

This beautiful wildlife poster is brought to you by the thousands of citizens who have contributed to the Nongame Wildlife Fund on their state tax form or by a direct donation to the fund. It portrays the unique, fragile, beauty and ecological value of sand dune habitats, one of the most important elements of Michigan's rich natural heritage.

MICHIGAN COASTAL DUNES

INTRODUCTION

Michigan's shoreline is a showcase for 275,000 acres of sand dune formations. An interaction between blustery winds and waves has moved and carved fine sands into the largest display of fresh-water dunes in the world. These beautiful sand formations contain a diversity of life, climatic conditions, and geological relief unique to Michigan.

A visit to a sand dune provides an opportunity to experience a landscape of natural sounds, smells, and sights. Feeling the clean sand beneath your feet as the fresh lake breezes bathe your face is one of the values of Michigan's magnificent sand dunes. We have a responsibility to protect and preserve this natural legacy for the enjoyment and wise use by our present and future generations.

We hope this poster will enhance your enjoyment and appreciation of the sand dune ecosystem by introducing you to its geology and ecology, as well as to the human impact of this unique, fragile environment.

GEOLOGY

Michigan's glacial history provides an explanation for the formation of dunes. The Great Lakes dune complex is relatively young, in terms of geological time. As recently as 16,000 years ago, Michigan was covered with glacial ice thousands of feet thick. The glacial ice contained a mix of boulders, cobbles, sand, and clay. During glacial melting, this deposit was left and is known as glacial drift.

This glacial drift is the source of sand in most of Michigan's dunes. The sands were either eroded from glacial drift along the coast by wave activity or eroded from inland deposits and carried by rivers and streams. Only the hardest, smallest, and least soluble sand grains were moved. Waves and currents eventually moved these tiny rocks inland, creating beaches along the Great Lakes shoreline.

DUNE FORMATION

Winds, blowing shoreward at speeds of 8 to 25 miles per hour, begin to move the sand grains. The size of the grains which are moving is directly related to wind velocity – larger grains require higher wind speeds. These bouncing sand grains resemble tiny, skipping ping pong balls as they are moved by the wind through a process called saltation (see figure 1). Colliding with each other, barely a foot or two off the ground, they may meet a slight obstruction, such as a clump of grass, which deflects the wind and allows sand grains to drop. Thus a slight mound or hummock is created.

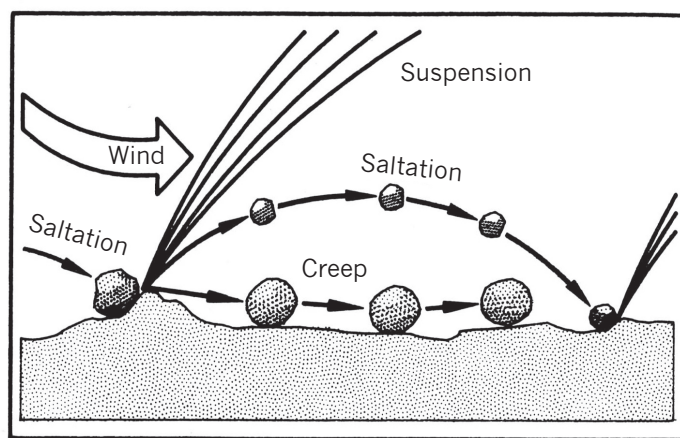


Figure 1. Sand movement by wind: saltation and surface creep.

The wind continues to push sand grains up the windward side of the dune crest, causing the dune to grow in the downward direction. Many sand grains continue moving and eventually roll down the steep backslope. A dune is slowly being formed, and its continued growth depends upon perennial vegetation, wind, and sand. Because dune plants act as barriers to sand movement and hold migrating sand, they play a critical role in the formation and stabilization of dunes.

MAJOR DUNE TYPES

Parallel dunes are a series of low, linear dunes formed parallel to the shores of large shallow bays. The parallel dunes along the eastern shore of Lake Michigan were formed about 4,000 years ago during the Lake Nipissing stage of Lake Michigan, when water levels were 25 to 30 feet higher than present day Lake Michigan water levels. Rivers entering the bays carried abundant sand, which was then moved along the shore by lake currents.

On-shore winds formed these sands into low-laying dunes. As the water level of ancient Lake Nipissing dropped, a series of parallel dunes were created. They occurred in areas that were formally wide bays in Lake Nipissing.

