

### #8 CHANGES OVER TIME

Imagine how this land must have looked just after the glacier melted about 11,800 years ago. It was a landscape of sand and gravel stretching in every direction. No trees would have blocked your view. Only a few hardy plants struggled to survive. From this bleak beginning, plants, by their living and dying, have slowly created a layer of topsoil covering these sandy hills. Living communities of plants and animals have transformed this once-sterile ground into the productive forest that now surrounds you.

### #9 LAKE MICHIGAN OVERLOOK

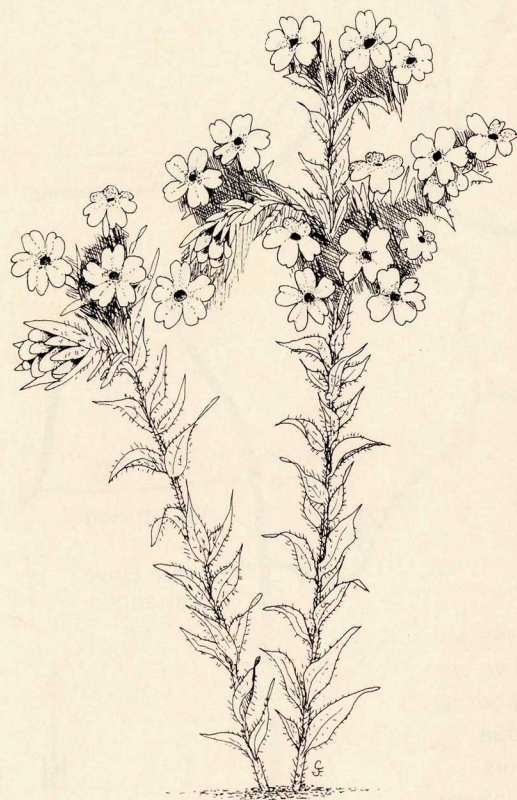
**Please remain on designated walkways and decks.**

This overlook, 137 meters (450 feet) above Lake Michigan, provides a magnificent view of the shoreline. If the visibility is good, to the south you can see Empire Bluffs 6.5 K (4 mi.) away and Platte Bay 14.6K (9 mi.) away, both within the 275 square kilometer (106 sq. mi.) area of Sleeping Bear Dunes National Lakeshore. Still further south is Point Betsie, the farthest point of land, 24.2K (15 mi.) away as the crow flies. To the west, it is 87K (54 mi.) across the lake to Wisconsin. Lake Michigan is the largest lake completely within the United States and is the fourth largest fresh-water lake in the world. It has had a profound influence on the region, including the formation of the sand dunes.

Lake Michigan is a product of the Ice Age, formed by a great lobe of ice advancing down the continent. Look down the slope of the bluff; notice that it is not pure sand—there are rocks as well. This is not a sand dune, but rather a glacial hill. Also, notice the black soil layer at the top. Observations like this help geologists to reconstruct the past.

In recent times, the bluff has been wearing back at the rate of about .3 meter (a foot) per year. Waves wear away the base of the bluff and sand and rocks from above slide down to the beach. This process has gone on for many years, so we can infer that this hill once extended much further out into the lake. The shallow waters offshore also seem to indicate that a peninsula once extended from here about 3K (2 mi.) out into the lake. This means that the site of this overlook used to be inland, protected from the strong winds off the lake. Plants took hold and, through decay, produced the thin layer of soil that we see here. As the waves wore back the old peninsula, this site got closer and closer to the lake. The resulting wind exposure produced an active dune environment.

