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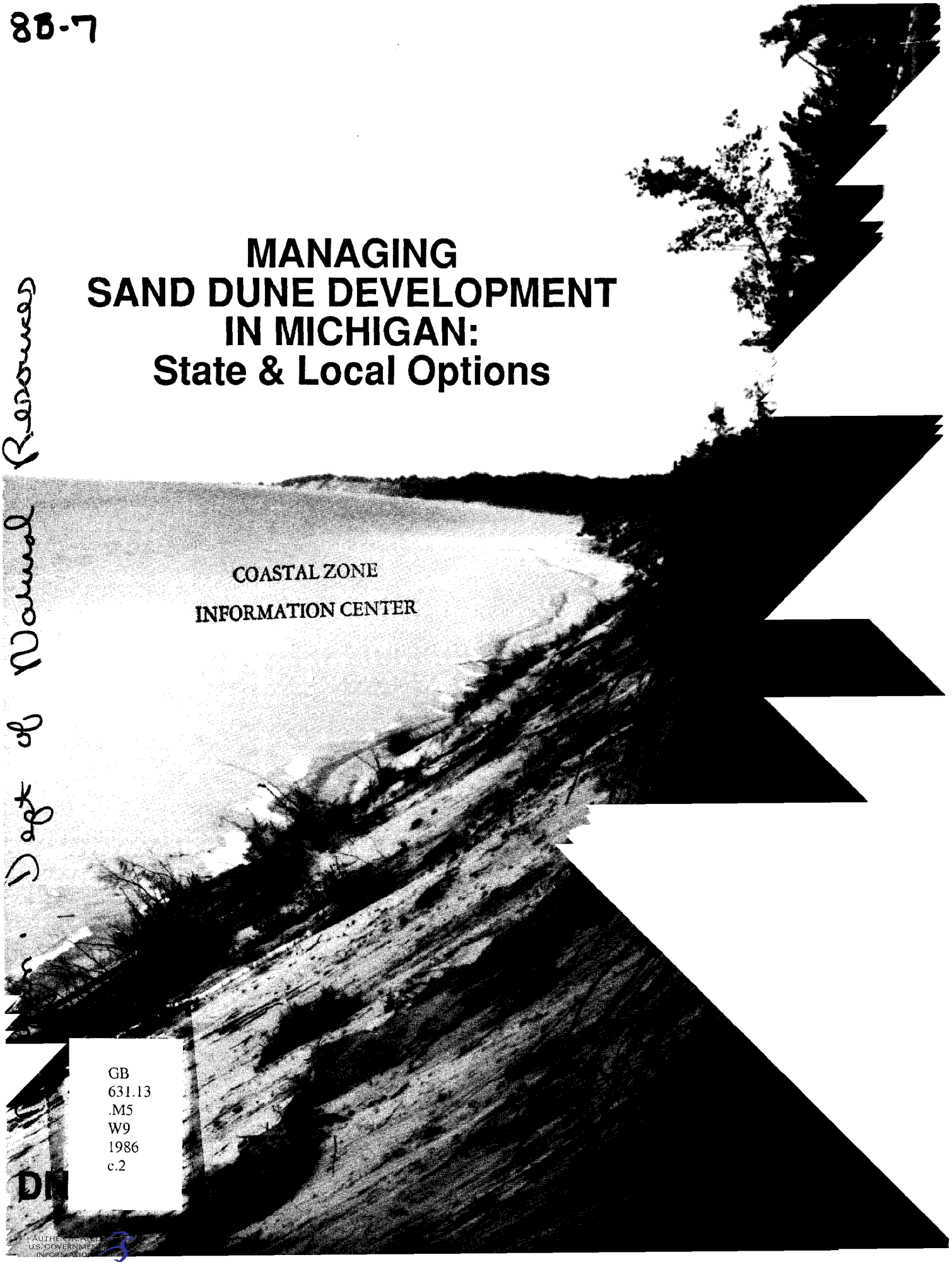
MANAGING SAND DUNE DEVELOPMENT IN MICHIGAN: State & Local Options



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MANAGING SAND DUNE DEVELOPMENT IN MICHIGAN:

State & Local Options

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December 1986

This report was financed in part by a Coastal Zone Management Grant

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ACKNOWLEDGEMENTS

The author wishes to thank the below listed individuals for their assistance in the preparation of this report. Many gave generously of their time and knowledge, often after normal business hours and on weekends. Their assistance was instrumental in leading the author to a wide variety of development sites along the Lake Michigan shore and in providing detailed information on dune development in their communities.

Teresa DiStefano, Van Buren County Planning Director
Harvey Silver, Mason County Coordinator
Kurt Schindler, Manistee County Planning Director
Bruce Orttenburger, Benzie County Planning Director
Max Putters, Emmet County Planning Director
Gerald Adams, Norton Shores Planning Commissioner & a planner with The WBDC Group, Grand Rapids

Lillian Dean, AICP, is thanked for her excellent observations on several sites the author was unable to get to. Jon Roethele of the Geology Division and Sid Worthington, Lansing City Councilman are thanked for sharing their historical insights into the passage of the Sand Dune Protection and Management Act. Christy Fox of the Division of Land Resource Programs, DNR deserves special mention for her patience and assistance.

Many other state and local government officials including John LaRose of the Michigan Townships Association, gave generously of their time in answering questions related to this study. I do not mean to slight anyone for failing to specifically mention their name, as everyone's input was valuable.

Special thanks is also extended to my friends Chris and Gary Uyede for their companionship on a particularly nasty day (weatherwise), while visiting southwestern Michigan's diverse dune lands.

Last, the author is especially indebted to Carolyn Freebury for her extra effort in the compilation and revision of various drafts of this report. Of course, the author assumes responsibility for the contents and any errors or misinterpretations presented herein.

Mark A. Wyckoff, AICP
Lansing, MI
December 1986

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"As the public official primarily responsible for the protection, management, and wise use of Michigan's resources, you are aware of the many threats to those resources and the competing interests for their use and preservation. As Michigan attempts to diversify its economic base, many are looking to Michigan's natural resources as a means of revitalizing the state's economy. While I am convinced that there is a role for natural resources to play in this effort, we must not lose sight of the fact that the significant natural resources which we in Michigan now enjoy must be protected for ourselves and future generations.

For this reason, I am requesting that the Department of Natural Resources undertake a special program which will ultimately lead to the long-term protection of one of our most special natural features---Great Lakes sand dunes."

From a letter to Dr. Skoog, former Director of the Dept. of Natural Resources by Governor James Blanchard, February 8, 1984.

INTRODUCTION

Purposes of the Report

The principal purposes of this report include:

- acknowledging that sand dunes are a unique resource of statewide significance that are imbued with a variety of public interests;
- identifying basic components of a strategy for managing development in sand dunes that:
  - is compatible with the constraints of the natural system,
  - is rooted in both geomorphic and natural resource principles, and
  - adequately serves to protect the public health, safety and general welfare of the private citizens living in the dunes and the public enjoying the diverse dune environments; and
- identifying a structure for managing sand dune development that provides for an effective partnership between state and local governments.

Outline of Contents

This report is divided into three major parts. Part One has three chapters that begin by examining the following questions:

Chapter One - What is sand dune development?
Chapter Two - What is a sand dune? Perceptions, values, law.
Chapter Three - Why are sand dunes important?

Part Two has three chapters. Chapter Four examines the extent to which sand dune development is controlled under existing state laws. Chapter Five examines alternative means for solving identified development problems, including approaches used in other states, statutory options and other techniques with some promise. Chapter Six addresses unique administrative problems associated with regulation of sand dune development.

Part Three has three chapters. The first presents case studies of four West Michigan shoreline communities. These capsule summaries are designed to illustrate the range of dune environments along the shore and variations in the extent of both existing dune development and regulation thereof. Chapter Eight focuses more specifically on current local zoning efforts to address sand dune development problems. The last chapter summarizes some of the key issues presented previously. It focuses on issues relevant to designing an effective partnership between state and local governments in the management of development in Michigan's sand dunes.

PART ONE - BACKGROUND
Chapter One

WHAT IS SAND DUNE DEVELOPMENT?

Concern has been raised among various sectors of the public that the reshaping of sand dunes for development purposes, is often unnecessarily destructive of the natural dune environment and is in some cases hazardous to the public health, safety and general welfare. In this section, the general range of activities taking place in sand dunes is identified. Many of these activities focus on "sand dune development".

Examples of Dune Development & Other Activities
The following examples illustrate the breadth of activities in sand dunes and thus help establish the parameters for development of sand dune management criteria.

Eiffel Tower Bluffs Subdivision, Grand Beach, Berrien County
This subdivision, currently under development, occupies about 60 acres along 2,000 feet of Lake Michigan property. It is being built upon what is now a nearly level sand plain created by flattening a sand dune and moving the fill inland to provide an unobstructed view of the lake. As of midyear 1986, only two dwellings were constructed. No lots have yet been platted. No state or local regulations prevent land clearance in anticipation of subdividing, although in most cases a soil erosion and sedimentation control permit would be required. The dunes are not in an area designated under the Sand Dune Protection and Management Act, PA 222 of 1976.

I-94, Bridgman, Berrien County
A stretch of I-94 is built on sand dunes, which after the highway's construction, were designated under PA 222. In fact, the road forms the eastern extent of a barrier dune adjacent to Bridgman.

Forest Dunes & Wilderness Dunes, Covert Township, Van Buren County
This 40 acre parcel with 400 feet of frontage on Lake Michigan is within a contiguous "tract" of nearly 700 acres known as the Forest Dunes Area. The forested parcel completely encompasses a blowout that extends from the top of a 100 foot bluff at the shore and rises to a height of 300 feet at a distance about 3000 feet inland. It provides a commanding view of the lake within a forested dune "valley". At this uppermost location is proposed a 36 unit condominium project complete with swimming pool and tennis court on the only open sand area remaining on the site. Access would be obtained by a 22' road cut into a very narrow dune ridge running perpendicular to the shore for most of its length.