Today, some examples of parallel dune complexes can be seen at the mouth of rivers, including the Muskegon, Kalamazoo, and Grand. Remnants of several ancient bays now are coastal lakes, such as Hamlin Lake in Mason County, Silver Lake in Oceana County, and White Lake in Muskegon County.

Blowouts are saddle-shaped or U-shaped (parabolic) depressions in a stabilized sand dune, caused by the local destabilization of the dune sands. Blowouts, which originate on the summit or windward face of a dune, are often rapidly formed by the wind, creating narrow channels and exposing plant roots. Blowouts can create interruptions in the shape of parallel dunes that may result in deeply carved indentions called **parabolic dunes** (see figure 2). It is the combination of interwoven parallel dune ridges that characterizes the classic dunes from Indiana, northward to Ludington, in Michigan.

The moving sand from the blowouts often buries forest on the steep lee slopes. Blowouts may also uncover the bleached trunks of trees still standing after being buried in the dry sand for hundreds of years. These “ghost forest” are silent testimonials to ancient forests buried by blowouts in the past.

Blowouts have historically been caused by natural disturbances, such as fires, wind storms, or plant diseases. However, in recent decades, human activities and disturbances or destruction of sand-holding vegetation has initiated blowouts. Off-road vehicle traffic and human foot traffic are major causes, but clearing of protective dune vegetation to build homes, cottages, and commercial buildings has also resulted in large-scale wind erosion-man –made blowouts. Continuous human disturbance has the potential for much more widespread destabilization because it does not allow blowouts to stabilize.

Perched Dunes are some of the more famous and most spectacular land features in Michigan. They are actually wind-blowing sand dunes perched atop glacial moraines. Glacial moraines, common landforms in Michigan, are ridges of sand, gravel, stone or clay left by retreating glacial ice. The moraines lying along the present shoreline of the Great Lakes were subjected to wind and wave erosion. Sand, moved by waves and long-shore currents, was blown up the steep faces of the moraines by on- shore winds, accumulating along the summits and leeward sides, forming perched dunes. The famous dunes at Sleeping Bear Dunes National Lakeshore are a well-known example. Others include those on the Manitou and Fox Islands in northern Lake Michigan and Grand Sable Banks near Grand Marais in Lake Superior.

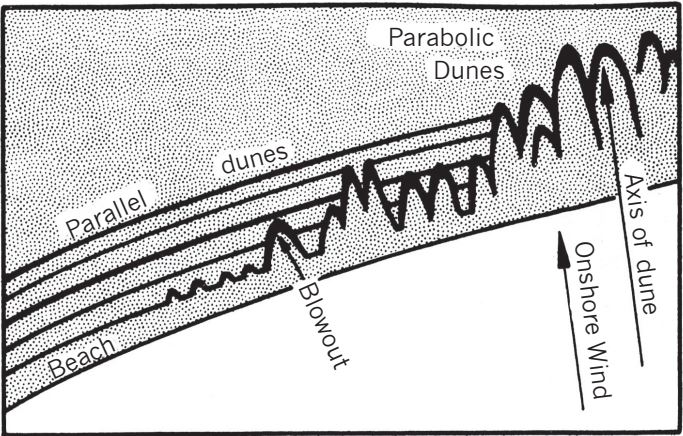
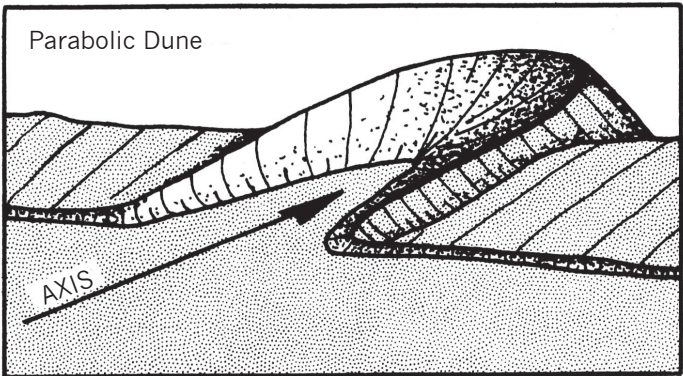


Figure 2. A blowout and parabolic dune interruption of a Michigan shoreline. From: Bird, 1969, page 139



DUNE LIFE ZONES

The dune ecosystem is made of several zones with very different physical characteristics. They are as follows:

Beaches are zones where water meets land. The constant movement of sand by the wind, pounding storm waves, and winter ice and snow make this a formidable habitat for any living thing. For this reason, few plants or animals live on the beach. Most wildlife seen there are just visitors. Among these visitors are scavengers ranging in size from small flies and beetles to shore birds, herring gulls, and even bald eagles. The remains of fish, birds, and insects washed ashore provide food.