**CAUTION: Descending the Lake Michigan bluff causes erosion and is dangerous. The steep grade makes footing difficult and there is danger from falling rocks. The return climb is extremely strenuous.**



PUCCOON



1907 VIEW OF THE SLEEPING BEAR

### #10 THE SLEEPING BEAR DUNE OVERLOOK

The Sleeping Bear Dune is the large dune, about 1.6K (1 mi.) away, along the edge of the bluff. It hardly looks like a bear now, for it has been changing rapidly in recent years. At the turn of the century, it was a round knob completely covered with trees and shrubs. You can still see some of the thick vegetation that gave it a dark, shaggy appearance. The Chippewa Indians used the Bear as a landmark and told a story to explain its origin:

Long ago, along the Wisconsin shoreline, a mother bear and her two cubs were driven into Lake Michigan by a raging forest fire. The bears swam for many hours, but eventually the cubs tired and lagged behind. Mother bear reached the shore and climbed to the top of a high bluff to watch and wait for her cubs. Too tired to continue, the cubs drowned within sight of the shore. The Great Spirit Manitou created two islands to mark the spot where the cubs disappeared and then created a solitary dune to represent the faithful mother bear.

The Sleeping Bear Dune is estimated to be about two thousand years old and has a fascinating history. It is classified as a perched dune because it is perched on top of a plateau, high above the lake. When the dune was forming, it was not at the edge of the bluff, but somewhat inland. Wind carried

sand from the upper portion of the Lake Michigan bluff inland and deposited it to form the Sleeping Bear Dune.

Notice the skeletons of dead trees within the eroded bowl of the dune. This is called a ghost forest and tells a story of alternating stability and change. After an initial phase of active sand accumulation, a period of stability followed when trees began to grow on the dune. Later, more sand moved in and buried the trees. Two layers of buried soil within the dune indicate that there was a second period of stability and tree growth, followed by another period of sand build-up, and then the final growth of the trees and shrubs that now cover the sheltered portions of the dunes.

For a long time, the Sleeping Bear Dune stood at about 71 meters (234 feet) high with a dense plant cover. However, through most of the twentieth century, erosion has prevailed. By 1961, the dune was only 38 meters (132 feet) high, and by 1980, it was down to 31 meters (103 feet). The process is a continuing one. The major cause of the dune's erosion was wave action wearing away the base of the plateau on which the dune rests. As the west side of the dune loses its support, it cascades down the hill. The wind, too, is a major agent of erosion, removing sand and destroying the dune's plant cover. What does the future hold? It seems that the present trend will continue and it is only a matter of time until the Bear disappears completely.

