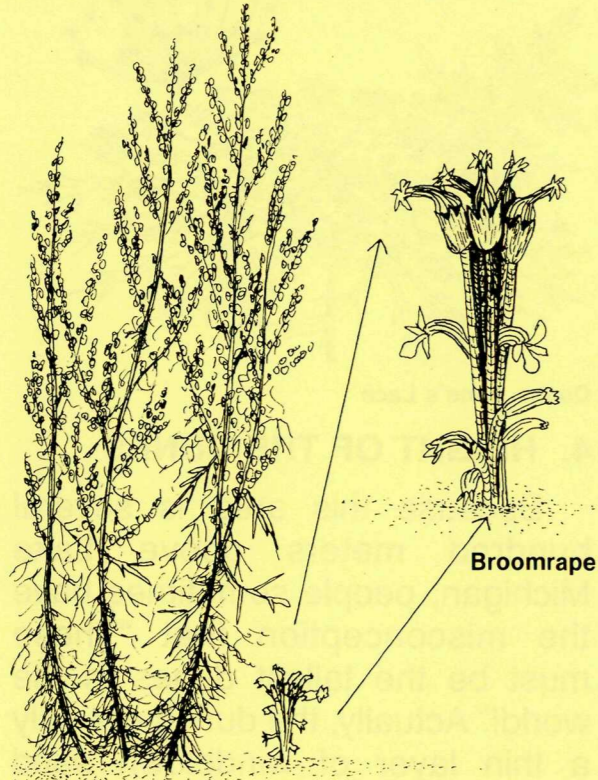


Sandreed

Sandreed is another important sand binder. The feathery seedheads are quite different from the tight clusters of seeds in beachgrass.

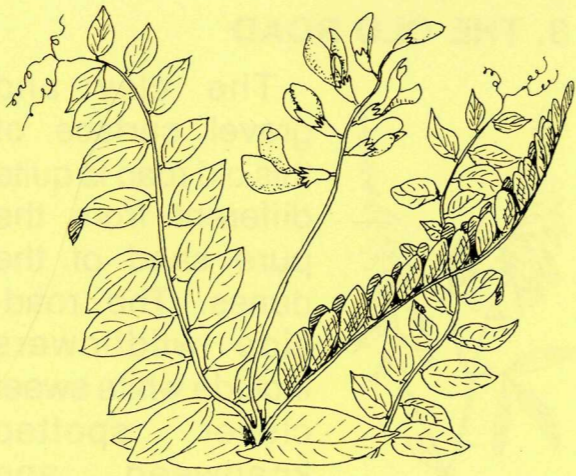


Wormwood

Wormwood belongs to the same genus as Western sagebrush. The flowers, blooming July through October, are wind-pollinated. They are not showy, for there is no need to attract insects for pollination. Perhaps you will see a small, brownish plant growing at the base of the wormwood. This is the broomrape, a Michigan protected wildflower, because of its rarity. Lacking chlorophyll for manufacturing its food, the broomrape live as a parasite on the wormwood.

Little Bluestem

Little Bluestem grows on stabilized dunes. It is a bunchgrass, forming distinct clumps rather than a continuous cover. It is not as well suited to preventing erosion as beachgrass.



Beach Pea

7. VIEW FROM THE BENCHES

From here you can survey the dunes, Glen Lake and the surrounding countryside. The Dune Climb below, where thousands of people climb each year, lies along the eastern edge of the dunes. The sand advances there at a rate of about 1.2 meters (four feet) per year.

If you stop at the Dune Climb later, look for the exhibit on sand movement. In 1985, a horizontal beam was placed at the edge of the dunes. It allows you to measure how many feet the dune has advanced over the years. The exhibit is located just north of the main climbing area.

Actually the rate of movement of these dunes is minor compared to some desert dunes. The wind loses its ability to move sand beyond two kilometers (a mile) or so from Lake Michigan, and plants also help to stabilize the dunes and limit sand movement.

8. AN ACTIVE DUNE

The cottonwood trees on this dune tell the story of change. Some of the trees are being buried in sand, while others have had their roots exposed where the sand has blown away. You can follow some of the runners along the surface of the dune to places where new trees have sprouted.

Feel a leaf of the cottonwood tree. How would you describe it? Maybe waxy or like plastic? This type of leaf is found among many different plants in dry locations. The waxy surface slows down water loss through the leaves.

