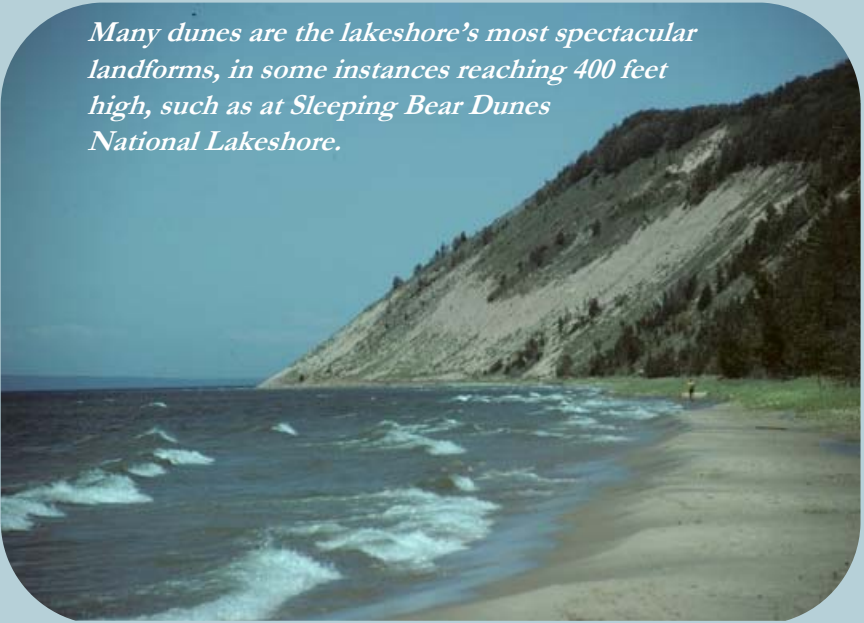


A scenic view of a Michigan coastline. In the foreground, there is a dense forest of green trees. Behind the trees, a grassy dune rises. In the middle ground, a large body of blue water stretches to the horizon. A single sailboat with a white and red sail is visible on the water. The sky is a clear, light blue with some wispy white clouds.

# LIVING IN MICHIGAN'S CRITICAL DUNES

**This booklet is prepared to help the owner of a critical dune area in Michigan understand the rationale for the state's regulation of critical dunes and the ecological values that individual critical dune parcels provide to the entire dune system.**

*Many dunes are the lakeshore's most spectacular landforms, in some instances reaching 400 feet high, such as at Sleeping Bear Dunes National Lakeshore.*



## **Michigan's Dunes**

The state of Michigan boasts some of the most spectacular coastlines in the world, including 275,000 acres of shoreline sand dunes famous for breathtaking vistas, “singing sand” beaches, barrier dunes, low lying coastal marsh areas, and dense forests that provide habitat for many migratory songbirds. Coastal dunes are common globally, but those in Michigan are unique in the Midwest for their size and geographical extent, diversity of habitats and proximity to massive freshwater lakes, such as Lakes Michigan and Superior. While each dune area has its own historical record and their ages vary, scientific studies show that present day coastal dunes developed within the last 5,000 years.

The dunes are a geologic gift -- the result of a complex series of processes operating over thousands of years. Once lost, they would likely take at least as many years to be replaced. The sand that forms the dunes was created during the most recent ice age, which ended about 10,000 years ago. Advancing ice ground rocks into sand. Some of the sand became part of coastal bluffs that were eventually eroded by waves over thousands of years and then deposited onto lake bottoms or beaches. Sand eroded

from inland glacial deposits was transported to the lakes by rivers and streams and distributed along the coast by currents. Through these processes over thousands of years, some of the most prominent land formations of our day were created. The dune ridges and foredunes along the shoreline were created in much shorter time periods.