Mammals that venture down the beach include the raccoon, skunk and fox, which wait until dark to search the shoreline for food. A recent study conducted on North Manitou Island revealed an unexpected scavenger: white-tailed deer that feed on dead alewives.

The sea rocket is one of the few plants specially adapted to withstand the pounding of waves and other adverse conditions. It sinks its roots to the water table and stores water in its succulent leaves.

The **foredune** is the first ridge behind the beach. Although foredune are above wave action most

of the time, they are regularly subject to storm waves.

Like the beach, life in the foredune is a daily struggle against shifting sand, scarcity of nutrients, rapid water drainage, high evaporation rates, and storms. Out of the reach of waves, a few hardy plants, such as marram grass and sand reed grass, are able to survive. These grasses are known as pioneer species, because they are one of the first plants to become established, and they create habitat for other plants by stabilizing the soil with their extensive root systems, thus increasing the soil's capacity to retain water and nutrients. Marram grass spreads quickly by sending stems to the surface to form new plants. As drifting sand accumulates in the marram grass, the central stem continues to grow, keeping the plant's leaves exposed to the sun and air. This keeps the grass from being buried and increases the height of the foredune.

A foredune stabilized by these grasses can host a wide variety of wildflowers and shrubs. They include beautiful clusters of the yellow hairy puccoon, the common milkweed, beach pea, sand cress, smooth rose, bearberry, poison ivy, wild grape and sand cherry. Foredunes will remain stable as long as the vegetation is undisturbed.

Unlike plants, animals can escape the extreme temperatures and harsh conditions. Most birds migrate seasonally or retreat daily to the cover of heavy vegetation. Many animals are nocturnal and are most active during the cooler nighttime hours. Like the plants, animals that live on the grass-covered foredune have special adaptations that help them survive the extreme temperatures of the summer and winter. Surface temperatures on the open dunes can reach 120 degrees Fahrenheit. The sand wolf spider is adapted to extreme temperatures by living in a burrow deep under the sand. Its sandy brown color also helps it blend into its surroundings when leaving its burrow time.

Interdunal wetlands are shallow ponds or pools located between dunes. They typically are found between low dunes or sand spits created when water levels drop or as shoreline currents change. Ponds may vanish during dry periods. These fluctuations in water table are important for plants such as the threatened Houghton's goldenrod.

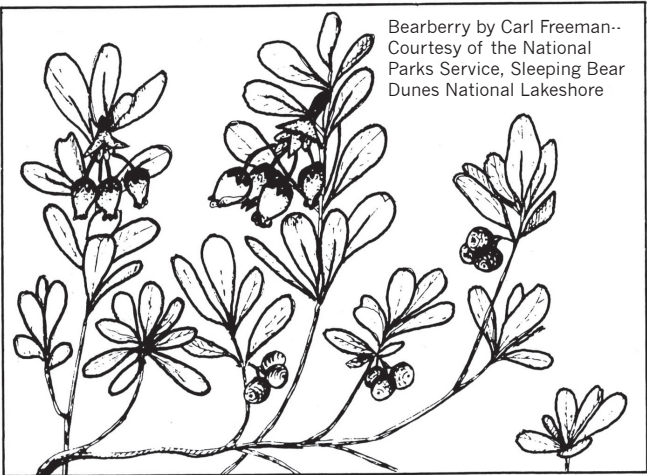
The animals and plants found in and around interdunal wetlands are similar to those inhabiting most ponds. Insects like water striders may skate across the surface. Whirligig beetles make erratic patterns on the surface. Shorebirds, like greater yellow-legs, feed on the rich insect life. Spikerush-

es and sedges grow in the shallows.

Dune forests can be found on stabilized dunes protected from intense wind erosion. The dominant forest type varies as one travels north along the coastline. In southern Michigan dunes, oak-hickory forests are common. Northern dune forests are dominated by beech, maple and hemlock.

The uniqueness of dune forests stems from the fact that they develop on steep, barren sand slopes that are a short distance from open dunes. The contrast between cool, shaded dune forest and the extreme temperatures and intense sunlight of the open dune can be striking. Through thin and slow to accumulate, the topsoil of dune forests supports a variety of spring wildflowers and woodland plants.