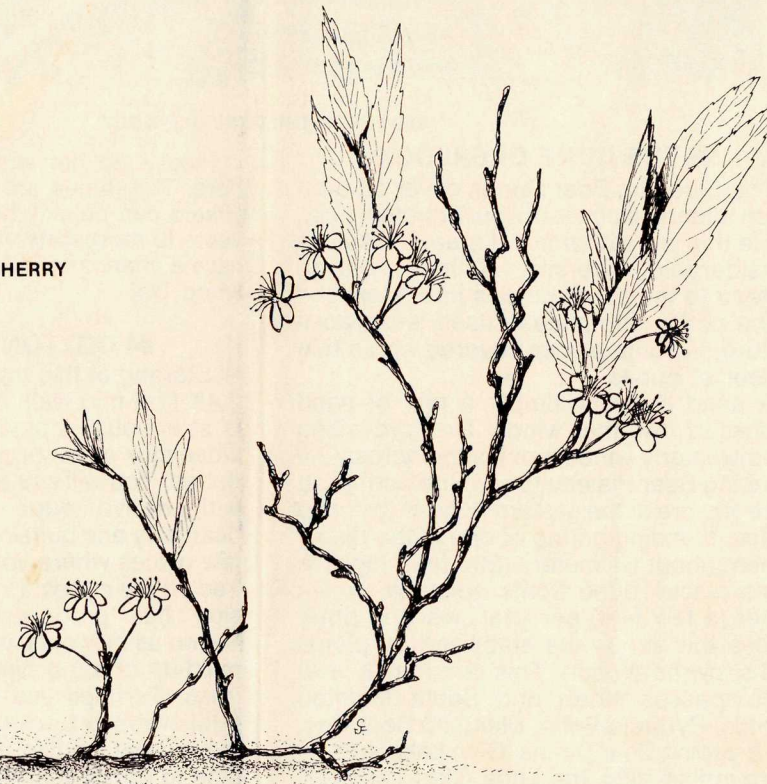
### #11 NORTH BAR LAKE

The small lake below is North Bar Lake. The name describes how the lake formed: it is ponded behind a sand bar. At times, the sand bar builds up and separates North Bar Lake from Lake Michigan. At other times, a small connecting channel exists between the two lakes. North Bar Lake occupies part of a former bay on Lake Michigan. This ancient bay was flanked by headlands on both sides: Empire Bluffs on the south and Sleeping Bear Bluffs on the north. Shorelines have a natural tendency to become straighter with time. Wave action focuses on the headlands and wears them back, while shoreline currents carry sediment to the quiet bays and fill them in. Deeper parts of the bay are often left as lakes when sand fills in the shallower parts. The same process that formed North Bar Lake also formed many of the other lakes in northern Michigan: Glen, Crystal, Elk and Torch Lakes, for example.

### #12 THE PINE PLANTATION

Notice that the pine trees at the side of the road are all about the same size and are not mixed with other kinds of trees. This is a pine plantation. You can estimate the age of the trees by counting the whorls of branches. These trees were planted before the land became part of Sleeping Bear Dunes National Lakeshore. Logging and farming played an important role in Michigan's history, but left many tracts of land depleted. Property owners planted pine trees in an effort to improve their land. Pine trees serve a number of purposes: they prevent soil erosion, provide a windbreak, yield a timber crop and provide some wildlife habitat. Yet, for all their benefits, pine plantations are out of place in Sleeping Bear Dunes National Lakeshore. The park was set aside to preserve the natural environment. Therefore, native forest growth is more desirable here than pine plantations. In some parts of the park, portions of pine plantations have been cut selectively to encourage a mingling of natural forest growth among the pine trees.

