.5. Age-class distribution of upland spruce/fir in the Lake Michigan Shoreline management area (2012 Department of Natural Resources inventory data).

### Section 4.19.1.6 Forest Cover Type Management – Lowland Conifer

#### Current Condition

Lowland conifer occurs on 2,418 acres (5%) of the management area (Table 4.19.1). Some of these stands are within deer wintering area special conservation areas. Lowland conifer stands in this area have been successfully harvested and regenerated with natural regeneration resulting in stands in all age classes (Figure 4.19.6). A small portion of the lowland conifer stands have been classified as uneven-aged as a result of natural processes. Lowland conifer stands along the Lake Michigan shoreline are valuable to many migrating neotropical bird species.

Currently, there are 38 acres with a final harvest prescribed. There are 719 acres of lowland conifers that have site conditions limiting their harvest at this time. These hard factor limited acres have been removed from harvest calculations. Lowland conifer stands in areas inaccessible for harvest will be subject to natural processes, resulting in a range of successional stages.

Desired Future Condition

- Lowland conifer stands will be maintained on operable sites through even-aged management, with acres balanced between 0-89 years of age providing for a continuous supply of timber, wildlife habitat and recreational opportunities.

10-Year Management Objectives

- The 10-year projected final harvest of lowland conifers is 189 acres.

Long-Term Management Objectives

- Balance the age-class structure of accessible lowland conifer stands providing for a regulated harvest of approximately 189 acres every decade.

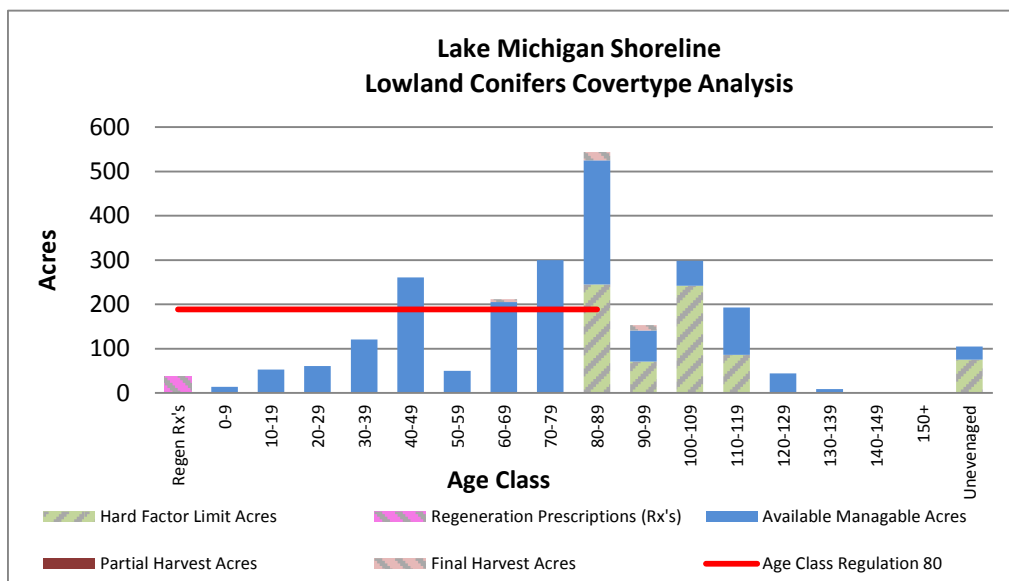


Figure 4.19.6. Age-class distribution of lowland conifers in the Lake Michigan Shoreline management area (2012 Department of Natural Resources inventory data).

**Section 4.19.1.7 Forest Cover Type Management – Other Types**

Current Condition

There are many other cover types spread across the management area that have less than 5% of the total management area acres (Table 4.19.1). Paper birch (2,094 acres) and red pine (2,041 acres) each have 4%, and upland conifers (1,343 acres) and upland mixed forest (1,206 acre) each have 3% of the total management area acres. Upland open/semi-open lands (961 acres of 2%) category is a combination of herbaceous openland, bare/sparsely vegetated, low-density trees and upland shrub.