Michigan's coastal dunes range from smaller foredunes near the beach where active growth occurs, to backdunes farther inland that support mature forest communities. In between the beach and forest there are a variety of ecosystems, such as coastal marshes, interdunal ponds or wetlands, wooded dune and swale complexes, and open dune areas, that provide habitat for dune species. Sand moves from the beach to the foredune and inland, linking the different dune zones and connecting the whole system. Impacts to one part of the system, for example, cutting off the sand supply from the beach, affect the physical and ecological characteristics of the entire dune system. The many diverse natural communities in the dunes house many different kinds of wildlife, from snakes, toads, and turtles, to ducks, songbirds, owls, and deer. Endangered and threatened species in the dunes include the dwarf lake iris (Michigan's state wildflower), Lake Huron locust, eastern box turtle, black rat snake, and cerulean and hooded warblers. Some endangered and threatened species, such as the Pitcher's thistle, Houghton's goldenrod and the Lake Huron tansy are only found in Great Lakes dunes. The sheltered back dune forest is home to picturesque spring wildflowers, like the white trillium, Jack-in-the-Pulpit, and even exotic orchids, such as the showy lady slipper.



Photo credit: Mike Ingels

*The coastal shoreline of the Great Lakes is critical habitat to some plant and animal species, such as the Lake Huron tansy, that live only in the dunes. (Biological Diversity in the Great Lakes Basin Ecosystem, The Nature Conservancy, 1994.)*



## **What are Critical Dunes?**

Dunes are fragile, unique systems that can be significantly altered by human activities, particularly the construction of buildings and infrastructure, such as roads, water and power lines. In 1989, Michigan’s legislators, concerned about the effects of human activities in the dunes, deemed the state’s dunes to be “unique and irreplaceable” and passed a law regulating development activities in a relatively small portion of the dune system regarded to be the most environmentally sensitive. These dunes are designated as “critical dunes” and make up approximately 70,000 acres of dunes along Lake Michigan and Lake Superior, including publicly and privately owned lands. Managers of public lands *and* private property owners are required to abide by the law.

## **Why There is a Law Regulating Building in Critical Dunes**

Critical sand dunes are widely acknowledged as a unique natural system within Michigan and one of our state’s most defining and appealing features. There are state regulations for building and other activities in critical dunes because the Michigan legislature, through enacting the Sand Dune Protection and Management Act in 1989, decided their protection was of public interest.

Regulation of building in Michigan's critical dunes is intended to balance the public interest in protecting the state's dune resources with the needs and rights of hundreds of the private landowners who own small pieces of the large dune ecosystem. Private duneland owners are fortunate to have some of the most valued and appealing real estate in Michigan. But along with the rights of ownership comes the responsibility for a special level of care and commitment for these environmentally sensitive natural systems.

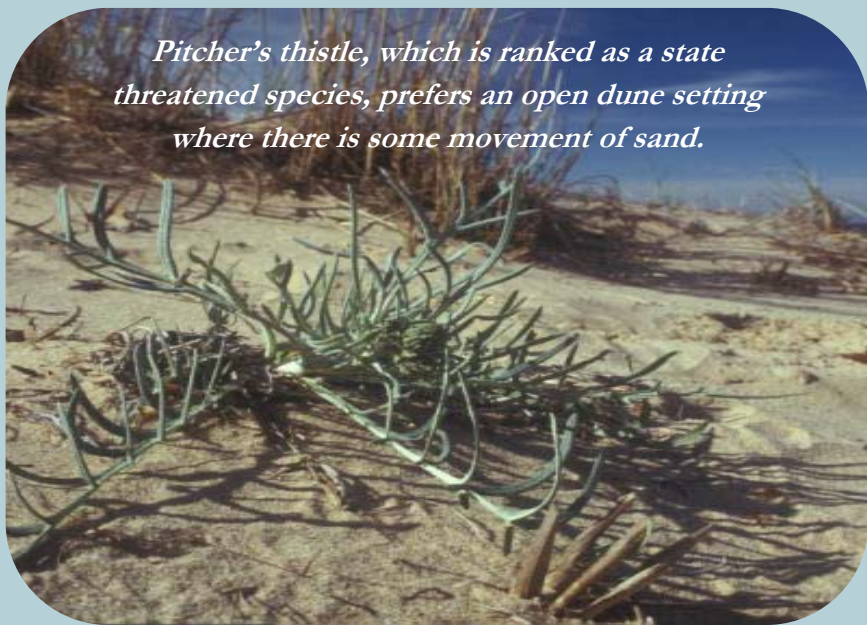
## **What Does Owning Critical Dunes Mean For You?**