SAND CHERRY

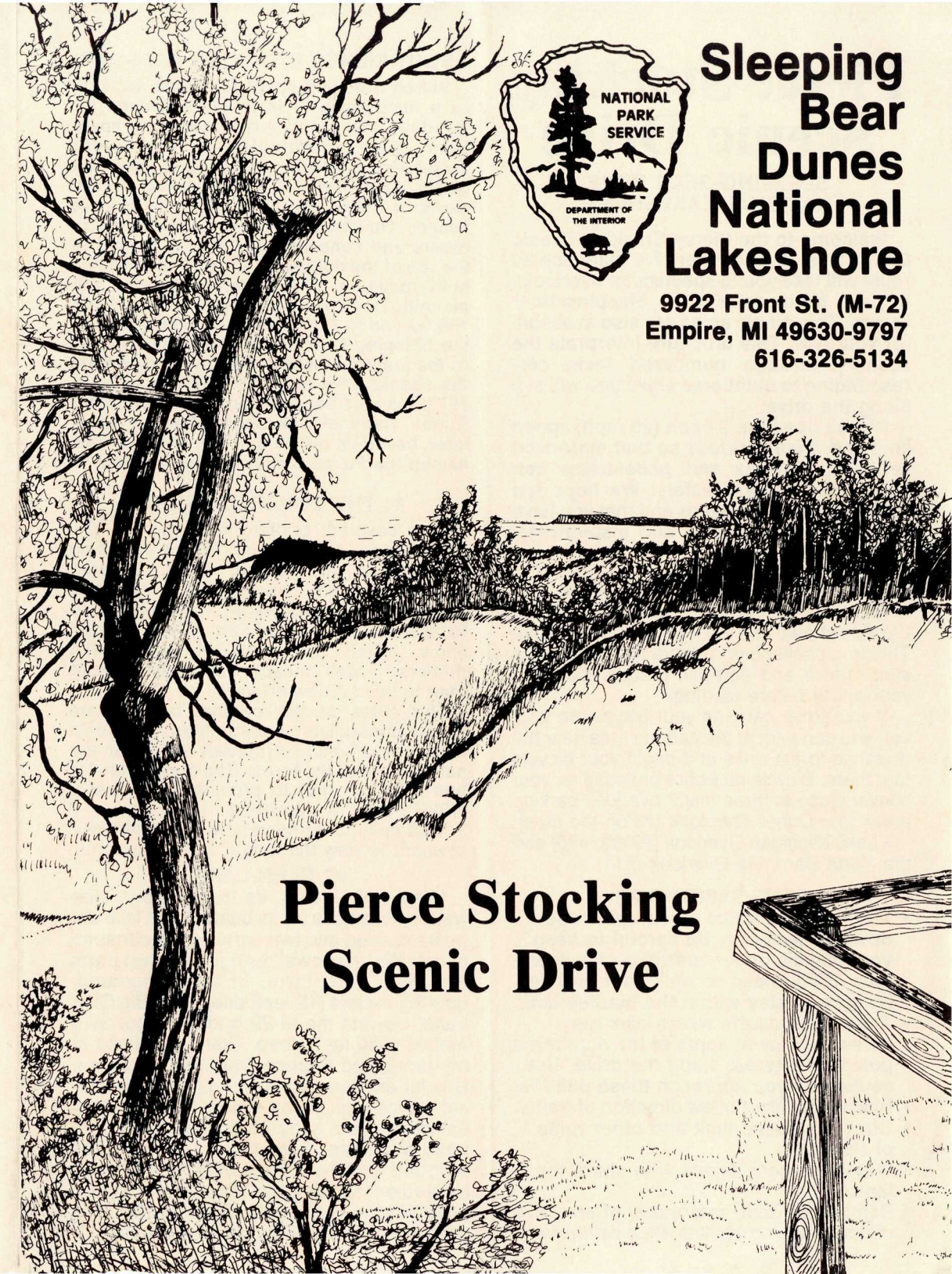


REVISED 2/95



# Sleeping Bear Dunes National Lakeshore

9922 Front St. (M-72)  
Empire, MI 49630-9797  
616-326-5134



## Pierce Stocking Scenic Drive



# Pierce Stocking Scenic Drive

SLEEPING BEAR DUNE  
NATIONAL LAKESHORE

Welcome to the Pierce Stocking Scenic Drive. This 12 Kilometer (7.4 mile) scenic route will take you to spectacular overlooks of Lake Michigan and the Sleeping Bear Dunes. Two picnic areas are also available for your use. This brochure interprets the scenery through numbered texts corresponding to numbered signs you will see along the drive.

Please obey the 32 kph (20 mph) speed limit and drive carefully so that motorized vehicles, bicycles and pedestrians can share this roadway safely. We hope the facilities meet your needs and that you have a relaxing, recreational and inspirational visit.

## A NOTE TO BICYCLISTS

Bicycling is permitted along the drive. Cyclists should use the right side of the road. This is a challenging bicycle tour with some steep uphill and downhill grades. Consider your ability before starting.

If you arrive carrying your bicycle on your car, you can park at the parking area near the entrance to the drive and begin your bicycle tour there. Bicycle racks are provided for your convenience at three major overlook parking areas: the Dunes Overlook (#3 on the map), the Lake Michigan Overlook (#9 and #10) and the North Bar Lake Overlook (#11).

## SOME SAFETY TIPS

- The road has some steep uphill and downhill sections. Be careful to keep your bicycle under control on the downhills. If you need to walk your bicycle, be sure to stay within the marked lane.
- There are pulloffs where cars may cross the lane at some of the numbered points of interest along the drive. Use caution as you approach these pulloffs.
- Ride single file. Follow direction of traffic.
- Obey the speed limit and other rules of the road.
- Watch for pedestrians who share the lane.
- Remember that motorists often have difficulty seeing cyclists. Ride defensively.

## ABOUT PIERCE STOCKING (1908-1976)

Pierce Stocking spent his youth working as a lumberman in Michigan's forests. He loved the woods and spent most of his spare time there, developing a self-taught knowledge of nature. He used to walk the bluffs above Lake Michigan, awed by the views of the dunes, Lake Michigan and the islands. He wanted to share this beauty with others and conceived the idea of a road to the top of the dunes. As a lumberman he had built roads in difficult terrain before. The planning for the road began in the early 1960's, and in 1967, the road, then known as the Sleeping Bear Dunes Park, first opened to the public. Stocking continued to operate the scenic drive until his death in 1976. In 1977, the road became part of Sleeping Bear Dunes National Lakeshore. Several years later, based on public opinion, the drive was named the Pierce Stocking Scenic Drive.