This property has characteristics that are unusual among coastal properties. First, with the exception of 18 mostly seasonal homes near the bluff, and several firelanes providing access, there have been no significant manmade disturbances on this property since it was last logged in about 1880. This is in part because of an ethic shared by most of the current landowners in this tract that its natural characteristics should not be disturbed. It is the home of several special status species and is valued by some as a rare natural laboratory.

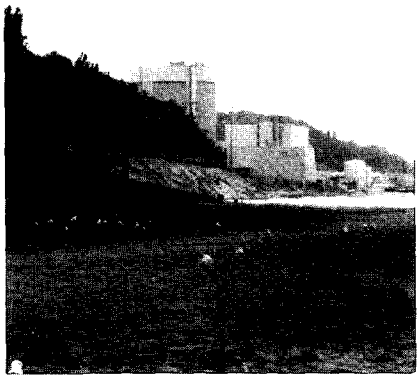
An unscientific half-day investigation of this area by the naturalist-director of the Sarett Nature Center, Charles Nelson, revealed seven protected, threatened or endangered wildflowers. They were flowering dogwood, climbing bittersweet, Michigan holly, trillium, pipsissewa, false pennyroyal, pitcher's thistle, and lycopodium. Nelson also noted that *"the microclimates and undisturbed forest floor render a density and diversity of wildflowers which is outstanding. *** What exists now in the Covert Dunes is a very large and completely natural biologically important dune ecosystem. It may well be one of the largest stretches of fresh water dunes without a major disturbance left anywhere."*

Nelson, in commenting on the unique geologic character of the area also noted *"The Covert Dunes are a major geologic formation of such magnitude and uniqueness that they would merit national recognition if this land were in public hands. The Grand Mere Dunes, (which are similar in height but are not as extensive along the lake nor exist as far inland as the Covert Dunes) have, nevertheless, been designated as a national landmark worthy of national park status. The Covert Dunes, in my opinion, would easily qualify for the same distinction."*

Thus, despite a proposed development plan that seeks to keep the overall density low and to minimize the amount of on-site disturbance, the construction of the access road, the condominiums and recreational facilities will introduce 36 families into the middle of this dune environment. Concern has been raised that such a development may have irreversible effects not only on this parcel, but also on the entire 700 acre tract because of its strategic location therein. This concern is illustrated most clearly by looking at the new Wilderness Dunes Subdivision on the south end of the tract in question. By conventional standards, the design of the Wilderness Dunes Subdivision is "sensitive" to the topography. However, significant dune reshaping has altered the natural character of the site which once was completely forested and displayed a wide variety of plant life. Now, extensive dune grass (planted to stabilize the steep bluffs) and remnants of the original forest cover provide the new "character" on sculpted dunes. That it has been accomplished with an eye to aesthetics overlooks the salient issue. The project was not designed to minimize impact on the natural dune environment, instead it sought to, and achieved a reshaping of that environment for low density residential purposes. In doing so, it rearranged and reduced the number and diversity of the "natural" vegetation types present even while leaving large tree stands. The purpose of dune alteration, was to create lots with a view of Lake Michigan. The subdivision attracts a limited and exclusive market as some of the lots reportedly sell for $175,000. Both the Covert Dunes and Wilderness Dunes Subdivision are in designated dune areas under PA 222.

As a side note, some residents of the Wilderness Dunes subdivision now wish to relocate additional dune sand on the site to provide protection against erosion caused by the high water levels. Their engineers are discouraging this attempt because it is not likely to be effective.

Palisades Nuclear Power Plant, Van Buren County
One of several power plants on the Lake Michigan shoreline, this large facility is built into the dune just south of Van Buren State Park. As a high volume water user, a coastal location is critical. It is in a designated dune area. Another major power plant on the Lake Michigan shoreline that is built on dunes is the Warren Cook facility, in Berrien County. The Ludington Pumped Storage Project in Mason County is built on a large clay bank along the lakeshore.



Spyglass Condominiums, Park Township, Ottawa County
This development generated statewide controversy in large measure due to its prominent location in a blowout just north of (and highly visible from) the Holland State Park. By concentrating the condominiums in a few large structures, the developers sought to minimize the direct dune alteration, and to increase the open space on the site. However, this also increased the contrast in scale of the condominium structures from the few very sheltered single family homes (adjacent) and the open beaches on the state park property. Adjoining property owners argued against the project complaining about the likelihood of increased traffic, noise, loss of open space and related impacts. It is in a designated dune area. Two similar developments are L'Arbre Croche, an exclusive community (access is regulated by a guard) in Bear Creek Township, Emmet County which is in an undesignated sand dune just North of Petoskey State Park; and a proposed development on North Point in Charlevoix Township, Charlevoix County in undesignated dunes just North of Mt. McSauba Nature Area. All three of these properties are highly visible from public parks.

Sunset Bluff Subdivision, Park Township, Ottawa County
This is an excellent example of what a typical contemporary suburban subdivision looks like when constructed on a dune that is deforested for the subdivision and then revegetated with, predominantly, dune grass and

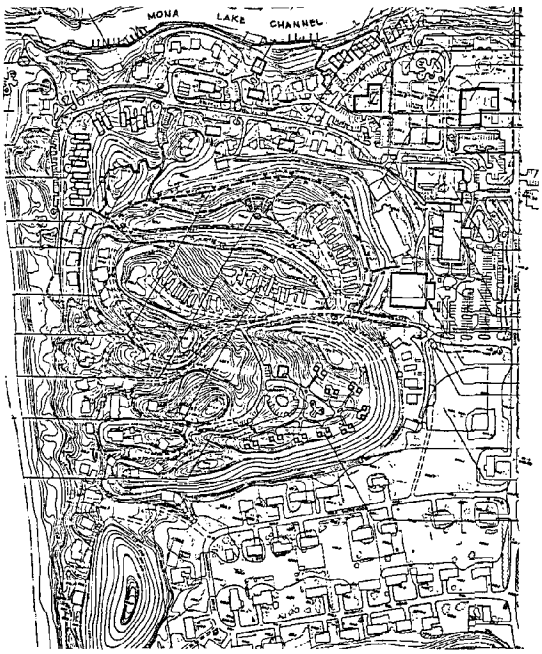
indigenous shrubs and trees. A similar example can be found in the Sheldon Dunes Subdivision in Port Sheldon Township, Ottawa County. Both are in a designated dune area.

P.J. Hoffmaster State Park, Ottawa and Muskegon Counties

One of 17 state parks with over 47 miles of shoreline along Lake Michigan. P.J. Hoffmaster Park includes the Genevieve Gillette Nature Center with its special dune emphasis. The Nature Center has two excellent slide programs running almost continuously that aptly demonstrate the uniqueness of the Michigan dunes and how they were formed. Dozens of county and township parks and the 60,000 acre Sleeping Bear Dunes National Lakeshore comprise the balance of public parks along Lake Michigan. Hoffmaster State Park is in a designated dune area.

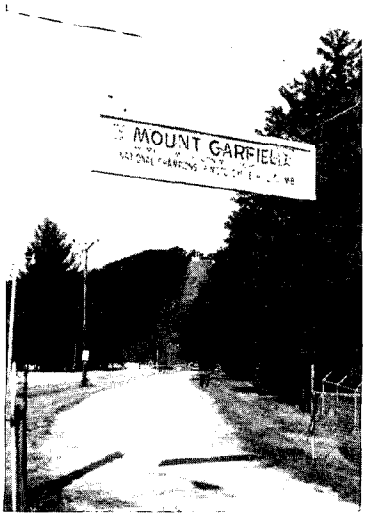
Marantha Bible Conference, Norton Shores, Muskegon County

Norton Shores has approved alteration of a densely forested small dune inside this large compound for construction of additional condominiums. There are already a large number of small residences within the compound that are constructed into the forested dune face. All existing structures on the shore side are adequately set back from the water and shore vegetation is protected by directing access to established pathways. The property is south of the Lake Harbor Park which is on the site of a former dune mining operation (borders north shore of Mona Lake Channel). It is in a designated dune area.



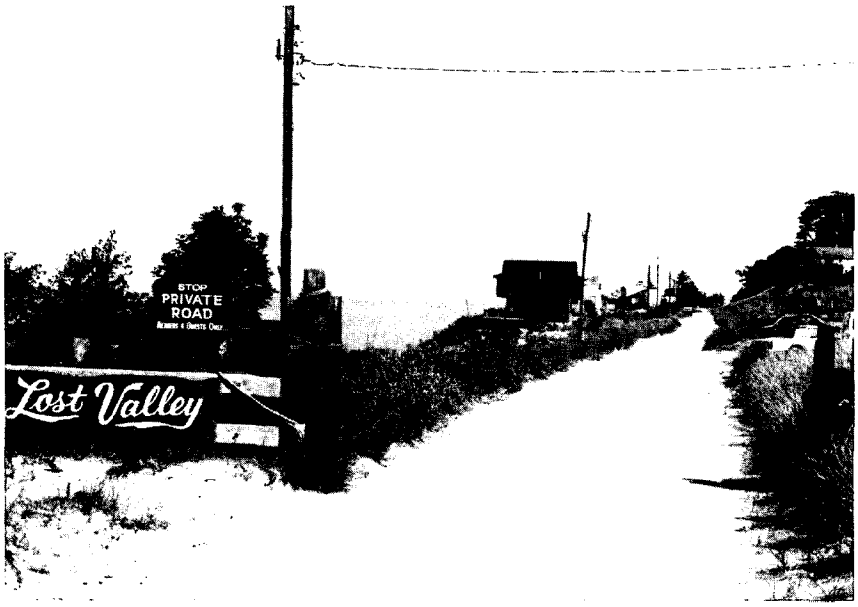
Mt. Garfield Norton Shores, Muskegon County

This is the site of the bi-annual national motorcycle hill climb straight up the back side of a 200 foot dune. The hill is vegetated to reduce erosion, and adjoins a large field used for camping during the competition. The hill climb was established in 1920. It is in a designated dune area.