“Other types” is made up of forested cover types with 2% or less of the total acres, and includes: white pine (1,132 acres), mixed upland deciduous (1,064 acres), lowland deciduous (721 acres), natural mixed pines (704 acres), hemlock (620 acres), jack pine (567 acres), lowland aspen/balsam poplar (340 acres), lowland mixed forest (321 acres), tamarack (252 acres), lowland spruce/fir (235 acres) and oak (27 acres). In addition there are 1,635 acres (3%) of “miscellaneous other” stands, which includes water, sand/soil and roads.

Most of these cover types will be managed as even-aged stands using natural regeneration after harvest. Perform regeneration harvests in even-aged cover types attempting to balance the age classes where possible. Mixed cover types with high basal area may be thinned prior to final harvest depending on the species composition.



Over 3,500 acres of these other minor cover types have site conditions limiting their harvest this entry cycle. These hard factor limited acres have been removed from the total number of manageable acres available for harvest. Inaccessible stands will be subject to natural processes, and may succeed to late successional species, thus changing the cover type distribution in the management area.

#### Desired Future Condition

- These other minor cover types may be managed on operable sites, contributing to the compositional diversity of the landscape while providing for continual harvest, wildlife habitat and recreational opportunities.

#### 10-Year Management Objectives

- The projected 10-year final harvest is: 27 acres of paper birch, 576 acres of upland conifers, 223 acres of upland mixed forest and 820 acres of other types; and
- The projected 10-year partial harvest is: 576 acres of red pine, 647 acres of upland conifers, 390 acres of upland mixed forest and 978 acres of other types.

#### Long-Term Management Objectives

- Continue management of these other cover types to provide a sustainable yield of forest products and wildlife habitat.

### **4.19.2- Featured Wildlife Species**

The Lake Michigan Shoreline management area is probably the most biologically diverse landscape within the eastern Upper Peninsula ecoregion. Piping plovers nest in this management area from Pte. Aux Chenes west to Indian Point in Delta County. Another critical habitat value provided in this management area is the use of trees along the water's edge by neotropical migrants to feed on midges. Lowland conifers and cedar in this management area provide important habitat for over-wintering deer.

#### **Piping Plover**

The state-wide goal for the Great Lakes piping plover is to maintain a breeding population of a minimum of 100 nesting pairs. In the eastern Upper Peninsula habitat management should focus on protecting and improving critical habitat on occupied shoreline and throughout designated critical habitat.

#### Wildlife habitat specifications:

- At known breeding sites work with partners to:
  - Limit human activity near nests;
  - Construct predator exclosures around nests; and,
  - Control avian and mammalian predators as needed.
- In other critical habitat, support land acquisitions and conservation easements.
- At active sites, support public education and increased awareness to help avoid disturbance to nesting birds.
- Address/discourage illegal off-road vehicle activity on Great Lakes shorelines.

#### **White-tailed Deer**

The eastern Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR Department procedure 32.22-07 states "Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer." There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

### Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
  - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
  - There is a forest health issue (e.g., hemlock wooly adelgid); or
  - Part of an approved research project; or
  - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

### **4.19.3 – Rare Species and Special Resource Area Management**

All forest operations must be reviewed for potential conflicts between rare species and proposed forest operations following the guidance in “DNR’s Approach to the Protection of Rare Species on State Forest Lands” (IC4172). This is especially important when listed species are present, past surveys have indicated a possibility of their presence, or when appropriate habitat is available and the species is known to occur in the general region.

Past surveys have noted and confirmed twenty-four listed species as well as nine natural communities of note occurring in the management area as listed in Table 4.19.2. Any established management guidelines will be followed. Further surveys for special species and natural communities will be carried out as a matter of course during the inventory process and opportunistically for special more focused surveys.

The Lake Michigan Shoreline management area contains several special conservation areas as shown in Figure 4.19.7. These are the Crow River Mouth (517 acres), Point Detour (484 acres) and Seiner’s Point (3,192 acres) non-dedicated natural areas; extensive winter deer habitat; cold water streams and lakes; and two visual management areas at Big Knob and the Cut River Bridge (Figure 4.19.7).

Areas that might meet the definition of Type 1 and Type 2 old growth have been identified in a special conservation area layer in the Geographic Decision Support Environment and are shown in Figure 4.19.7. This set of areas originated from a subset of forested natural communities within some state natural areas and all A/AB-ranked natural heritage database element occurrences. Within the Lake Michigan Shoreline management area there are 5,856 acres in three patches (Figure 4.19.7) identified as potential Type 2 wooded dune and swale complex with dry-mesic northern forest and/or boreal forest. In addition, approximately 6,000 acres were identified as potential old growth and these stands are also special conservation areas until they are evaluated.