The sand dunes are not a desert; they receive about 76 centimeters (30 inches) of rainfall per year. However, the dunes are somewhat drier than the neighboring forests because of strong sunlight, wind and the lack of moisture-holding layer of humus. Water filters through sand more quickly than through soils that have some silt and clay. Therefore dune plants have some of the same adaptations as desert plants.

9. SHRUBS OF THE DUNES

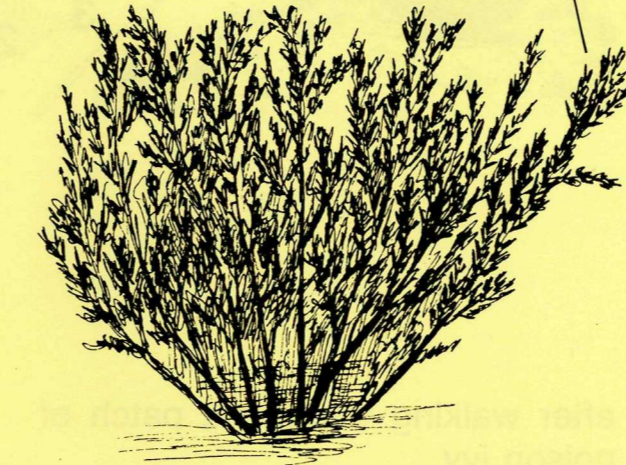
As you walk along this section of trail, look for some of the typical shrubs of stabilized dunes. Try to spot a paper birch, a small tree with white bark. This is one of the few places on the dunes where it grows.

Why is the plant community here so different from the one you saw earlier along the trail? Perhaps this location is more sheltered from the wind; or maybe the underlying glacial deposits (which provide more moisture and nutrients) are closer to the surface.



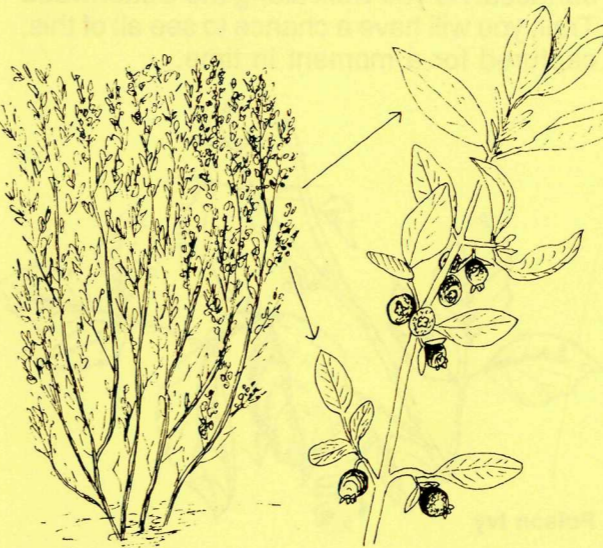
Bearberry

Bearberry forms a low ground cover. It is a broad-leaved evergreen with tiny, pink flowers in the spring and a red berry in late summer and fall.



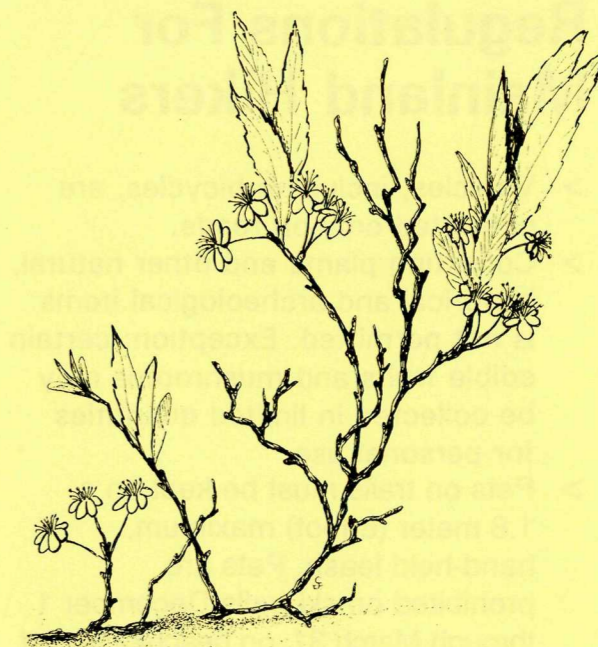
Common Juniper

Common juniper is an evergreen shrub that occurs in two forms; an upright form 1-2 meters (several feet) tall and a low ground cover.