Lost Valley Estates, White Lake Twp., Muskegon County

This development has single family residences closely spaced together on low open dunes. The two story height makes them appear out of scale and not "in harmony" with the rest of the natural dune environment. These fairly new houses are perched at the edge of a low dune bluff and may soon face danger from erosion at the toe. The subdivision is not in a designated dune area.

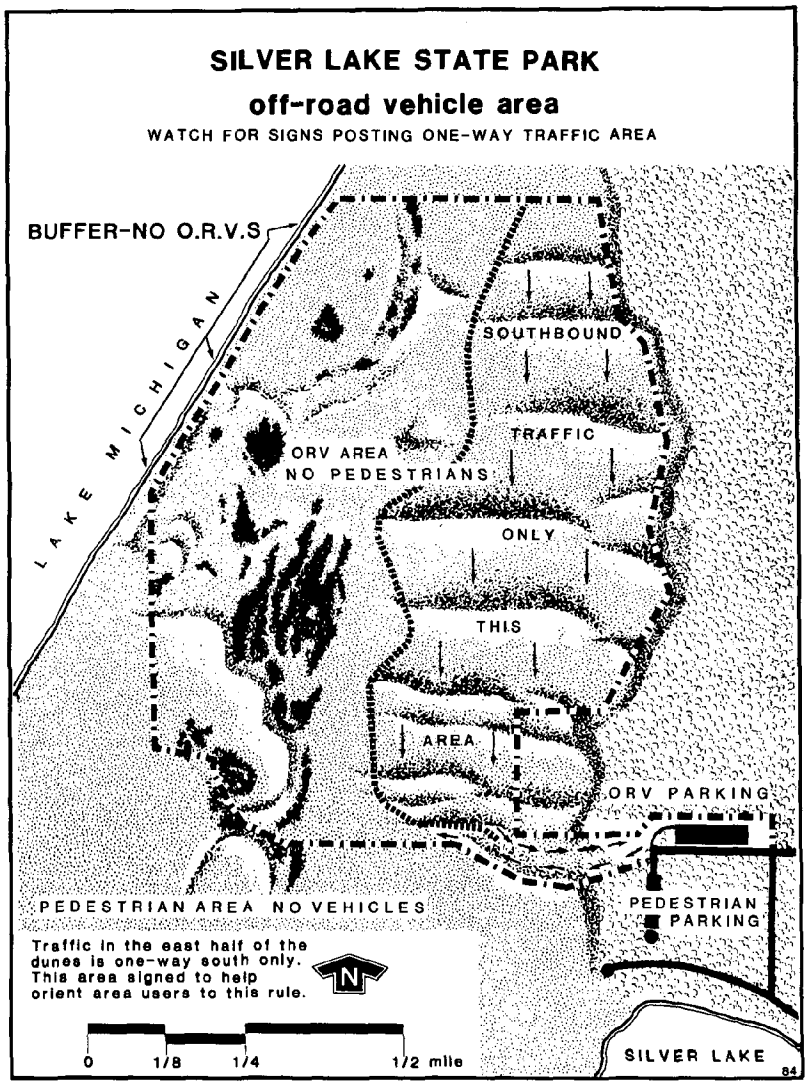


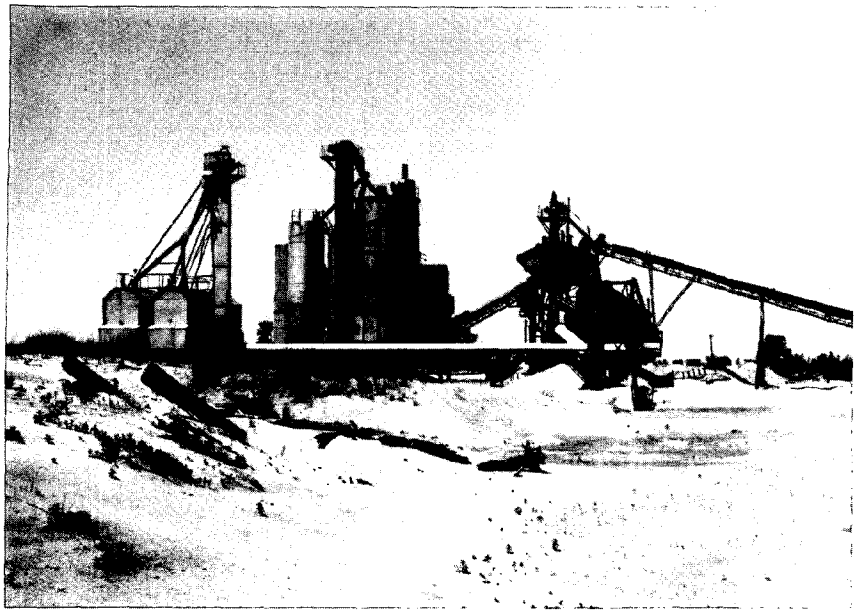
Black Forest Subdivision, Benona Township, Oceana County

This property is just north of Oval Beach in Benona Township (where Stony Lake outlets to Lake Michigan). The developer knocked the top 20-25 feet off a foredune to fill the trough behind it and increase the lakefront viewing area and hence the saleability of the lots. Access is via a very steep private road straight up the back face of a dune. Benona Township sued because the sand reshaping was undertaken without the benefit of necessary permits. The case was settled out of court in return for an agreement that the Township would not be liable for any damages claimed by owners of the lakefront lots which are now subject to severe wind, water and soil erosion due to the dune alteration. The agreement also required planting of dune grass to minimize erosion potential. This planting has been completed. Only one house has so far been constructed. It is in a designated dune area.

Silver Lake ORV, Silver Lake State Park, Oceana County

Thousands of 2-, 3- and 4-wheel off road vehicles (ORV's) cavort on the pure sand of this 2,765 acre supervised "*kids playground for adults*" as some have been known to call it. The existence of this well policed facility is felt to take considerable pressure off private dune lands by providing a public outlet for the desires of many to engage in ORV activities. It is a designated dune area.

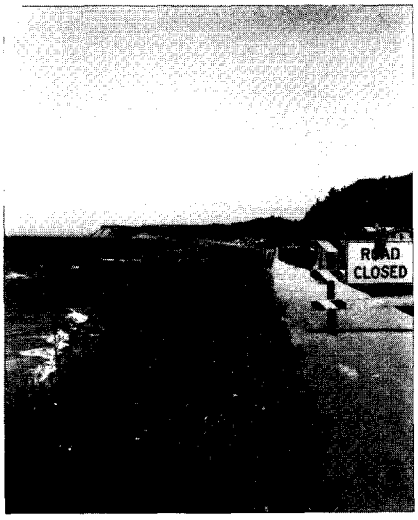


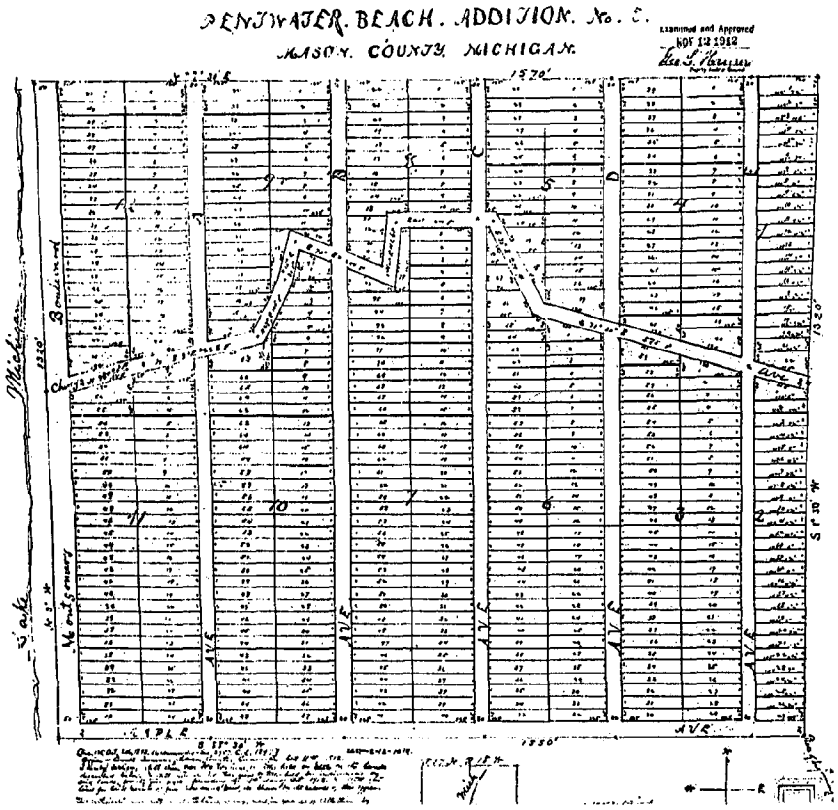


Detroit Sand Mining Site, Hamlin Township, Mason County
This site, just north of Ludington and south of the Ludington State Park, has been extensively mined for its pure sand used in making die castings for the auto industry. Entire dunes of sand have been removed. A large lake is being created on the site with the intention that someday it will be the centerpiece for a residential development. It is in a designated sand dune area and is regulated by PA 222.