### #1 THE COVERED BRIDGE

The covered bridge was one of the picturesque details that Pierce Stocking included in the Scenic Drive. Covered bridges, usually associated with New England and Pennsylvania, were developed to protect wooden bridges from rain and snow, which can cause rotting of the timbers. It was cheaper to repair the roof than to build a new bridge.

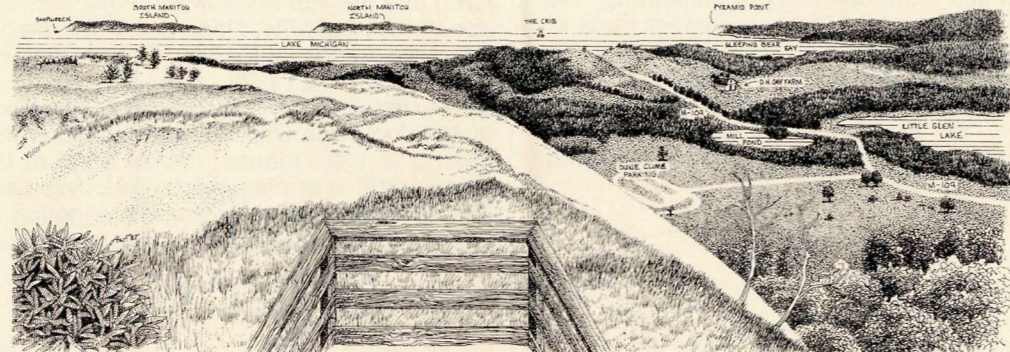
The sides of the original bridge were largely consumed by porcupines, who seem to relish man-made structures more than the native wood of the forest. The present bridge has a higher roof to provide a 4.1 meter (13'6") vehicle clearance.

This pull-off is intended to let you linger a moment to view the bridge or photograph it.

### #2 GLEN LAKE

Glen Lake, with its remarkably blue waters, is famous for its beauty. The lake appears divided into two parts by the constriction at the "narrows" bridge. The two parts are Little Glen Lake, in the foreground, only 3.7 meters (12 feet) deep, and Big Glen Lake, beyond the M-22 bridge, about 39.6 meters (130 feet) deep. Glen Lake used to be connected to ancestral Lake Michigan. Glacial erosion carved out both lakes during the Ice Age. In post-glacial times, a sandbar developed, separating Glen Lake from Lake Michigan. Both the D.H. Day Campground and the Village of Glen Arbor are located on that sandbar. The flat terrain and proximity to Lake Michigan made it a desirable site for these developments.

The hill on the north (left) side of Little Glen Lake is called Alligator Hill because of its shape. It is a product of the Ice Age and early post-glacial times. Glaciers carried a tremendous load of sand, gravel and other rock debris frozen in the ice. When the ice melted, the run-off streams deposited great piles of sediment to form the hill. Imagine how thick the ice must have been to have left hills of debris several hundred feet high. The "snout" of the alligator is a wave-cut terrace of a lake that occupied the Glen Lake basin briefly during deglaciation.



VIEW FROM THE DUNE OVERLOOK

Drawing by Tom Ford

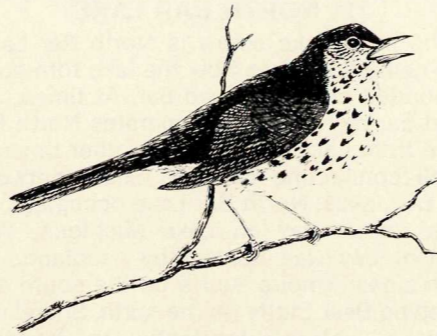
### #3 THE DUNE OVERLOOK

The Sleeping Bear Dunes cover an area of ten square kilometers (four square miles). While this is a rather small area, it displays considerable diversity. A high, barren plateau to the south grades into a lowland to the north. The plateau itself is a glacial feature, in some places covered with a thin veneer of dunes.