Buffaloberry

Buffaloberry stands 1-2 meters (3 to 5 feet) high and has small clusters of orange berries. The shrub contributes nitrogen to the soil through bacteria that live on its roots



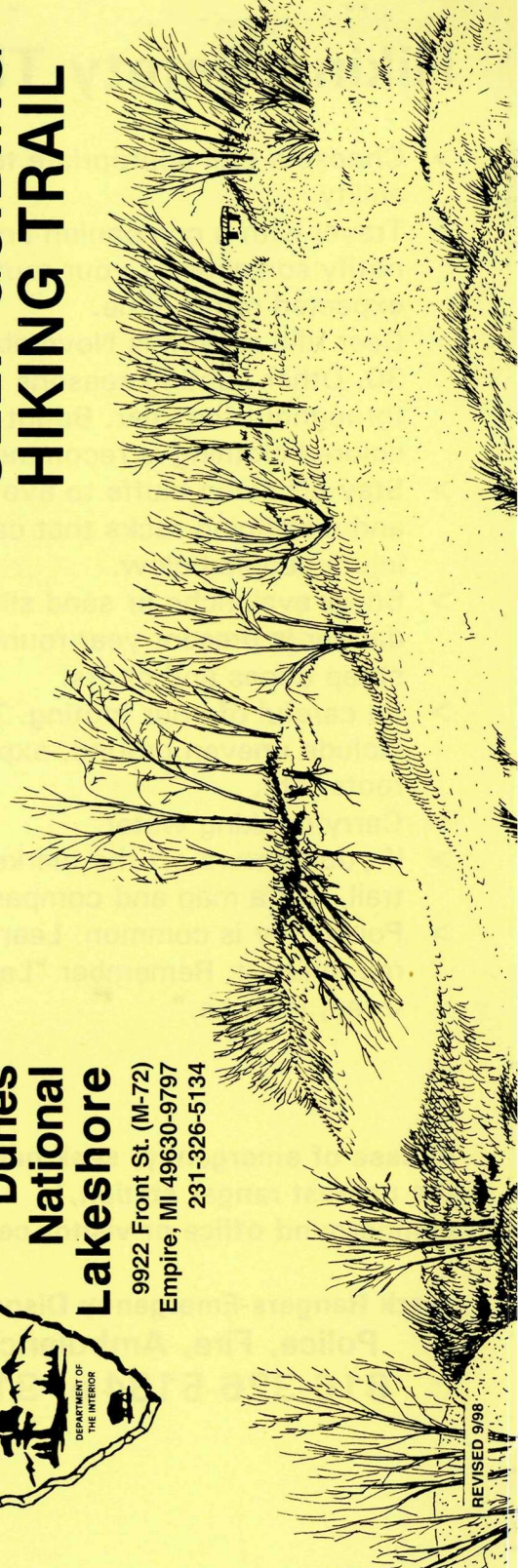
Sand Cherry

Sand cherry is a small shrub with white flowers in the spring and blackish cherries in late summer. A black fungus growing on the twigs is an aid in identification.

We hope you have enjoyed your walk on the Cottonwood Trail. There are other trails within Sleeping Bear Dunes National Lakeshore, both on the sand dunes and through wooded areas. Please feel free to stop at the Visitor Center in Empire to pick up trail maps and get more information about the park.

COTTONWOOD SELF-GUIDING HIKING TRAIL

Sleeping Bear Dunes National Lakeshore
9922 Front St. (M-72)
Empire, MI 49630-9797
231-326-5134



REVISED 9/88

Hiking Safety Tips

- > Choose a trail appropriate to your ability.
- > Travel with a companion and notify someone of your route and expected return time.
- > Deer rifle season is November 15-30. Other hunting seasons occur throughout the year. Bright-colored clothing is recommended.
- > Stay off steep bluffs to avoid falls and dislodging rocks that can injure people below.
- > Snow avalanche or sand slide danger is present year-round on steep dunes and bluffs.
- > Be careful of your footing. Trails include uneven ground, exposed roots, etc.
- > Carry drinking water.
- > If you venture off the marked trail, use a map and compass.
- > Poison ivy is common. Learn to recognize it. Remember "Leaflets three, let it be."

In case of emergency, seek help at the nearest ranger station, campground office or visitor center.