Studies of dune slopes reveal varying patterns of vegetation, depending on the direction of sunlight and the amount of shade, moisture, and protection from the wind. For example, Eastern hemlocks prefer shady north-facing slopes. Spring wildflowers such as the white trillium bloom in abundance on south-facing slopes where they can absorb more sunlight.



DUNE PLANTS

Lichens, fungi, mosses, grasses, wildflowers, shrubs and trees all are part of a dunescape. All dune plants must adjust their survival to the harsh environment. Drying winds, low soil moisture and fertility, and intense sunlight along with blowing sand are conditions that affect the growth of dune vegetation. In most active parts of the dune, only a few species of grass and shrubs can survive; on more protected areas, forests become established.

Dune plants have evolved special adaptations to the harsh environment. Some are gray-green and covered with tiny hairs that act like a reflective blanket, reflecting light to prevent heat loss and aiding in transpiration. The sea rocket, a member of the mustard family, has fleshy stems that hold

moisture. Its root system is able to withstand continual wave action at the shoreline.

As sturdy as they seem, dune plants are especially sensitive to human disturbance. Walking or driving all terrain vehicles on them may cause destruction of surface vegetation and root die-off. This exposes a dune to wind erosion, allowing the sand to move or open up channels in its form. **Without sand dune plants, the integrity and preservation of a stable dune complex cannot exist.**

ECOLOGY

Many of the fundamental concepts of plant succession and ecology were first identified as a result of studies made on Lake Michigan's sand dunes. The struggle of plant communities to pioneer and evolve on barren sand is a complex process known as succession, in which natural communities replace each other. Each stage of plant succession creates different microenvironments. These microenvironments are created by changes in temperature, moisture, and light intensity caused by plants and animals occupying the site.

Dune systems are well suited for the study of succession and ecological change because of the rapid changes which occur. For example, when drops in lake levels expose sand spits or create new foredunes, these features are rapidly colonized by beach grass. Within one or two human generations the vegetation can change from beach grass to shrubs to trees. Storms and high lake levels can cause an even more rapid change in plant communities.

SAVING THE DUNES

SAND DUNE LEGISLATION

Coastal dunes are in danger of being destroyed by overuse, misuse, and unwise development. They are popular sites for home building, off-road vehicle use and other intensive recreational uses, as well as sand mining and other commercial activities. Such activities, when allowed to continue in an uncontrolled and improper way, may result in dune destruction. Recognizing this threat, the people of Michigan enacted legislation in 1989 to more adequately ensure protection of the dunes. The Sand Dune Protection and Management program, being part of 353 on the Natural Resources and Environmental Protection Act, 1994 PA 451, forms the basis for protecting sand dunes from indiscriminate development. Part 353 of establishes protective standards on dunes considered to be the most sensitive. Such areas are now legally defined as critical dunes and include 70,000 acres along shorelines of Lake Michigan and Superior. Critical dunes are designated by the acts and are identified in the Atlas of

Critical Dunes, dated February 1989, developed by the Land and Water Management Division, Department of Environmental Quality (DEQ).

Passage of part 353 came after years of effort by Governor James J. Blanchard, a number of legislators, representatives of local governments, environmental groups, the Natural Resource Commission, and the DEQ. Part 353 originally amended the Sand Dunes Protection and Management Act, 1976 PA 222, by expanding regulated uses to include commercial, residential, and industrial developments, in addition to the mining industry already regulated by the existing act. The standards in the acts are intended to ensure that the dunes are protected when new uses and developments are proposed that significantly alter the physical characteristics of a critical dune area. The standards, among other things, require new uses to be set back behind the crest of a critical dune, limit the amount of grading and vegetation removal allowed, and prohibit construction on steep slopes.

PUBLICLY OWNED DUNES

Approximately 40 percent of the coastal dunes are in public ownership and managed by federal, state, or local units of government. State-owned lands are managed by the DEQ and DNR/Natural Resources Commission policy guidelines designed to fit the appropriate use with the sensitivity level of each dune area. The DEQ and DNR will continue to coordinate and cooperate with federal and local units of government to develop consistent management plans for all public sand dune areas.

ADDITIONAL REFERENCES

Dune Country – A Guide For Hikers and Naturalists, Glenda Daniel, The Shallow Press, Inc., Chicago, 1977.

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Vegetation and Common Plants of Sleeping Bear, P.W. Thompson, Cranbrook Institute of Science, Bulletin 52, Bloomfield Hills, Michigan, 1967.