A sand dune is simply a pile of sand deposited by the wind. The prevailing southwesterly winds move sand across the Sleeping Bear Plateau toward the northeast. Here you are at the eastern edge of the sand dunes, standing on top of one of the tallest dunes, about 61 meters (200 feet) high. In some places dune fronts advance over a meter (a few feet) per year, while in other places the dunes are stabilized by plants and show no motion. This panoramic view encompasses North and South Manitou Islands, Pyramid Point, Sleeping Bear Bay, the Sleeping Bear Dunes, Glen Lake and the surrounding hills, the Little Glen Lake Mill Pond, and the historic D.H. Day farm with the huge white barn (in private ownership).

### #4 COTTONWOOD TRAIL

Starting at this trailhead, you can take a 2.4K (1.5 mi.) walk on the dunes. The trail is strenuous in places but will give you a close look at the beauty and diversity of the dunes. You will see areas that are stabilized with native dune vegetation such as bearberry and buffaloberry. This is one of the few places where you can even see a birch tree on the dunes. In some places, wind erosion has produced bowl-shaped dunes known as blowouts, while in other places, the build-up of sand has partially buried living trees. Perhaps you will see some colorful wildflowers or tracks in the sand that reveal the elusive wildlife of the dunes. Take the time to get acquainted with this unique environment. Please stay on the designated trail.



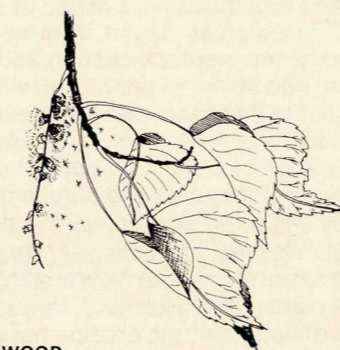
WOOD THRUSH

## #5 DUNE ECOLOGY

Consider the conditions that plants must deal with on the dunes: strong sunlight; low soil fertility; drying wind action; limited soil moisture; wind erosion, which can expose root systems; and build-ups of sand which can partially or completely bury plants. Notice the cottonwood trees growing on the steep dune across the road. They are managing to survive despite their precarious position. The cottonwood is the only common tree of the dunes, and is well adapted to the dune environment. Its fast rate of growth allows it to keep pace with burial by sand. Notice that the trees are growing in a cluster. This too is typical. The cottonwood can reproduce by cloning, sprouting new trunks from roots. The network of roots helps to hold the sand in place and the tree itself acts as a windbreak. This helps to stabilize the dunes. The dense root networks of various grasses also hold the sand in place. Once the dune is stabilized, new plants can begin growing on it, plants which are not able to survive on an active dune. Common juniper, the evergreen shrub growing among the grasses, is one of the typical plants of stabilized dunes.