The state, public land managers, and private property owners share a responsibility to protect critical dunes for future generations. The Michigan Department of Natural Resources and Environment (DNRE) provides guidance on certain construction activities in critical dunes, so that where development does occur, it is done in a way that has the least impact on individual dune parcels and the entire dune system. Those who plan to build on a property that is a critical dune must apply for a permit from the DNRE. Through the permit process, DNRE oversees activities such as the placement of structures, preparation of the building site, and construction, to help prevent unnecessary damage to the dunes.



*The dune ecosystem is already diminished. Since the mid-1800s, tremendous volumes of dune sand have been mined for use in glassmaking and foundries, despite the passage of the Sand Dunes Protection and Management Act in 1976, intended to curb the excesses of mining. From 1978 through 2005 (the latest year that data is available), nearly 63 million tons of sand were mined from dunes on the lakeshore. The loss of many dunes to mining makes it that much more important to provide protection for the state's remaining coastal dunes.*

*Pitcher's thistle, which is ranked as a state threatened species, prefers an open dune setting where there is some movement of sand.*



## **How Critical Dunes can be Altered by Development**

Dunes are a dynamic natural system. Change is natural for dunes and it's important for the health of dunes and the species they support. While natural disturbances are essential to dune health, the dunes cannot recover from the intensity and type of some human disturbances, such as construction activities or excessive trampling that can severely alter the very character of the dune that makes it so valued.

Dunes are degraded when native vegetation and sand is removed and natural dune processes are altered, which then changes the habitat on the site. Construction in the dunes can change the light, temperature, and wind in one or all of the dune's habitats – the beach, foredune, interdunal wetland and forest – disrupting the microclimates of each habitat and the normal biological activities that occur in them.

Development can also affect dunes by stopping sand movement in some areas and starting it in other areas. In the backdunes, for example, construction can restart dormant dune processes, causing disruption to the forest community, shifting of sand, and erosion. Critical dune regulations place different constraints on parts of the dune system, such as

not building lakeward of the first (non foredune) crest, because of greater vulnerability to wind erosion.

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The least noticed result of development - habitat fragmentation – has the greatest impact on the dunes. Habitat fragmentation occurs when the landscape has been "cut up" into smaller and smaller pieces. Aerial photos of Michigan's coastal dunes show this is already occurring.



*The population of the Great Lakes piping plover decreased significantly due to lakeshore development along beaches used for nesting. Being closer to human activities, the plovers also became more vulnerable to predators, such as raccoons and fox that live around human dwellings. Sixty pairs of piping plovers have been documented (September 2010)*

*Over the past few decades, the massive “walking dune” at Silver Lake has encroached and buried numerous homes.*



Photo credit: Rob Wilmer

Breaking up habitat changes the dynamics of the ecological communities within the dunes, altering the normal behavior and patterns of wildlife – changing where they live, their travel, and their eating habits. Small habitat areas can only support small wildlife populations. Animals that live in these small parcels are considerably more vulnerable to extinction.

If certain plants species in one piece are lost due to drought, fire, disease and/or insects, the distance may be too great for its seeds to travel to another fragment. This may result in a decrease in the population of that plant species.

Protecting your critical dune helps to maintain what you like about the coastal dunelands – their diversity of varied grasses, shrubs and trees, colorful songbirds, and beautiful scenic views. This also helps to protect the entire dune system, which is an important part of the state’s vital tourism and recreation economy.

Following the requirements of the critical dune law can also limit problems associated with building in sand dunes that can damage your home, such as erosion and blowouts. Advancing dunes, locally termed “walking dunes,” can occur from the loss of vegetation.



See “How to Protect Critical Dunes: Practical Guidelines for Site Development and Management in Michigan’s Critical Dune Areas,” for more on how to protect your critical dune before, during, and after construction. Carving up habitat into fragments also puts certain plant species at risk, due to the distances created between habitat parcels.