High conservation value areas include: Little Brevort Lake Natural Area and Simmons Woods dedicated management areas, barrier dunes, coastal environmental areas and critical coastal habitat for piping plovers (Figure 4.19.7).

There are seventeen ecological reference areas in this management area, as shown in Figure 4.19.7. These Ecological reference areas represent the following natural communities: three areas of limestone bedrock glade or alvar (10, 103 and 127 acres), two areas of limestone bedrock lakeshore (5 and 17 acres), two areas of Great Lakes marsh (10 and 29 acres), open dunes (16 acres), two areas of interdunal wetland (16 and 57 acres) and seven areas of wooded dune and swale (167, 774, 954, 1757, 2346, 2783 and 3144 acres). All ecological reference areas will be managed to protect and enhance their natural vegetative and wildlife communities as directed by an ecological reference area-specific management plan.

Management goals during this planning period:

- Document occurrences of rare, threatened, endangered and special concern species and natural communities for the management area through the inventory process or with occasional focused surveys.
- Evaluate all potential Type 1, potential Type 2 and potential old growth areas to determine their status as a special resource area.
- Develop and maintain management and monitoring plans for ecological reference areas on state forest land.

Table 4.19.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Lake Michigan Shoreline management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
<b>Natural Communities</b>								
Alvar		S1/G2?	Confirmed				Upland open/semi-open	N/A
Great Lakes marsh		S3/G2	Confirmed				Lowland open/semi-open	N/A
Interdunal wetland		S2/G2?	Confirmed				Lowland open/semi-open	N/A
Limestone bedrock glade		S2/G2G4	Confirmed				Upland open/semi-open	N/A
Limestone bedrock lakeshore		S2/G3	Confirmed				Upland open/semi-open	N/A
Limestone cobble shore		S3/G2G3	Confirmed				Upland open/semi-open	N/A
Mesic northern forest		S3/G4	Confirmed				Northern Hardwood	Late
Open dunes		S3/G3	Confirmed				Upland open/semi-open	N/A
Wooded dune and swale complex		S3/G3	Confirmed				Upland open/semi-open	N/A
<b>Birds</b>								
Red-shouldered hawk	<i>Buteo lineatus</i>	T/G5/S3-4	Confirmed	PS	Very High	Floodplain forest	Lowland mixed	Mid
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Piping plover	<i>Charadrius melodus</i>	LE/E/G3/S1	Confirmed	MV	Moderate	Open dunes	Upland open/semi-open	N/A
						Common loon	<i>Gavia immer</i>	T/G5/S3-4
Bald eagle	<i>Haliaeetus leucocephalus</i>	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Late
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
						Osprey	<i>Pandion haliaetus</i>	SC/G5/S2-3
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
<b>Insect</b>								
Lake Huron locust	<i>Trimerotropis huroniana</i>	T/S2S3/G2G3	Confirmed	MV	Very High	Great Lakes barrens	Upland open/semi-open	N/A
						Open dunes	Upland open/semi-open	N/A
<b>Snail</b>								
Pleistocene catinella	<i>Catinella exile</i>	T/G2/SU	Confirmed	EV	Moderate	Northern fen	Lowland open/semi-open	N/A
						Limestone cobble shore	Lowland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Interdunal wetland	Lowland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
						Tapered vertigo	<i>Vertigo elatior</i>	SC/G5/S3
						Limestone cobble shore	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Prairie fen	Lowland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
Hubricht's vertigo	<i>Vertigo hubrichti</i>	E/G3/S2	Confirmed	EV	Moderate	Alvar	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
Crested vertigo	<i>Vertigo pygmaea</i>	SC/G5/S3	Confirmed	MV	Low	Limestone cliff	Upland open/semi-open	N/A
						Granite bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Limestone lakeshore cliff	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
						Volcanic bedrock cliff	Upland open/semi-open	N/A
<b>Plants</b>								
Walking fern	<i>Asplenium rhizophyllum</i>	T/G5/S2S3	Confirmed			Mesic northern forest	Northern Hardwood	Late
						Limestone cliff	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Limestone lakeshore cliff	Upland open/semi-open	N/A
						Sinkhole	Upland open/semi-open	N/A
						Green spleenwort	<i>Asplenium trichomanes-rama</i>	SC/G4/S3
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Rich conifer swamp	Tamarack	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
						Limestone cliff	Upland open/semi-open	N/A
						Limestone lakeshore cliff	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
Calypso or fairy-slipper	<i>Calypso bulbosa</i>	T/G5/S2	Confirmed			Rich conifer swamp	Tamarack	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
						Limestone bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Wooded dune & swale complex	Upland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Late
						Dry-mesic northern forest	White Pine	Late
						Great Lakes barrens	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Sedge	<i>Carex albulutscens</i>	T/G5/S2
						Intermittent wetland	Lowland open/semi-open	N/A
						Lakeplain wet-mesic prairie	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A