A Guide to Sand Dune and Coastal Ecosystem Functional Relationships, Joan M. Peterson and Dr. Eckhart Dersch, Michigan Cooperative Extension Service. Extension Bulletin E – 1529 – MICHU-SG-81-501.

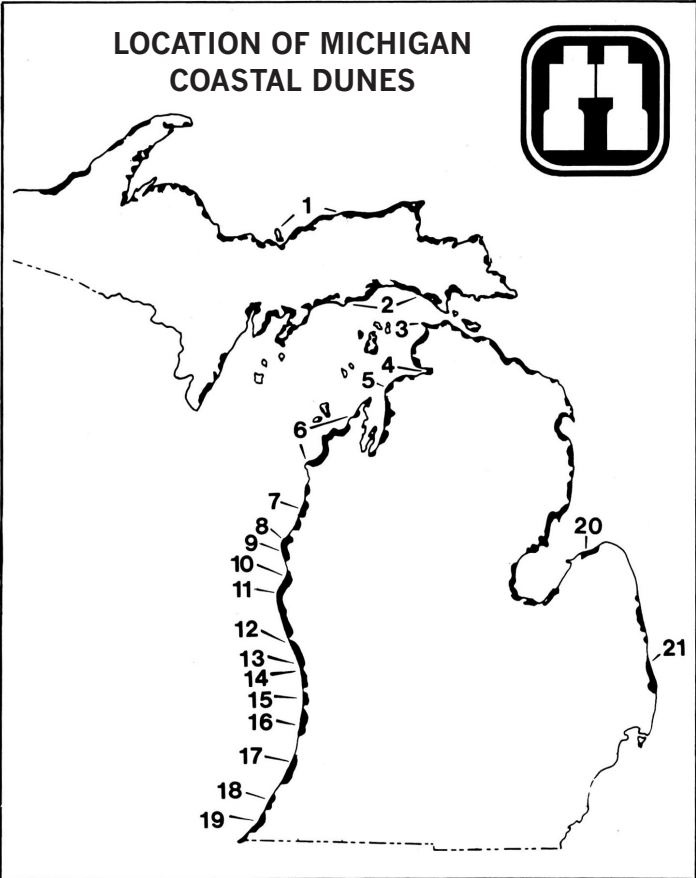
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SAND DUNE VIEWING AREAS

Listed below are locations where sand dunes can be found and enjoyed in Michigan. Remember that dune habitats are fragile and easily damaged by human activity. Visit these areas in small groups and use boardwalks or special viewing platforms when available.

	FACILITY / ADDRESS	COUNTY/PHONE
Eastern Upper Peninsula	1. Pictured Rocks National Lakeshore Box 40 Munising, MI 49862	Alger County (906) 387-2607
	2. Highway Viewing Eastern Upper Peninsula Hiawatha National Forest 1498 W. 2 St. Ignace, MI 49781	Mackinac County
Northwest Lower Peninsula	3. Wilderness State Park Box 380 Carp Lake, MI 49718	Emmet County (616) 436-5381
	4. Petoskey State Park 2475 · M 119 Carp Lake, MI 49718	Emmet County (616) 347-2311
	5. Fisherman's Island State Park P.O. Box 456 Charlevoix, MI 49720	Charlevoix County (616) 547-6641
	6. Sleeping Bear Dunes National Lakeshore P.O., Box 277, 9922 Front Street HWY M-72 Empire, MI 49630	Leelanau County (616) 326-5134
	7. Orchard Beach State Park 2064 Lakeshore Road Manistee, MI 49660	Manistee County (616) 723-7422
	8. Ludington State Park Box 709 Ludington, MI 49431	Mason County (616) 843-8671
	9. Nordhouse Dunes U.S. Forest Service 1658 Manistee Highway Manistee, MI 49660	Manistee County (616) 723-2211