### **What the Law Requires of Critical Dune Property Owners**

The major purpose of the Sand Dune Protection and Management Act, which has been amended several times since 1989, is to prohibit earthmoving, vegetation removal, and construction activities on critical dune slopes measuring greater than 33 percent. The law also does not allow structures to be built on the first lakeward-facing slope of a critical dune area, unless a special exception is granted. Larger projects, or “special use projects,” such as the building of subdivisions and site condominiums requires an extra step – completion of an environmental assessment or possibly even an environmental impact statement. (For additional information about the law’s requirements, see “An Overview of Michigan’s Critical Dune Areas.”)



*Warblers that live at the edge of small fragments of habitat are more likely to lose their young to predators and parasites.*



Photo credit: Jerry Grady



## **Think Before You Build: Questions to Consider**

Some initial decisions to consider before buying or building in critical dunes are the most important. Ask first, “Where do I fit on the landscape (the dune system)?” Then ask, “Where do I fit on the lot, my site?”

Consider such questions as to whether it is necessary for you to build in the middle of undisturbed dunes or if it might be possible to build where other development has already occurred, and whether or not it will be necessary to build a new road rather than share a road with a neighbor (which lessens habitat fragmentation).

Critical dune owners can protect their dune area from future development, while also retaining ownership, by placing all or a portion of the dune property under a conservation easement. This may result in significant income tax, estate tax, and property tax benefits and aids in passing land on to the next generation -- by removing the land's development potential, the easement lowers its market value, which in turn lowers estate taxes. (See the Heart of the Lakes website for more information on conservation easements.)

## After You Build: Living Lightly in the Dunes

Your special responsibility as a critical dune owner does not end after your home is built. It's important to remember that the changing nature of dune topography can lead to challenges, such as erosion, that can damage structures built in the dunes. Open dune areas with moving sand are vital to the survival of many dune plant and animal species. Moving and blowing sand, however, can impair the workings of septic systems, and build up against foundations. Knowing about best management practices for building in the dunes, such as using stairs and boardwalks instead of adding footpaths, can help control erosion where it's needed. Planting native species, such as marram grass with its long roots, can also help to limit the movement of dune sand in areas that may damage the structures on your property.

Michigan's critical dunes are tremendously valuable, both ecologically and economically. The dune resource in Michigan is part of one geologic natural system owned by numerous public entities and private individuals. This requires a shared commitment to consistent management of the uses on individual parcels in order to cause the least harm to the entire system.



Photo credit: Charles Davis

*One homeowner's changes to one dune parcel may not seem like much, but over time, many changes to many parcels will eventually result in large-scale transformation of Michigan's dune system.*

*A 1988 University of Michigan study concluded that if not protected, many of the state's tallest remaining dunes along the Great Lakes would be lost to increased lakeshore development. This report was a catalyst for the regulation of building in the critical dunes.*

This publication was produced by the Muskegon Conservation District and Great Lakes Consulting, with the assistance of: John Allegretti of Allegretti Architects, Dr. Alan Arborgast of Michigan State University, Elizabeth Brockwell-Tillman of PJ Hoffmaster State Park (Michigan Department of Natural Resources and Environment), Nancy Cuncannan of the Michigan Department of Natural Resources and Environment, Charles Davis of Preserve the Dunes, Jan Deur of Alliance for the Great Lakes, Dr. Suzanne Devries-Zimmerman of Hope College, Brad Garmon of Michigan Environmental Council, Dr. Ed Hansen of Hope College, Mike Hayes of JFNew and Associates, John Legge of The Nature Conservancy (Michigan Office), Lee Schwartz of the Michigan Association of Home Builders, and Dr. Deanna Van Dijk of Calvin College.



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For more information or for additional copies, see: <http://macd.org/critical-dunes.html>. Additional products associated with this project, and available on the website, include [How to Protect Critical Dunes: Practical Guidelines for Site Development and Management in Michigan's Critical Dune Areas](#), and a quick reference guide to critical dune areas and regulated activities - [An Overview of Michigan's Critical Dune Areas](#).