Climate Change Vulnerability Index: EV – Extremely Vulnerable; HV – Highly Vulnerable; MV – Moderately Vulnerable; PS – Presumed Stable; and IL – Increase Likely.

Table 4.19.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Lake Michigan Shoreline management area (Continued).

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
<b>Plants (Cont'd)</b>								
Richardson's sedge	<i>Carex richardsonii</i>	SC/G4/S3S4	Confirmed			Alvar	Upland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Dry-mesic prairie	Upland open/semi-open	N/A
						Dry-mesic northern forest	White Pine	Late
						Hillside prairie	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
Pitcher's thistle	<i>Cirsium pitcheri</i>	LT/T/G3/S3	Confirmed			Open dunes	Upland open/semi-open	N/A
						Wooded dune & swale complex	Upland open/semi-open	N/A
						Great Lakes barrens	Upland open/semi-open	N/A
						Sand and gravel beach	Upland open/semi-open	N/A
Ram's head lady's-slipper	<i>Cypripedium orietinum</i>	SC/G3/S3	Confirmed			Rich conifer swamp	Tamarack	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Poor fen	Lowland open/semi-open	N/A
						Wooded dune & swale complex	Upland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Late
						Dry-mesic northern forest	White Pine	Late
						Great Lakes barrens	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
Limestone oak fern	<i>Gymnocarpium robertianum</i>	T/G5/S2	Confirmed			Rich conifer swamp	Tamarack	Late
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone lakeshore cliff	Upland open/semi-open	N/A
Fir clubmoss	<i>Huperzia selago</i>	SC/G5/S3	Confirmed			Open dunes	Upland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
Dwarf lake iris	<i>Iris lacustris</i>	LT/T/G3/S3	Confirmed			Open dunes	Upland open/semi-open	N/A
						Alvar	Upland open/semi-open	N/A
						Wooded dune & swale complex	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
Michigan monkey flower	<i>Mimulus glabratus michiganensis</i>	LE/E/G5T1/S1	Confirmed			Rich conifer swamp	Tamarack	Late
Butterwort	<i>Pinguicula vulgaris</i>	SC/G5/S3	Confirmed			Limestone cobble shore	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Sandstone lakeshore cliff	Upland open/semi-open	N/A
						Interdunal wetland	Lowland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
Houghton's goldenrod	<i>Solidago houghtonii</i>	LT/T/G3/S3	Confirmed			Open dunes	Upland open/semi-open	N/A
						Alvar	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Interdunal wetland	Lowland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
Stitchwort	<i>Stellaria longipes</i>	SC/G5/S2S3	Confirmed			Open dunes	Upland open/semi-open	N/A
Lake Huron pansy	<i>Tanacetum huronense</i>	T/G5T4T5/S3	Confirmed			Open dunes	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Wooded dune & swale complex	Upland open/semi-open	N/A

Climate Change Vulnerability Index: EV – Extremely Vulnerable; HV – Highly Vulnerable; MV – Moderately Vulnerable; PS – Presumed Stable; and IL – Increase Likely.