Pentwater Beach #5 Subdivision, Summit Township, Mason County

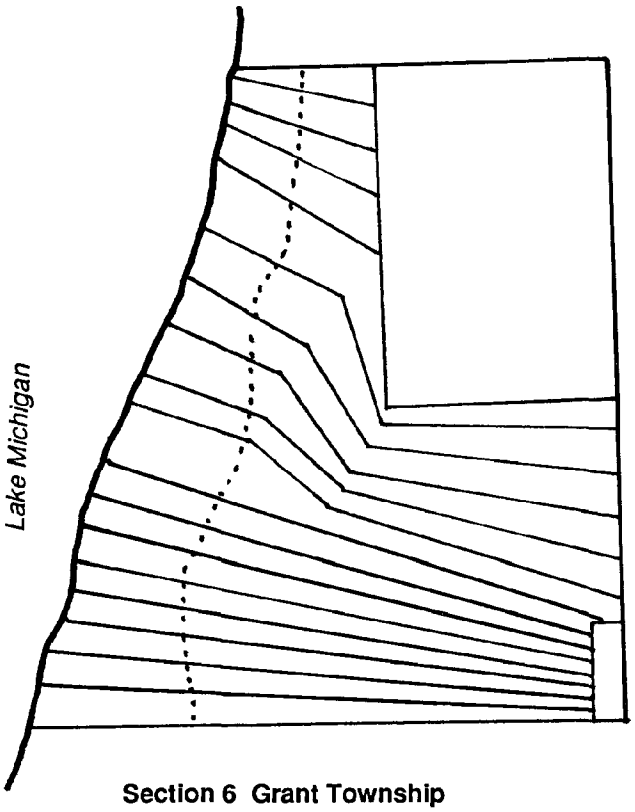
The original plat was made in 1912, many of these lots were long ago lost to erosion. What is left, presents a situation opposite of most in the dunes. Instead of houses sited close to the lake with the access road in back, here the houses are built at the back of the foredune complex (base of the secondary dune). However, severe erosion over the past year has undermined the integrity of the access road to the point that there is only one lane open. There is only one way into these properties at present. There is sufficient room to put in another road, but the real question is how far back it must go and how long it will last with the high lake levels. It is a designated sand dune area.



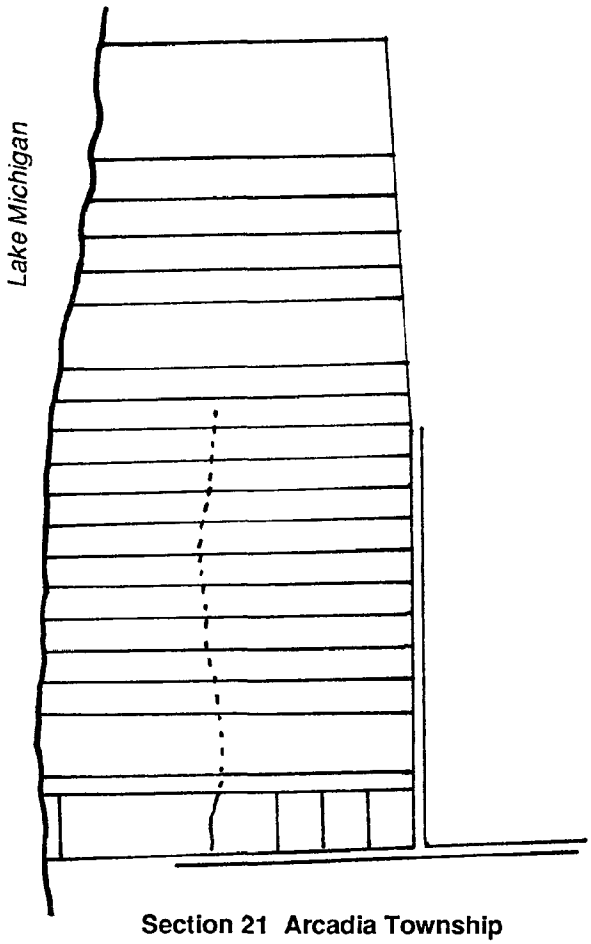


Ten plus acre subdivisions in Grant Township, Mason County and Arcadia Township, Manistee County

Both of these land divisions by the same developer represent a typical platting scheme in rural Michigan to avoid requirements of the Subdivision Control Act of 1967. Each consists of 10-20 lots. Most lots are slightly larger than 10 acres and nearly all are at least 2,000 feet in depth. An unimproved road cutting roughly 1/3 to 1/2 way through each parcel sets up the opportunity for existing owners to divide the back portion of their lots in another 10 years. This can create an unplanned and unplatted subdivision of between 100 and 150 lots on a forested dune over a 20 - 30 year period. No part of either area is designated as sand dunes under PA 222, although sand soils predominate along the shore. The "parent" parcels of the Arcadia tract show little remaining evidence of failed agricultural attempts over the past century, as the forest cover has reemerged. The Grant Township parcels are heavily forested.



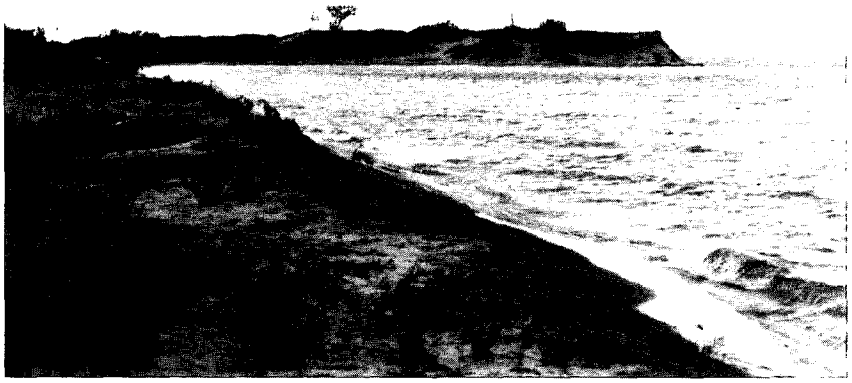
Section 6 Grant Township



Section 21 Arcadia Township

Man-Made Lake, City of Manistee, Manistee County

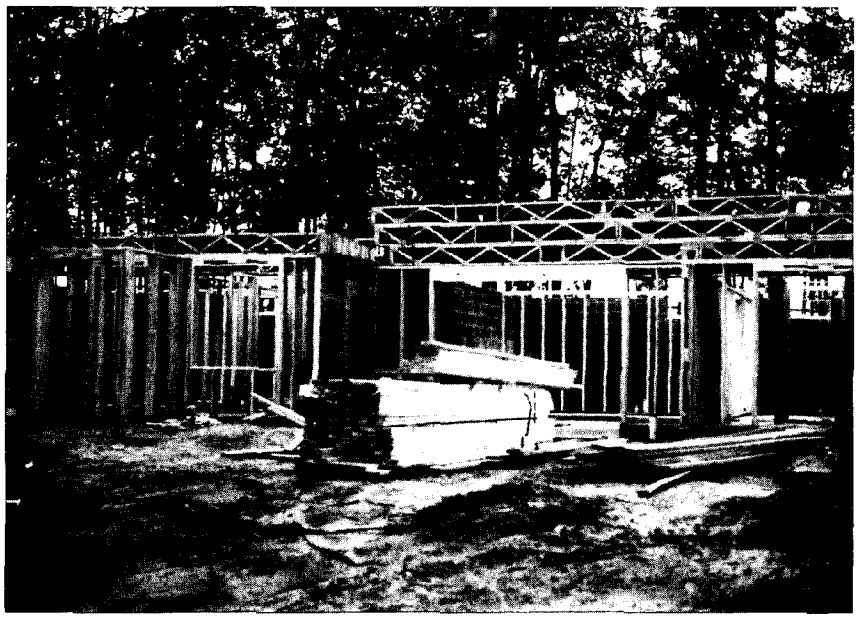
This articifial bay, which was a lake until its western shore was destroyed by wave action in the fall of 1985, was created as the result of sand mining over a 50 year period. Formerly a large high dune occupied the site. This property now has a half-moon shaped shore on Lake Michigan as a result of the breach. The property is owned by the City of Manistee. It is presently under consideration for conversion to a condominium development. It is not in a designated dune area.



Harbor Lights, Frankfort, Benzie County

This condo/motel development was recently completed. It occupies private land immediately behind the City beach and has been controversial because it effectively cuts off a view to the lake from downtown that has been enjoyed by many for decades. It is in a designated dune area.

Bluffs of Frankfort Condos, Frankfort, Benzie County
These new condominiums atop a 100 foot clay high bluff provide a commanding view of the lake to almost every unit, but are set back only 60 feet from the edge of the bluff (which has lost 15 feet this year). It is in a designated sand dune area.



Hang Gliding Club Launching Facility, Benzie County
This launching facility at the top of a 200 foot sand/clay bluff serves the unique needs of the Green Point Flyers Association. Access is very poor so it is unlikely that unintended users will easily arrive at the site. It is in a designated sand dune area. Public hang gliding is also available off a dune face at the Warren Dunes State Park in Berrien County.

Nine Mile Point, Charlevoix County and Bay Harbor Club in Antrim County
These two new developments on the shore of Lake Michigan are in undesignated areas that could arguably be considered sand dunes. Nine Mile Point is a condominium project and is a single family subdivision. The former raises questions as to the appropriate scale for highly visible waterfront development (it borders US 31 and is on a point in Little Traverse Bay), while the latter illustrates development on a very low relief forested dunes plain.

Cross Village Shores, Cross Village Twp., Emmet County
This single family subdivision has been under development for more than a decade. Houses tend to be set back just behind the low foredune, yet still rise far above the natural topography to silhoutte against the sky--revealing not development in the dunes, but development on them. It is in a designated sand dune area. There are large areas of active, open sand on the site.

Chapter Two

WHAT IS A SAND DUNE? PERCEPTIONS, VALUES, LAW

Public Perceptions

There are nearly as many different "publics" with an interest in sand dunes, as there are perceptions of what constitute dunes and what values are important. This variety makes identification of a single "public interest" in dune development very difficult. The perceptions of five general groups are discussed below. These perceptions are not scientifically derived. They are not based upon established positions of any organization; instead, they are aggregated from conversations the author had with many individuals in the course of this study and from various published materials. Their intended use is to help focus on the pertinent issues related to preparation of a sand dune management strategy that meets the interests of as broad a "public" as possible, rather than to criticize or evaluate the perceptions of the so-called "groups". A scientifically derived survey of perceptions of sand dune development issues may result in a different aggregation of views.

Citizens

Michigan citizens, being the broadest and most diverse of these groups, hold a wide variety of perceptions about sand dunes. Many value dunes for their recreational attributes. Dunes are a pleasant environment in which to spend a warm, sunny day at the beach. Other people see them as wonderful places to picnic, hike, photograph, drive their ORV's through, or if forested, to hunt in. Citizens who live in areas with extensive dunes often view them as favorable locations in which to construct a permanent or seasonal residence, preferably with a good view of the lake. Others appreciate dunes for their value as quality sand for building and industrial use. Some of these uses are incompatible, such as ORV use and passive recreation. As a result, conflicts over uses are inevitable and are at the root of policy decisions concerning appropriate sand dune management.