	FACILITY / ADDRESS	COUNTY/PHONE
Southwest Lower Peninsula	10. Mears State Park P.O. Box 370 W. Lowell Street Pentwater, MI 49449	Oceana County (616) 869-2051
	11. Silver Lake State Park Route 1 Box 187 Mears, MI 49436	Oceana County (616) 873-3083
	12. Muskegon State Park 3560 Memorial Drive North Muskegon, MI 49445	Muskegon County (616) 744-3480
	13. P.J. Hoffmaster State Park 6585 Lake Harbor Road Muskegon, MI 49441	Muskegon County (616) 789-3711
	14. Grand Haven State Park 6585 Lake Harbor Road Grand Haven, MI 49417	Ottawa County (616) 842-6020
	15. Holland State Park Ottawa Beach Road Holland, MI 49424	Ottawa County (616) 399-9390
	16. Saugatuck State Park c/o Holland State Park Ottawa Beach Road Holland, MI 49424	Allegan County (616) 399-9390
	17. Van Buren State Park 2390 Ruggles Road South Haven, MI 49090	Van Buren County (616) 637-2788
	18. Warren Dunes State Park Sawyer, MI 49125	Berrien County (616) 426-4013
	19. Grand Mere State Park Stevensville, MI 49727	Berrien County (616) 426-4013
Eastern Lower Peninsula	20. Albert E. Sleeper State Park 6573 State Park Road Caseville, MI 48725	Huron County (517) 856-4411
	21. Lakeport State Park 7605 Lakeshore Road, Route 1 Port Huron, MI 48060	St. Clair County (313) 327-6765



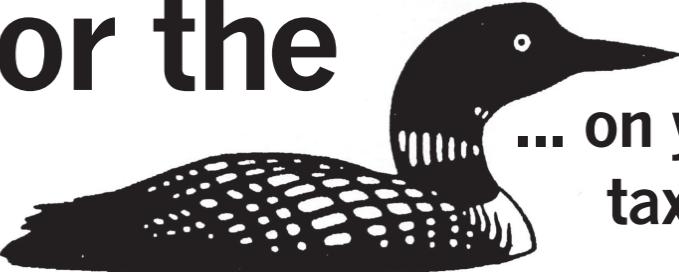
For more information, visit:

The GILLETTE NATURE CENTER, Michigan Department of Natural Resources, sand dune interpretive center. Located in P.J. Hoffmaster State Park, Muskegon, the center features multi-image presentations, exhibit hall, classroom, galleries and hiking trails and boardwalks into the surrounding dues of the Park. Call 616-798-3573 for information.

COMPLIMENTS OF:

Numbers on map refer to sand dune viewing area list.
Dark lines refer to coastal sand areas.

MICHIGAN’S NONGAME WILDLIFE FUND:
A decade of commitment to helping wildlife.

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LOON  **... on your state tax form.**

Become a working member in this Wildlife Partnership. Your contributions have helped to:

- reintroduce the peregrine falcon in Michigan, with the first successful fledging of chicks in over 40 years.
- bring back trumpeter swans to Michigan’s wetlands.
- provide school children with educational posters and teaching activities on Kirtland’s warblers, gray wolves, raptors and bluebirds.
- provide information to landowners on protected Great Lakes plants.
- create watchable wildlife opportunities.
- offer tips on creating butterfly gardens, wildlife nest boxes and wildflower gardens.

For more information or to make a donation to this important wildlife program, contact: Michigan Department of Natural Resources, Nongame Wildlife Fund, P.O. Box 30180, Lansing, MI 48909-7680.

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DESCRIPTIONS OF DUNE PLANTS AND ANIMALS

INVERTEBRATES

Monarch Butterfly (Danaus Plexippus)

Often called the Milkweed Butterfly, this large black-veined orange-winged butterfly can be observed feeding on milkweed. During its matting behavior, the adult male monarch will display a “courtship dance.” Perching on the tips of the milkweed, it will fly to other large butterflies to see if one is a female monarch; if it is, they will fly together in a fast, darting flight, lasting up to a minute and covering many yards and to a height of 100 feet. As fall approaches, the monarchs can be seen in large numbers migrating along the Great Lakes shorelines enroute to Mexico and Central America.

Lake Huron Locust

(Trimerotropis huroniana)

Open, sparsely vegetated northern Michigan dunes is home to this silver gray locust with the pale yellow hindwings. A lack of suitable undisturbed habitat has resulted in listing this species on the special concern list in Michigan.

VERTEBRATES

REPTILE

Eastern Hognose Snake

(Heterodon platyrhinos)

Sometimes called a puff adder, the hognose snake is thick-bodied, slow moving, and harmless to humans. This species was named for its flattened, upturned “nose”, which it uses as a shovel while burrowing into the soil in search of food. Rarely more than three feet long, hognose snakes come in a variety of colors – usually gray, brown, yellow or olive – and may be solid colored or patterned with dark spots and blotches on a lighter background. They are typical inhabitants of the wooded dunes of western Michigan.