# Lake Michigan Shoreline

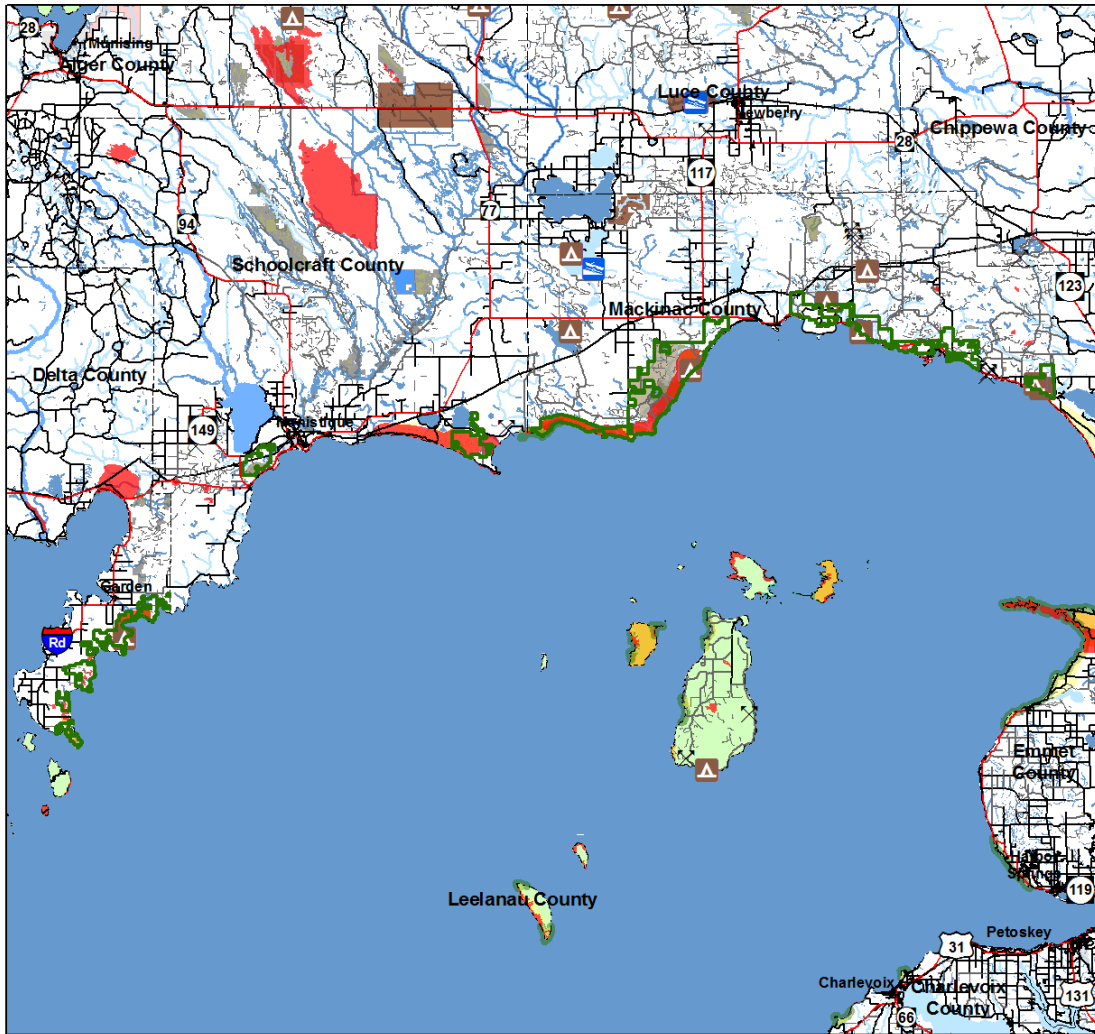


Figure 4.19.7. A map of the Lake Michigan Shoreline management area showing the special resources areas.

#### 4.19.4 – Forest Health Management

Although forest health issues span the entire landscape, some specific threats are more important in this management area due to the species composition, site quality or other factors. Some of the more important forest health pests in this management area by major cover type include:

- Northern hardwoods: beech bark disease;
- Aspen and lowland aspen/balsam poplar: white trunk rot and *Hypoxylon* canker; and
- Lowland spruce/fir, Upland spruce/fir: spruce budworm.

For further information on forest health refer to section 3.