It appears however, that in areas with extensive sand dunes, while residents tend to value them for their aesthetic contribution to the landscape, and as desirable places to live, their relative scarcity (when looking at the total shoreline) is often taken for granted. On the one hand, this should not be surprising since every community needs a full complement of housing, businesses, institutions and recreational areas, and if sand dunes make up a significant portion of the local jurisdiction, then, it is often felt, they must accomodate their share of these land uses, the same way that the relative abundance of agricultural lands, woodlands, mountains or floodplains are expected to do the same elsewhere. Additionally, since developed lands comprise the principal tax base of most communities, development below the density or value that market forces would tend to generate is often considered to be inefficient, or an underutilization of the land. Viewed in this light, low density development on dune lands could be undesirable to some local officials. On the other hand, the value of sand dune lands in their natural state may also be overlooked in in terms of their direct contribution to the local tourist economy.

"While flying along the Lake Michigan shoreline in late April, I was again reminded of how diverse and fragile the dunes are with their rolling wooded hills, towering sand cliffs, mounds of barren moonscape clusters and dozens of small, interdunal ponds tucked between lightly vegetated undulations. Pocketed here and there was the evidence of man's impact on the incredibly fragile dune environment. Cutting and removal of vegetation to make room for one cottage had caused a dune to march inland, deeply burying the forest in its path and eventually removing all support for the building. Cottages perched on the bluff seemed to be watching the lake undercut the foundations. A few more years and they too, will be part of the lake."

"Saving the Dunes", by Marlene J. Fluharty, Michigan Natural Resources, July-August, 1985, p.27

Of greater significance however, appears to be the common perception of both "inlanders" and citizens of dune communities about what a sand dune actually is. To most people it appears, a sand dune is a lake-facing dune with an exposed face. A forested dune at the top of a bluff, or the forested inland side of a barrier dune is often not perceived to be a dune at all. Instead it is viewed as a forest, or a forested hill, but often not as a dune.

Environmentalists

Environmentalists, geologists and ecologists do not view sand dunes as composing such a narrow strip of Michigan's real estate. Extensive research and education has revealed that the land mass which is composed primarily of sand does not stop at the edge of the windward exposed sand surface along the shore. Instead, it extends inland, sometimes as far as 1-2 miles, but more often it is a hilly, forested area along the shore to a depth of roughly half a mile.

In the last decade there has been a growing awareness among the general population as to the public values associated with sand dunes, and a growing recognition of the need to institute some public action to "protect" the dunes. That attention is largely focused on dune lands that still have many natural characteristics and are often privately owned. Some effort has been made by the State and environmental groups to acquire some of these lands and to promote public education of the uniqueness of sand dunes.

Developers/Realtors

Owners of dune lands, developers, and realtors with listings of sand dune property perceive sand dune development as a natural and logical conversion from the land in its present state to a "*higher and better use*". Their primary motive is usually profit. However, due to high land values, and the often higher expense associated with development in sand dunes, either a higher density of development or higher sales prices are necessary to generate a profit. If the market in which the developer works perceives the sand dune environment as an attractive selling point, an effort is made to preserve tree stands and the natural topography of the land. Doing so will increase the selling price of the lots and homes (see for example, the Wilderness Subdivision in Covert Twp. described previously). However, where the market for high priced housing is small, and yet the demand for waterfront lots/access remains high, developers will seek to meet those market needs by radical reshaping of the dune environment to give many smaller lots a view of the Lake (see the Grand Beach example described previously).

In the absence of special state and or local regulations that restrict sand dune development options, the perception of developers of the market will greatly influence their plans for conversion of sand dune property. Likewise, regulations that significantly impede the process or options available to sand dune developers can be expected to be strongly opposed.

Local Officials

Local officials are primarily caught in the crossfire between the growing awareness of a wider range of public values in sand dunes and landowner/developer concerns over greater regulation/scrutiny of the sand

LONGITUDINAL DUNES

A ridge lying parallel to the direction of the prevailing wind is called a longitudinal dune. Longitudinal dunes are developed by a complete blowing through of the landward crest of an apex or saddle dune and the formation of a gap known as a wind rift or transection. Thus the apex or saddle dune is divided into a pair of longitudinal dunes.

Dune Type Inventory and Barrier Dune Classification Study of Michigan's Lake Michigan Shore, Report of Investigation 23, Geological Survey Division, DNR, by William R. Buckler, 1979, p.5.

dune development process. Local officials are people with values and backgrounds as wide as the public they represent. As such, it is no surprise that there is no uniform concensus about the extent of dune development problems and prospective solutions among them. The lack of common understanding among local officials as to the public values associated with sand dunes is primarily a problem of education. However, with awareness comes the recognition that there is both an opportunity to be siezed and a responsibility that local units of government will have to bear in order to protect and advance those values. This responsibility carries the potential for local conflict among land owners and local development interests and may not be welcomed. Despite these apparent problems, there remains a strong desire among local officials to take appropriate actions to protect scarce and valuable resources when adequate rationale is presented for doing so, and when adequate authority is granted to effectively carry out a given responsibility.

State Officials

Only a few state officials have current responsibilities for decisions that directly affect development in sand dunes. These officials are concentrated in several programs in the Geology and Land Resource Programs Divisions of the DNR. Additionally however, a number of other prominent state officials are directly concerned about sand dune development. Most significantly these include Governor Blanchard who called for sand dune protection legislation in his 1986 State of the State Address, Dave Dempsey, the Governor's environmental aide, and several state legislator's including a number with miles of sand dune shoreline in their districts. Additionally, Representative Jondahl has indicated a substantial interest through his introduction of House Bill 5667 which seeks to amend the Sand Dune Protection and Management Act to protect sand dunes from unwise development.

That these state officials in high positions are concerned about sand dune development is of great importance, because it helps stimulate support for a more directed agency effort. Such support was instrumental in establishment of the new sand dune staff position in the DNR. However, in the absence of a comprehensive and clear state policy on sand dune development, local efforts to protect dunes are significantly weakened.

There also remains a relatively primitive acknowledgement of the role and importance of sand dunes to tourism and tourism related economic development among state agencies dealing with those programs. This has the effect of further overlooking the significance of sand dunes to an important part of what gives Michigan her identity and attracts so many tourists to her lands and waters each year. These state agencies recognize that sand dunes are a portion of Michigan's physiography that attracts tourists, but often do not see them as so important, or limited in area, or subject to such a direct threat, that a special focus to call for their protection is felt to be necessary. This lack of awareness is not as great in the area of state recreation services where recognition of the importance and sensitivity of sand dunes to development of recreation facilities is growing.

"PARABOLIC DUNES
Parabolic dunes, which derive their name from their shape like a parabola, are probably the most characteristic and most frequently observed dunes in coastal regions. The windward (concave) side of the parabolic dunes faces the shore. These dunes are central extensions of the blow-outs in dune ridges and develop in height and breadth from repeated blowing and by addition of sand from the shore. They may attain a height of over 250 feet above the lake and a length of approximately one mile. The two arms of the parabolic dune remain attached to the source of sand as development progresses."

Dune Type Inventory and Barrier Dune Classification Study of Michigan's Lake Michigan Shore, Report of Investigation 23, Geological Survey Division, DNR, by William R. Buckler, 1979, p.5.

Public Values

This leads us to a brief discussion of some of the public values associated with sand dunes. Four important values include: economic, aesthetic, recreational, and ecological.

Economic

There is a variety of economic values associated with sand dunes. These include its value as a mineral resource, as a recreational resource, and as waterfront property. Exposed sand in dunes along Lake Michigan and Lake Superior represent the most easily accessible, and often the purest form of sand around. It is used for a wide variety of construction and industrial processes. The sand has been highly valued for its use in preparing precision molds, often for the automobile industry. In pursuit of this valuable mineral, several notable sand dunes have been mined out of existence in Muskegon, Ludington and Manistee. Public concern over the complete removal of sand dunes led to the passage of the Sand Dunes Protection and Management Act in 1976. This act relies on a permit process to regulate sand mining activity in designated sand dune areas. Now inland sources of sand are being used to meet much of the industrial demand (which is lower due to new processes that result in reuse of the sand many times prior to disposal). New ceramics promise further reductions in the need for dune sand in manufacturing processes.

Sand dunes also have economic value as a recreational resource. They have helped spur the waterfront based recreational industry in Michigan, and have provided jobs for persons in the ORV and dune ride industries. Michigan's splendid state park system includes many with extensive dunes acreage.

Sand dunes are also recognized for their significant economic value as waterfront property. In fact, it could be argued that the dollar value of sand dunes property is probably greatest due not to the fact that sand is the primary ingredient, but because it is real estate that borders the Great Lakes. The aesthetic appeal of sand dunes does of course, also contribute to its high value. However, property that is expensive to buy also creates the need for intensive development, or high rent/sales prices to cover acquisition and development costs. This market condition only puts more pressure on a sensitive environment. It also rules out future use and enjoyment for the less economically advantaged.

Aesthetic Values

The aesthetic values of sand dunes have several very different components. These are perhaps best appreciated by looking at dunes from different viewing points: from the lake, from the beach, from an inland point and from the air. Additionally, the view from a popular vista which provides a panoramic view is important.

Observing sand dunes along the lower peninsula from a boat in Lake Michigan offers views that are as scenic as any other in the State. Between the 400 foot towering Sleeping Bear Dunes in Leelanau County to the multiple blowouts and open sands of Van Buren and Warren State Parks lie miles of meandering dunes -- most with a forest cap. From a boat, it is often difficult to differentiate sand dunes from the high clay cliffs that stretch from Oceana to Leelanau County. Yet each offers a distinctive

"DUNE RIDGE
Foredune ridges may blow out due to the removal of protective vegetation by fires, lumbering, building of roads or by wave cutting during high water periods. Where cut by waves the sand in the dune assumes a slope of the natural angle of repose and the bare exposed sand is blown up over the ridge locally, thus starting blow-outs through the ridge at various places. Wherever the vegetation cover is broken, by whatever cause, the sand is subject to wind blow. A series of small blow-outs along a foredune ridge develops a sinuous form which is called a "dune ridge."