Park Rangers-Emergency Dispatcher
Police, Fire, Ambulance
616-326-5134 or 911

Regulations For Mainland Hikers

- > Vehicles, including bicycles, are permitted only on roads.
- > Collecting plants and other natural, historical and archeological items is not permitted. Exception: certain edible fruits and mushrooms may be collected in limited quantities for personal use.
- > Pets on trails must be kept on a 1.8 meter (6-foot) maximum, hand-held leash. Pets are prohibited on ski trails December 1 through March 31, on beaches and at the Dune Climb throughout the year.
- > Glass is banned on all park beaches.
- > Fires are permitted only in campground and picnic area fireplaces and on areas of bare beach sand between the water and the first dune.

Protect Your Park

Please stay on designated trails. This will help prevent erosion and damage to vegetation. Off-trail hikers can quickly produce paths that take years to revegetate. Avoid disturbing plants and animals: threatened and endangered species occur in the park.

Welcome to the Cottonwood Trail. Allow about an hour to walk this 2.4 kilometer (1½ mile) loop. Portions of this trail go through loose sand and are strenuous.

The numbers in this folder refer to numbered markers along the trail.

At #7 you will find benches where you can relax and enjoy the view of Glen Lake.

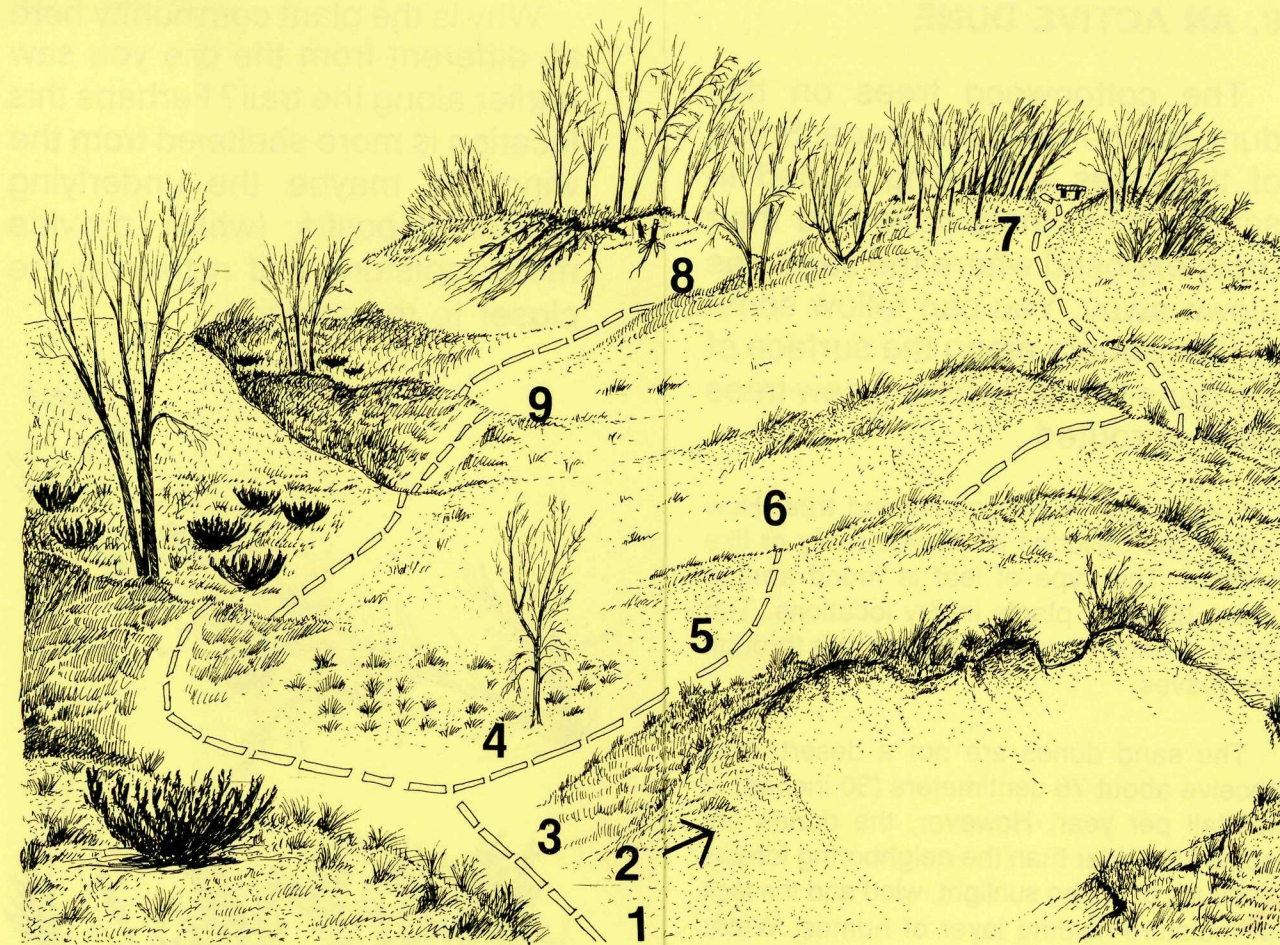
The dunes are an ever-changing landscape. If we could view a time-lapse movie of the dunes, we would see dunes growing and advancing across the land; we would see plants taking root and holding the dunes in place; and we would see wind action eroding the dunes, leaving behind irregular, broken surfaces. As you walk along the Cottonwood Trail, you will have a chance to see all of this, captured for a moment in time.