BIRDS

Broad-winged Hawk (Buteo

platypterus)

Broad-winged hawks are solitary forest birds except during their migration period, when large

numbers are often seen flying together. When conditions are favorable, hundreds of birds may form huge flocks, called kettles. In this formation, the birds circle together to the tops of warm air thermals and then glide to another with minimal effort. In using the thermals the birds expend less energy during their long flight to and from South America where they spend their winters.

Piping Plover (Charadrius melodus)

Piping plovers look like a small, pale killdeer with a single dark breast stripe. Their preferred habitat is a wide, sandy beach along the Great Lakes shore in areas that have scant vegetation and scattered stones. Their nesting territories often include a small stream or interdunal wetland. Piping plovers lay four eggs in a small scrape on the ground and depend on the coloration of their eggs and feathers for protection. Piping plovers are an endangered species in Michigan. There are only about 15 pairs on the entire Great Lakes shoreline, all of which nest in Michigan. They winter on the Atlantic and Gulf of Mexico Coasts.

American Goldfinch (Carduelis tristis)

The American Goldfinch male is well known, with its bright yellow body contrasting with black wings and a black cap. It is one of the common songbirds found in dunes. They are one of the latest nesting birds, typically nesting in July and August. Goldfinches feed primarily on seeds but feed insects to their young. They will often be seen feeding on seeds in weedy areas. The goldfinch is one of the most common birds at winter feeding stations in Michigan.

MAMMALS

White-tailed Deer (Odocoileus virginianus)

The White-Tailed deer is one of Michigan most popular and successful animals. Noted for its beauty, grace, keen sense and wariness, it is found in every Michigan County. Unlike many of our native species the white-tail has flourished because of its ability to adapt to disturbed areas, alteration of forest habitat, and our hodgepodge of land use practices. Dunes are not usually thought of

as deer habitat, yet the white-tail is a common summer resident, and its tell-tale tracks are a prevalent feature of open dunes.

Red Fox (Vulpes vulpes fulva)

Although common in coastal dunes, the red fox is found in a wide variety of habitats throughout the state. This bright-colored canid is seldom seen due to its largely nocturnal nature. Its tracks and scat are evidence of its presence. This popular furbearer is much smaller than most people believe. A large fox will stand 14 inches high and weigh only 12-15 pounds. It can easily pass through a four-inch hole. The red fox has been described as an everything eater. Its diet is very diverse, from berries and insects to frogs, small mammals and birds. Its mainstay is small mammals such as the meadow vole and white footed mouse. The fox’s barking call is often heard at night.

Man (Homo sapiens)

Can you find the man in the poster?

PLANTS

Sand Cherry (Prunus pumila)

A familiar low shrub of coastal dunes, this creeping plant can be found along most of Michigan’s shores and in several other habitats throughout the state. It occurs throughout open dune areas and typically colonizes foredunes, serving as an important sand stabilizer. The plump, roundish cherries, which are substantially larger than those produced by black cherry, choke cherry or pin cherry, are mature when they turn a deep blackish-purple. The fruits are edible and a favorite wildlife food, sweet but somewhat astringent tasting, and usually much more suitable for making jellies and jams than eating directly from the bush.

Beach Grass, Marram Grass

(Ammophila breviligulata)

Beach grass is clearly one of the most critically important dune plants. Its fast-growing rhizomes can respond to the constantly shifting sands, enabling the species to serve as a significant sand-binder. Sand reed grass, Calamovilfa longifolia, is also a common grass of the dunes, bearing tough rhizomes that allow it to perform a similar ecological role. The latter species, which is usually a much taller plant than beach grass, can also be distinguished by its more open seed heads.

Pitchers Thistle (Cirsium pitcher)
This rare and easily recognized thistle occurs primarily within the state of Michigan. It is protected by state and federal endangered species laws as a threatened plant, and is known globally only from open dunes along the shores of Lake Michigan, Huron, and Superior. The stems and deeply divided spine-tipped leaves are distinctly bluish-green covered with dense, white-woolly hairs. The flowers are cream-colored, sometimes becoming slightly pinkish, and have a faint pleasant scent.

Lake Huron Tansy (Tanacetum huronense)
Lake Huron tansy is a threatened plant of the coastal dunes, occurring on the northern shores of Lakes Michigan and Huron and the Lake Superior shoreline. This large-headed tansy, which also occurs in northeastern North America, has lacy, hairy leaves and bright yellow, virtually ray-less flower heads that emerge in mid – to – late summer. Like the common garden tansy, which can be distinguished by its much smaller flower heads and non hairy leaves, all parts of the plant have a very characteristic pungent odor when crushed.