Dune Type Inventory and Barrier Dune Classification Study of Michigan's Lake Michigan Shore, Report of Investigation 23, Geological Survey Division, DNR, by William R. Buckler, 1979, p.5.

spectacular element to the coastline. Where structures have been carefully sited to minimize the intrusion onto the landscape, a relatively natural scene greets the eye. However, where a structure is sited out of scale, or without consideration to the natural vegetation, then the eye is drawn to it as an unwanted intrusion on the landscape. Since hundreds of thousands of men and women fish in Lake Michigan, and since many are tourists, a pleasant shoreline enhances their recreational experience, and hence the likelihood of a repeat engagement. This improves the value of tourism to the local economies of dozens of shore communities.

The view of the dunes from a vantage upon them, or from the beach is the most common viewpoint for many. Such opportunities are available to most citizens because of the numerous state and local parks along the shore. In many cases, these views are available from vantage points on public facilities which had been developed before the natural values of dunes were fully appreciated. Some of these park facilities have resulted in dune destruction and in the need for significant continued maintenance efforts in others. For example, the park managers in Muskegon and Warren Dunes State Parks must devote considerable staff resources to keeping sand off roadways and parking lots which are poorly sited in areas of open blowing sand. Whereas in Van Buren State Park, a newer facility, natural vegetation screens parking lots and helps prevent wind erosion while also keeping down the unpleasantness created by sunheated sand and parking lots unsheltered by the forest canopy.

Additionally, these public viewing points have helped establish for many people, the notion that a sand dune is only an area of open sand adjacent to a large body of water. Also, since land uses adjoining public parks may be seen by a large number of people, they become more subject to public scrutiny (Spyglass condominiums in Park Township is a case in point).

Viewing sand dunes from an inland point that is not upon the dune itself, usually means looking at the back side of a forested ridge. This ridge provides an important element of the coastal landscape, providing topographic relief, or elevation, which is otherwise absent. It also serves as a barrier to wind and bad weather that otherwise would come off the lake unobstructed. The beauty of this landscape is often taken for granted, but is well appreciated by thousands of tourists who make special trips along the inland roads that parallel these dune ridges to observe the spring and fall leaf changes.

Except for the open sand, and the splendor of a panoramic oblique view of the coastline from an aircraft, the view of sand dunes from above appears as largely a view of a coastal forest interspersed with significant stretches of housing and carefully cultivated orchards. Yet, beneath the forest cover are billions of cubic yards of sand--a unique natural resource.

Recreational Values

Many of the active recreational values of sand dunes have already been described. However, sand dunes also provide considerable enjoyment to thousands who engage in more passive forms of recreation such as bird watching, photography, painting, and nature study (of plant communities, insects, etc.). To a great extent however, these recreational values exist only on sand dunes that are already in public ownership. The recreational

"FOREDUNE
Foredune ridges are the first dunes to become established along a shore. They are relatively low and seldom attain a height of more than 30 feet above their base. The windward slopes of foredune ridges are rather gentle, usually not over 15 degrees. The lee slopes are somewhat steeper as a rule than the windward slopes, but only occasionally do they approach the angle of repose of dry sand. The crest of the foredune as a whole is relatively uniform and even, but in places the crests are rounded and somewhat irregular and locally knobby. The characteristic vegetation on foredunes is various dune grasses such as calamovilfa and ammophila, and shrubs such as red osier, willows, poplars, and sand cherries."

Dune Type Inventory and Barrier Dune Classification Study of Michigan's Lake Michigan Shore, Report of Investigation 23, Geological Survey Division, DNR, by William R. Buckler, 1979, p.5.

value of privately owned sand dunes exists as an unrealized value, since trepass is prohibited without owner permission. However, trespass by ORV's appears to be a significant problem along the shoreline and is viewed by many as both destructive of the natural dune environment and destructive of the solitude within which most passive forms of dune recreation are enjoyed.

Ecological Values

Perhaps the most significant public value associated with protection of sand dunes is the relative rarity of the dune environment and diversity of the unusual plant and animal communities that make their home there. Recognition of the rarity and fragility of these natural environments is recent. While mile after mile of this environment has already been permanently transformed, and much of the balance has been so significantly altered, that very little remains in a relatively undisturbed state, significant acreages with unique environmental characteristics do exist and are not yet in protective public or nonprofit ownership.

Additionally, the overall value of dune ridges to the microclimate of near shore areas is not well understood. Some scientists feel a significant reason that orchard crops have flourished in this area is because of the effect the dune ridge has on the microclimate. Major changes to the ridge, especially denuding and leveling, will have subtle and as yet unknown effects. It may even remove the moderating influence of the dune on the weather, and hence remove the natural protective role it plays for fruit crops. The annual harvest of fruits from the near shore area significantly contributes to Michigan's agricultural output and helps account for her "top five" standing in cherries, apples, peaches and pears.

Technical Definition and Attributes

Depending on the criteria employed, there is less than 50,000 acres (geologists), 275,000 acres (P.A. 222) or nearly the whole western shore of Michigan and portions of the Upper Peninsula which are sand dunes. Under P.A. 222 of 1976, the Sand Dune Protection and Management Act, a sand dune is *"an area which includes those geomorphic features composed primarily of sand, whether windblown or of other origin and which lie within 2 miles of the ordinary high water mark on a Great Lake."* Since this definition is broad, the Geological Survey Division developed additional criteria to aid in the designation of sand dune areas. They started with those areas identified as "coastal dunes", "inland dunes" or "coastal sand strips" in a 1962 DNR study. See map on next page. To these were added shorelands classified as "high sand dunes or low sand dunes" by the Great Lakes Basin Framework Study in 1975. Additionally, areas identified by the Soil Conservation Service as "sand dune types" or "sand dune associated soil types" were considered, as well as an area which adjoined the dune as a buffer. In the end, a requirement that an area had to have *"more than 50% of unconsolidated sand"* as established by a geologist, resulted in the exclusion of miles of shore that was over 50% clay, even though large pockets were 100% sand.

Designated sand dunes extend along 270 miles of the more than 450 mile Lake Michigan shoreline (60%). Yet, significant stretches of sand that appear to be dunes, are not designated under PA 222 (see examples of development in undesignated areas cited in Chapter One). This would

appear to be a major limitation for administration of a statute entitled the Sand Dune Protection & Management Act. However, titles, like appearances can be deceiving. The Act was not passed for the purpose of protecting all sand dunes from development, but rather for regulating the removal or mining of sand. The narrow criteria of *"at least 50% unconsolidated sand"* works well for designations under this act, since soils with less sand are not well suited for the markets that sand mining companies compete within. Likewise, small "pockets" of sand that are difficult to access could be ignored because of the costs associated with sand mining. Such a narrow criterion will not protect all of Michigan's unique sand dunes.

Areas Designated Under the Sand Dune Protection & Management Act

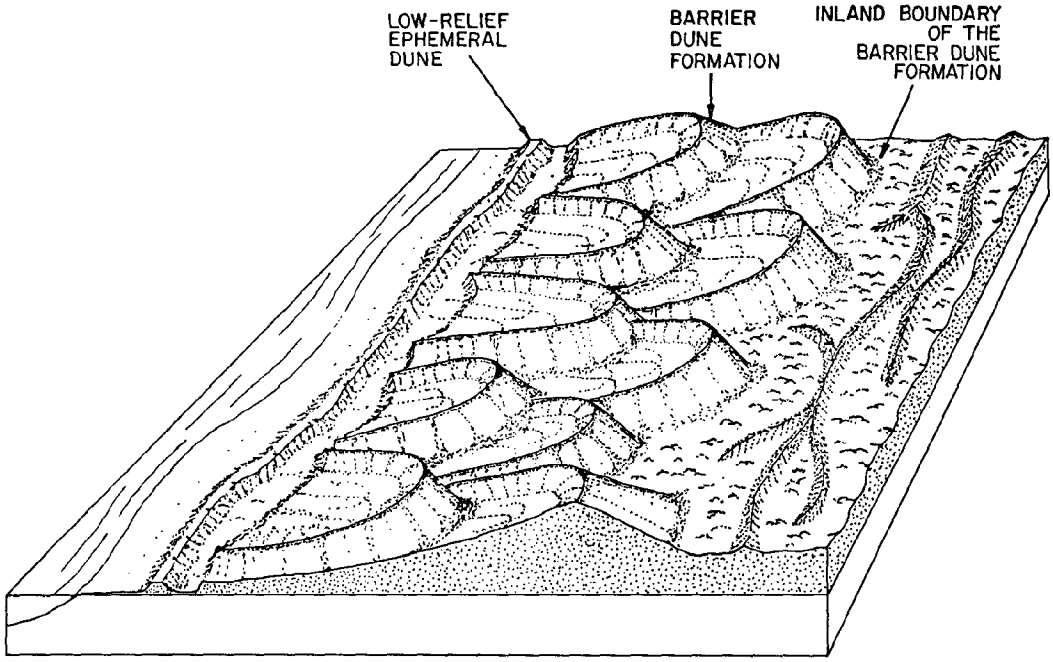
Since dunes are formed through the interaction of wind and water, and they shrink or expand dependent upon natural factors, they cannot be considered stable components of the environment. The natural meandering of this natural physiographic feature requires designation of some areas slightly beyond the present extent of a dune to provide a "transition zone". For convenience and accuracy, designations under PA 222 have been made in 40 acre units.