#### Invasive Species

Invasive exotic species, specifically plants, may pose a significant forest health threat to forested and non-forested areas throughout the management area. No invasive plant species have yet been documented within the management area. Garlic mustard and Japanese knotweed have been documented within a five-mile buffer of the management area (Table 4.19.3) and monitoring efforts should specifically look for new populations of this species. In addition, the Lake Michigan shoreline is susceptible to *Phragmites*. Evaluate eradication treatments of any new populations of invasive plant species found in the management area. Invasive species that merit eradication efforts are those species that threaten sensitive sites due to their location or growth characteristics and have population levels that may be successfully controlled.

While it is not yet listed in the Michigan Invasive Plant database, there have been sightings of *Phragmites* and garlic mustard within the management area and wild parsnip (*Pastinaca sativa*) within five miles of the management area.

Table 4.19.3. Invasive plant species within or near the Lake Michigan Shoreline management area (Data from the Michigan Invasive Plant Identification Network database).

Lake Michigan Shoreline - FRD Management Areas	Cases within FRD Areas	Cases within 5 Mile Buffer	Total number of cases	Total number of different Invasive Species
	0	4	4	2
Invasive Species within FRD Areas	Occurrences	Invasive Species within 5 Mile Buffer	Occurrences	
-	-	Garlic Mustard <i>Alliaria petiolata</i>	2	
-	-	Japanese Knotweed <i>Fallopia japonica</i>	2	

#### 4.19.5 – Fire Management

This area is predominantly lowland conifers and marsh. Much of the area likely had a very long fire return interval (up to 3,000 years) with mixed severities. Fire would have had a much more active role in maintaining dry sites on coastal dunes.

- Fire suppression tactics should take into account the sensitive nature of some of the natural communities in this management area.
- Prescribed fire may be used to maintain natural communities within the management area, and to manage invasive species.

#### 4.19.6 – Public Access and Recreation

Illegal off-road vehicle activities are an issue within this management area especially along the Lake Michigan shoreline.

Vehicle access is generally good in this management area.

Recreational trail facilities include snowmobile trails and Switchback Ridge, Big Knob-Crow Lake, Marsh Lake and Ninga Aki pathways (Figure 4.19.1). State forest campgrounds in the area are the Little Brevort Lake North, Hog Island Point, Big Knob and the Portage Bay campgrounds. Boating access sites in the area include Little Brevort Lake North, Little Brevort Lake South and Portage Bay.

Other types of recreation within this management area include: hunting, fishing, canoeing, kayaking, bird watching and sightseeing at the scenic overlooks.

Dispersed camping is popular along the lakeshore in locations including Simmons Woods, South Gould City Road and Fox Point. U.S. Highway 2 is part of the Lake Michigan Circle Tour that many people travel during the summer and fall months.

#### **4.19.7 – Aquatic Resource Management**

Fisheries Division management unit biologists will review proposed forest management activities using the compartment review process and will consider the potential impact of proposed prescriptions upon riparian and aquatic values. Management prescriptions will be modified to account for riparian and aquatic values by applying the standards and guidance documents listed in the introduction to this plan section to the unique conditions specific to any given forest stand.

Prescription of riparian management zone widths greater than the minimum widths provided in IC4011 (*Sustainable Soil and Water Quality Practices on Forest Land*) must be justified and documented during the compartment review process.

Forested stands adjacent to designated high priority trout streams will specifically be managed to discourage beaver use in accordance with both DNR Policy and Procedure 39.21-20 Beaver Management and IC 4011. Portions of the Black and Brevort River watershed systems and Davenport Creek are designated as high priority trout streams in this management area and the details are shown in the Integrated Forest Monitoring Assessment and Prescription Geographic Decision Support System and in Figure 4.19.1.

#### **4.19.8 – Minerals**

Surface sediments consist primarily of lacustrine (lake) sand and gravel with minor peat and muck and medium-textured till. The glacial drift thickness varies up to 100 feet. Sand and gravel pits are located in this area and there is potential for additional pits.

The Silurian Pte, aux Chenes Formation and Engadine, Manistique and Burnt Bluff Groups subcrop below the glacial drift. The Engadine and Burnt Bluff are quarried for stone in the Upper Peninsula.

Exploration and development for oil and gas has been limited to a few wells drilled in the Upper Peninsula (four in Mackinac, five in Schoolcraft and four in Delta). No economic oil and gas production has been found in the Upper Peninsula.

Metallic mineral production is not supported by the geology given the depth to known metallic bearing formations.