A GHOST FOREST



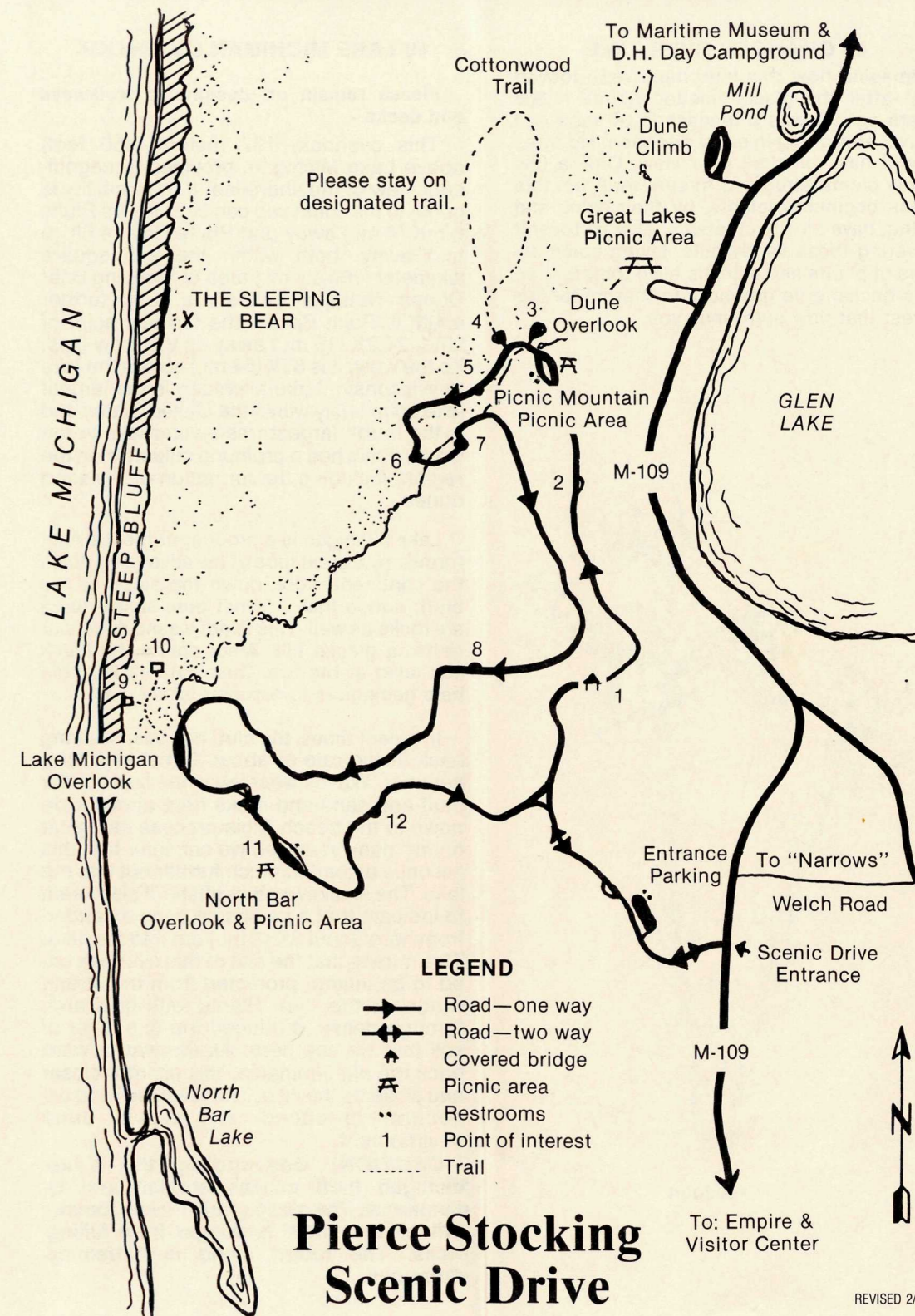
COTTONWOOD

### #6 LEAVING THE SAND DUNES

You are about to leave the dunes and enter the neighboring beech-maple forest. The dunes cover just a small area because they depend on strong winds off Lake Michigan to exist. The active dune zone extends for only about a mile from the lake. Further inland, the wind loses its energy and can no longer build dunes. As you leave this site, notice the fine old basswood tree on the left. Its exposed roots indicate the ongoing contest between plants and shifting sand.

### #7 THE BEECH-MAPLE FOREST

What a startling contrast we find between the open, sunny environment of the dunes and the lush, shady world of the beech-maple forest. Here plants must compete for the limited amount of sunlight. Shade-tolerance is the key to survival. The dominant trees are sugar maple and American beech. Both are able to survive in the shade of taller trees. However, if by chance a young tree gets enough sunlight, it experiences a burst of growth. By growing tall, it can reach the opening in the canopy of leaves. In addition to beech and maple, you will see black cherry, hemlock and basswood trees here. This is the climax forest of the area. Other plant communities, given enough time, tend to phase into a beech-maple forest. Once established, this forest remains stable unless it experiences a set-back such as forest fire or logging. Tune in all your senses. Maybe you will catch a glimpse of a squirrel or deer, or smell the odor of decaying leaves, or hear the flutelike song of the wood thrush.



# Pierce Stocking Scenic Drive