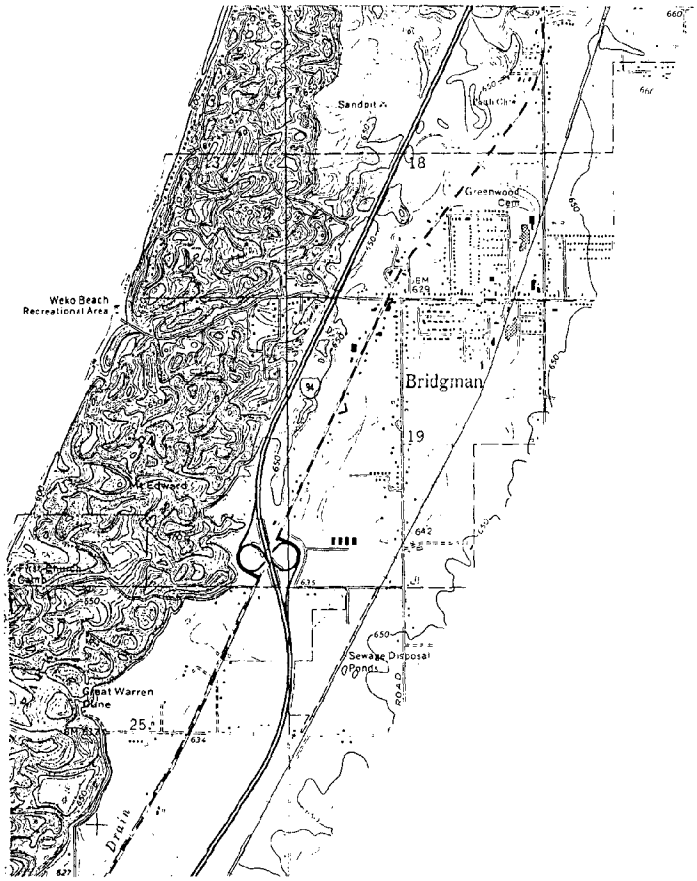
Two series of PA 222 designations have been completed and a third is underway. These designations are made to a distance up to 2 miles inland. However, the above analysis also suggests that if P.A. 222 were to be amended to include regulation of a wide range of land uses and activities within sand dunes (as is proposed by H.B. 5667), then additional areas of the shoreline will have to be reexamined for possible inclusion in the Act. The restrictive criteria *"composed of more than 50% of unconsolidated sand"* would probably need to be abandoned. The technical studies that provide the basis for dune designations are a time consuming process that could significantly impede the implementation of protective measures if they had to be made first.

Barrier Dunes

Within each sand dune area designated under PA 222 is a subelement referred to as a "barrier dune". The "barrier dune" is statutorily defined as *"the first landward sand dune formation along a shoreline of a Great Lake or a sand dune formation designated by the Department of Natural Resources"*. To assist with the identification of barrier dunes, the DNR contracted with William R.Buckler, then a PhD student at MSU. Buckler, while noting that the use of the term "barrier dune" is different from its normal context in sea coast areas, was able to develop a "practical definition" of the term. He suggested it be *"the first dune assemblage whose forms display the greatest relative relief within the officially designated 'sand dune areas'"*. The top illustration on page 23 shows a representation of this definition. Using his research, the DNR has identified the barrier dune "formation areas" within the series I II, and III designations. These areas are easily recognized on USGS 15 minute topographic maps. An example along I-94 at Bridgman appears as the bottom illustration on page 23. The edge of the barrier dune parallels the highway and is clearly visible where the topographic relief suddenly ends its variable pattern. While the barrier dune does not represent the full inland extent of most sand dunes, it does represent that lakeshore area

that is most fragile and most readily identifiable as a sand dune. It may be the appropriate boundary for regulatory purposes.





Chapter Three

WHY ARE DUNES IMPORTANT?

This Chapter synthesizes some of the salient points from the preceding discussion about various public values and perceptions of sand dunes. It focuses first on some of the unique characteristics of sand dunes and secondarily on the attributes that development in sand dunes share with other waterfront development.

Unique Characteristics

Michigan's sand dunes have at least four unique characteristics: natural, economic, recreational, and ecological. These categories are not mutally exclusive. They are presented as a way to summarize and focus the issues associated with the "public interest" in sand dunes.

Natural

Michigan's sand dunes are unique as illustrated in the following quote from dune expert William R. Buckler.

> *"The sand dunes along the shorezone of Michigan's Great Lakes are among the youngest geomorphic features in the state. Most are related to shoreline positions of higher glacial lakes during the last 13,000 years, although some are associated with the modern lakes. The largest dunes found today formed approximately 3,000 to 4,000 years ago at the time and during waning of the Nippissing Lake stage. Water level of Lake Nipissing was 25 feet higher than present Lake Michigan. The dunes have undergone considerable change since then. Because of favorable conditions, nowhere were they better developed than on the eastern and southern shores of Lake Michigan. These dunes are somewhat unique and collectively probably represent the largest accumulation of sand dunes along any fresh water body in the world. *** **The environmental (climatic and geomorphic) conditions under which they formed no longer exist; once destroyed, these dunes are not likely ever to regain their present significant size and extent."*** Dune Type Inventory by William R. Buckler, DNR, Report #23, 1979, p1. (emphasis added).

Michigan has more than 3,200 miles of Great Lakes shoreline, and yet only about 270 miles (encompassing 275,000 acres) have been designated as sand dunes. An untold amount of smaller, discontinuous dunes, remain to be designated. Together, these dunes are as important to the unique identity and image of Michigan as the British crown jewels are to the English.

Michigan's dunes provide a unique transition between inland land forms and the lake. They serve as natural barriers to mitigate against storm damage. They establish a protective barrier to wind and water while helping establish the right microclimate for Michigan's flourishing coastal fruit industry. They provide habitat for unique flora and fauna. They are a fragile ecosystem that is very susceptible to erosion from wind, water and overuse.

"The 1976 Dune Management Act and the recent agreements for the state to purchase several hundred acres of dunes in southwestern Michigan, notably at Grand Mere, have preserved some of the best of the crescent of dunes that runs up the lake from the Indiana line. But dunes are something Michigan residents should feel selfish about. Not one shovelful should be surrendered if there is a way to preserve it."

"Sand-Cast: The fragile beauty of Michigan's dunes needs stronger protection", Detroit Free Press, Sunday, April 21, 1985, p.2B.

Economic

The dunes also have unique economic characteristics. They have been mined for nearly a century for use in foundry core and moulding sands, glass making and other uses. They are attractive locations for residential and certain commercial developments due to their waterfront location and natural beauty. Land prices generally reflect the value placed on such land.

Recreational

The recreational land uses and activities associated with sand dunes is a very long list. The primary recreational activity is tourism. People come to hike, climb, hang glide, swim, sunbathe, use their ORV's and generally enjoy the unique features of this real world version of a child's sandbox. These activities spawn the demand for parks, nature centers, campgrounds, motels/hotels, and associated services (gas stations, grocery stores, etc). The growth and sustenance of many small towns is dependent on the tourists attracted to the recreational opportunities that abound along the lakeshore--including the dunes.

"Travel, it is said, will be the world's largest industry by the year 2000--a scant 14 years from now. And at the rate Michigan is growing in this field, the state will have a noticeable share of that industry before the 21st century gets underway.

Growing at the rate of 6 per cent a year or better, the Michigan travel industry will, during 1986, give the Michigan economy an estimated $13 billion boost. It will provide nearly 17,000 new jobs (for a total of nearly 300,000). It will host more than 2,800,000 new travelers and will pump nearly $35 million new dollars into the state treasury (for a total of more than $617 million)."

"Travel/Tourism Boom In Michigan Sparks Local Economic Growth", Outlook'86, Michigan Department of Commerce, June, 1986, p.3.

Ecological

The dunes also present rich opportunities for ecological research into unique plant and animal communities in these geologically young and changing natural environments. They also present significant challenges for assimilating man's activities in ways which are not unnecesarily destructive, and which result in a stabilization of the erosive wind and water processes which naturally seek to destroy the dune if protective vegetation is removed.

Attributes Common to Waterfront Development Issues

In addition to these unique characteristics which provide support for some of the arguments in favor of protection of public interests in sand dunes, development in dunes also share a number of attributes with any coastal development. These include concerns over access, aesthetics, scale of development, land use, land division patterns, soil erosion, and public trust considerations. Additionally, waterfront controversies usually have a host of protagonists and antagonists who often fan the fires with one-sided rhetoric. Statements like the following are common.

> *"It's my land and I'll do whatever I want with it!"*; or
> *"I'm not going to let you move one more grain of sand!"*; or
> *"If this development is approved, you'll destroy the reason I moved here!"*.

These statements represent, respectively, attitudes of frontierism, preservationism, and a "*last one in*" mentality. None are constructive in resolution of the conflicts, though they often honestly reflect the opinions of the speaker. They are important to appreciate however, because they help to shape the nature of controversies that arise and the specific issues being debated. These attitudes are particularly important with regard to development in sand dunes because of several factors.

First, the amount of undeveloped dune lands in private ownership is limited and steadily decreasing, yet the demand or market for living upon them remains high. Secondly, many sand dune lands with some residential structures are considered "underdeveloped" by land market interests, and as time goes on, pressure to redevelop or convert these lands to a more

intensive use will also grow. Third, just as has occurred around inland lakes in metropolitan areas, second and third tier development, often on or immediately adjacent to existing sand dunes will begin to emerge. Left unregulated, it will continue to increase pressure on the sand dune resource. These mounting pressures will, over time, further intensify the controversy over access, aesthetics, scale, land use, land division patterns, erosion concerns and public trust issues.

What is the "Public Interest" in Dunes?

The Michigan Constitution sets forth a strong statement about the environment.