Houghton’s Goldenrod (Solidago houghtonii)
This threatened plant is protected by both federal and state endangered species laws. Its global range is almost entirely restricted to Michigan, where it occurs in interdunal wetlands along the northern shores of Lake Huron and Michigan, primarily in the Mackinac Straits region, it produces relatively large flower heads.

Sea-rocket (Cakile edentula)
Although sea-rocket can sometimes be found at some distance from the water’s edge, even on perched dunes, it most often occurs on the beach strand where its seeds are typically deposited. This unusual member of the mustard family occurs in Michigan primarily on the shores of Lakes Huron and Michigan. At maturity, the fruits break into segments that become dispersed in the water, producing new plants when the seeds are washed ashore on some distant strand.

Beach Pea (Lathyrus japonicas)
This somewhat low, sprawling plant, which ranges around the

world on marine coasts and inland shores, is a native legume found along much of Michigan’s shoreline. Beach pea can be recognized by its alternate leaves that are divided into several segments and the clusters of purple to blue pea-like blossoms.

Hairy Puccoon (Lithospermum carolinense)
When in bloom, this member of the borage family can be readily spotted on the open sand dunes by its clusters of bright yellow-orange, tubular flowers. This species is characteristics of the dune but also occurs inland in dry sandy oak barrens and other upland prairie-like sites. A very similar species, Hoary puccoon, Lithospermum canescens, is found in open woods and prairies.

Harebell (Campanula Rotundifolia)
Commonly occurring on many of Michigan’s dunes, though not restricted to them, the harebell flowers through much of the summer, creating bright splashes of blue on the dunes and beach landscape. Often growing in clumps the perennial, narrow-leaved plants have milky sap, an aid to identification. The blue flowers are slightly nodding and bell-shaped with short lobes.

Creeping Juniper (Juniperus horizontalis)
As suggested by the scientific name, this evergreen is a low, trailing plant. It occurs in a variety of habitats in northern Lower Michigan and the Upper Peninsula. It thrives on the open dunes, particularly in areas with alkaline (basic) substrate. Its needle-like foliage is very similar to that of our common red cedar. The cones are berry-like and eaten and dispersed by birds.

Sand-dune Willow (Salix cordata)
Sandbar Willow (S. exigua)
Blueleaf Willow (S. myricoides)
Although many willows are plants of wet places, several grow on coastal dunes. Despite the difficulty often encountered in identifying willows, the sand dune willow can be easily identified by its relatively broad leaves that are slightly heart-shaped at the base and usually covered with dense, silky hairs. The wide-ranging sandbar willow, a common species of the dunes, can be recognized by its very narrow long leaves that have widely spaced teeth. Finally, the blueleaf

willow, a shrubby species like the preceding, can also be expected along Michigan’s sandy shores and dunes.

Wormwood (Artemisia campestris)
Clustered Broom-rape (Orobanche fasciculata)
A widespread species of sandy soils, wormwood is also a very characteristic plant of Michigan’s dunes. The foliage has the typical silvery, blue-green aspect of many other sand dune species. In upper Lake Michigan, especially on perched dunes you may find the rare fascicled broom-rape. It is a threatened species. This parasitic plant, which is also distributed in the prairies of the Great Plains, does not produce chlorophyll, and in Michigan always occurs in association with wormwood, its only known host here.

Bearberry, Kinnikinick (Arctostaphylos uva-ursi)
This low evergreen shrub occurs in several habitats throughout Michigan, including the dunes of all of our shores. The trailing stems have a papery, shreddy bark, and bear oval, dark green, leathery leaves about one inch long. The tiny bell-shaped flowers, which are often white pinkish tips, arise in terminal clusters, producing dull reddish berries that, although edible, are rather tasteless.

Milkweed (Asclepias syriaca)
One of several milkweeds occurring in Michigan, this milkweed species is our most common. The dense round clusters of dull purple flowers have an extremely sweet fragrance and produce abundant nectar, attracting a wide variety of pollinators, among them the large and striking monarch butterfly. Milkweed plays a critical role in the life cycle of the monarch, serving as the preferred host plant for its conspicuously black and yellow-striped larvae and for the green chrysalis rimmed with gold dots attached to the bottom of a leaf. Because of the abundance of milkweed on Michigan’s coastal dunes, the dunes form an important migration pathway for this beautiful butterfly.