Poison Ivy

1. WATCH OUT FOR POISON IVY ALONG THE BEGINNING OF THE TRAIL.

You can develop a rash from touching the plant itself, or even from touching your shoes or pants

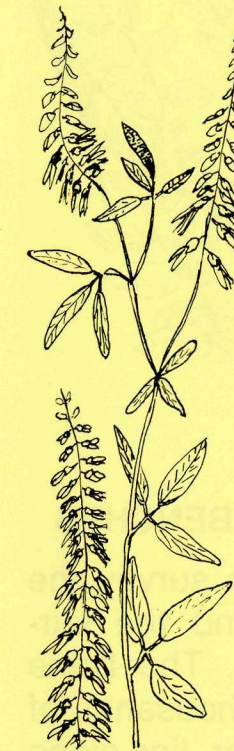


after walking through a patch of poison ivy.

2. THE BLOWOUT

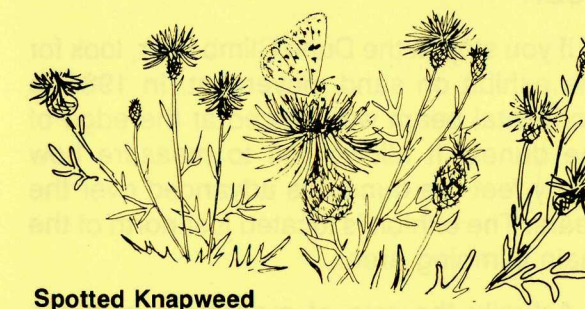
Notice the bowl-like shape of the dune up ahead, to the right of the trail. It is called a blowout. Erosion by prevailing southwesterly winds

3. THE OLD ROAD



White Sweet Clover

Alien plants frequently take over disturbed locations like roadsides and old farm fields. The different soil along this road probably helped to give the alien plants an advantage over the native flora.



Spotted Knapweed

This old road is actually an abandoned loop of the Pierce Stocking Scenic Drive. As you walk along, you will discover why the road is no longer maintained: sand has buried it to a depth of over a meter (several feet) in some places.

The clay and gravel surface of this old road is quite different from the pure sand of the dunes. The roadside wildflowers include white sweet clover, spotted knapweed and Queen Anne's lace. These are not native American plants; they originally came from Europe.



Queen Anne's Lace

4. HEIGHT OF THE DUNES

Because this area is several hundred meters above Lake Michigan, people sometimes have the misconception that "These must be the tallest dunes in the world!" Actually, the dunes are only a thin layer of windblown sand which lies or perches atop the Sleeping Bear Plateau and so are referred to by geologists as "perched dunes". Most of the plateau is a pile of sand, gravel and clay that was deposited by glacial ice as it melted here several thousand years ago.

5. SAND

Pick up a handful of sand and study it closely. Notice that all the grains are just about the same size: small enough to blow about in the wind, but heavy enough to come to rest abruptly when the wind stops blowing.

The grains of sand are not all the same color. Several different minerals are present. Quartz is the most common, and appears either clear or rusty in color, from a coating of iron oxide. Quartz is very resistant to breaking down chemically or physically. Other colors in the sand represent different minerals present in minor amounts. The grains of sand come from the breakdown of larger rocks.

Did you notice anything about the shape of the grains of sand? Dune sand is typically well-rounded and shows a frosted surface from contact with other grains of sand.

6. GRASSES AND FLOWERS OF THE DUNES

Quite a variety of grasses and wildflowers live on the sand dunes. Look over the illustrations and see if you can recognize some of these plants as you walk along the trail.



Beachgrass

Beachgrass is one of the first plants to grow on a newly-formed dune. Its roots form a dense network that helps to hold the sand in place. When sand piles up around its base, beachgrass can grow rapidly to avoid being buried.