> *"The conservation and development of the natural resources of the state are hereby declared to be of paramount public concern in the interest of the health, safety and general welfare of the people. The legislature shall provide for the protection of the air, water and other natural resources of the state from pollution, impairment and destruction."*

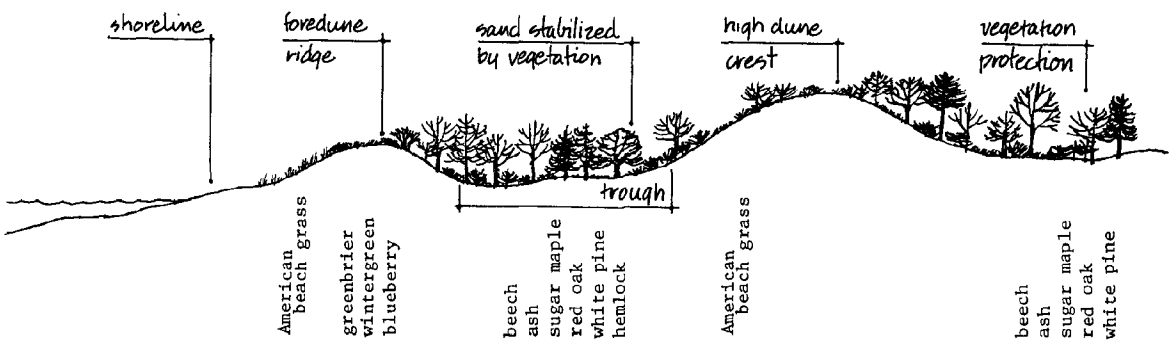
This constitutional declaration establishes the foundation for the conservation and development of Michigan's natural resources. In concert with specific statutory laws and local zoning enabling acts, the basic authority for regulation of most development in sand dunes already exists. However, that authority is not vested in a single state statute, nor is state policy regarding sand dunes comprehensive -- only regulation of mining is clearly established.

In the absence of specific state policy, regulation of sand dune development, like other development regulation, is left up to local government--to do or not to do. Local governments that zone must operate in concert with authority granted by the appropriate state zoning enabling act [City Village Zoning Act, 207 PA 1921; Township Rural Zoning Act, 184 PA 1943; County Rural Zoning Enabling Act, 183 PA 1943; all as amended]. The Township Rural Zoning Act provides the following authority for local zoning:

> *"The **township board** of an organized township in this state **may provide by zoning ordinance** for the **regulation of land development** and the establishment of districts in the portions of the township outside the limits of cities and villages which regulate the use of land and structures; **to meet the needs of the state's citizens** for food, fiber, energy, and other **natural resources,** places of **residence, recreation, industry, trade, service, and other uses of land; to insure that use of the land shall be situated in appropriate locations** and relationships; to limit the inappropriate overcrowding of land and congestion of population, transportation systems, and other public facilities; to facilitate adequate and efficient provision for transportation systems, sewage disposal, water, energy, education, recreation, and other public service and facility requirements; **and to promote public health, safety, and welfare.** For these purposes, the township board may divide the township into districts of such number, shape, and area as it considers best suited to carry out this act. The **township board** of an organized township **may** use this act to **provide by ordinance for the regulation of land development and the establishment of districts which apply***

> ***only to land areas and activities which are involved in a special program to achieve specific land management objectives and avert or solve specific land use problems, including the regulation of land development and the establishment of districts in areas subject to damage from flooding or beach erosion****, and for that purpose may divide the township into districts of a number, shape and area considered best suited to accomplish those objectives.* ***Ordinances regulating land development may also be adopted designating or limiting the location, the height, number of stories, and size of dwellings, buildings, and structures that may be erected or altered****, including tents and trailer coaches, and the specific uses for which dwellings, buildings, and structures, including tents and trailer coaches, may be erected or altered;* ***the area of yards, courts, and other open spaces, and the sanitary, safety, and protective measures that shall be required for the dwellings, buildings, and structures****, including tents and trailer coaches; and the maximum number of families which may be housed in buildings, dwellings, and structures, including tents and trailer coaches, erected or altered. The provisions shall be uniform for each class of land or buildings, dwellings, and structures, including tents and trailer coaches, throughout each district, but the provisions in 1 district may differ from those in other districts."* (Emphasis added).

There is ample authority in this statute and similar language in the County and City-Village Zoning Enabling Acts for specific local regulations related to development in sand dunes. At least fifteen communities have already taken the initiative to so act. Chapter Eight reviews the characteristics of these existing efforts. The next chapter looks more closely at the existing structure of state regulations applicable in dune areas.

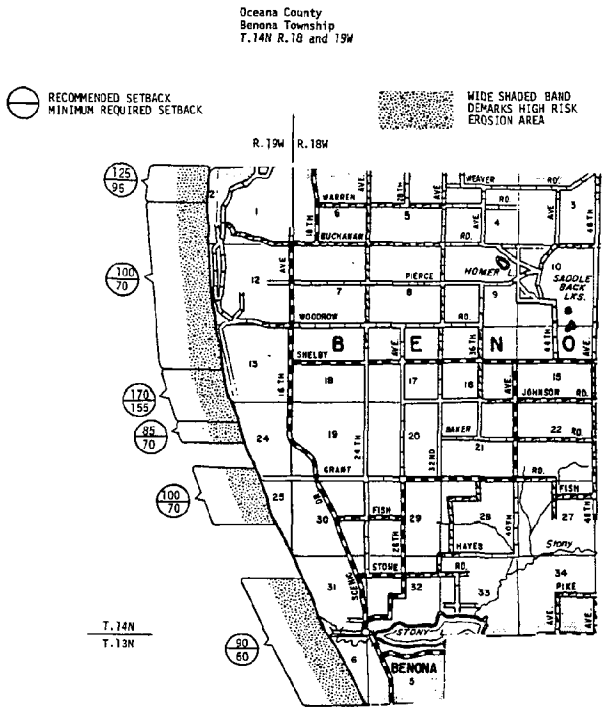


PART TWO - STATE EFFORTS
Chapter Four

HOW IS SAND DUNE DEVELOPMENT CURRENTLY BEING ADDRESSED AT THE STATE LEVEL?

Following is a summary of existing state statutes that could be a part of a comprehensive approach to management of sand dune development.

Shorelands Management & Protection Act
The Shorelands Management and Protection Act, P.A. 245 of 1970, established a three-pronged state and local effort to identify and protect coastal wetlands (environmental areas), coastal floodplains and areas subject to high risk of erosion. The Department of Natural Resources is charged with the responsibility of conducting special studies to identify lands that fall into these categories and for notifying local officials of their findings. The high risk erosion area program applies to all lands subject to high risk of erosion along the Great Lakes shores. This includes sand dune and other nonsandy soils. These regulations establish a minimum setback from the ordinary high water mark from which any new development must be located. The setbacks do not regulate use, nor prevent new development from taking place. Once established, the setbacks can be adopted and administered locally via the local zoning ordinance or a separate ordinance adopted for that purpose. The DNR has developed model local zoning regulations and assisted local units in their adoption. However, only eight local units of government have adopted high risk erosion area regulations that have been approved by the DNR. An unknown number of local units have adopted the DNR setbacks but have not sought DNR approval of their regulations as provided under PA 245. Below is an example of a map prepared by the DNR showing areas subject to high risk of erosion.



Sand Dune Protection & Management Act
The Sand Dune Protection and Management Act, PA 222 of 1976 would seem, as its title suggests to already comprehensively regulate dune development. However, as reviewed earlier, this statute regulates the removal of sand (i.e. mining) and not structural development or physical alterations in the dunes. While the stimulus for the bill was the unpopular mining of sand dunes in Manistee, Muskegon, Lincoln Township, and other places along the shore, the original legislative concept anticipated a comprehensive management strategy in designated sand dune areas. However, because basic technical information on sand dunes and adjoining land uses was so deficient, the bill focused on an immediate need -- regulation of mining -- and directed the DNR to conduct studies that would provide the necessary background for a more comprehensive approach. There is presently no local role in the management of sand dunes under PA 222. The Act is administered by the Geology Division of the Department of Natural Resources.

Soil Erosion & Sedimentation Control Act
The Soil Erosion and Sedimentation Control Act of 1972, PA 347, provides a mechanism for control of soil erosion, and hence the quality of water, during the development process. This is achieved by requiring a permit prior to undertaking certain "earth changes". Performance standards, based on construction practices which seek to minimize soil erosion, are used as the basis for reviewing permit applications. Permits are administered by local agencies, pursuant to locally adopted ordinances. Local administrative staff are trained in DNR sponsored seminars. Since sand dunes are such a sensitive environment and are subject to erosion from wind and water sources, permits issued under this Act are an important means for helping to preserve native vegetation and hence the dune itself. Sand dune development would generally be covered by Soil Conservation Service standards which are adopted by reference in local soil erosion regulations.

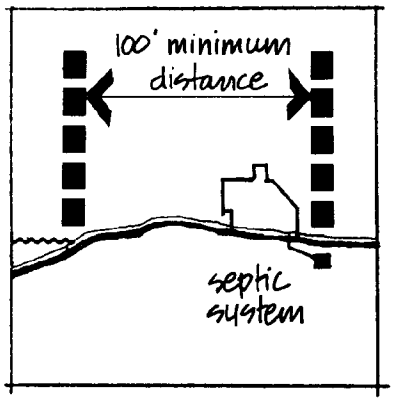
However, local officials report difficulty in administration of the Act on sand dune lots where disturbance is less than an acre in size or greater than 500 feet from a waterbody (common on many residential lots). These limitations, established by administrative rule, effectively prevent permit conditions to minimize erosion damage on both small lots and on long and narrow lots (an unpaved driveway is the principal concern on the deep lots). Yet, the sensitivity of all sand dunes to wind erosion suggests that soil erosion controls should be applied even on these parcels. It appears this could already be accomplished by local soil erosion regulations, since PA 347 permits local regulations that are "more restrictive". However, the Act does not authorize general law townships to administer its provisions, so for most of the Lake Michigan shoreline, a county enforcing agency would have to adopt and enforce the more restrictive sand dune erosion controls.

Thus, while PA 347 is an important Act for minimizing soil erosion, and hence is useful in protecting the integrity of sand dunes on large lots, it does not regulate development type, its scale or density, or any of the other elements usually addressed by zoning regulations. PA 347 seeks primarily to prevent unnecessary erosion and pollution of waters of the

"The management objectives for sand dune lands and the corresponding intensity of use shall be established on the principle that the amount of human disruption should decrease in proportion to the significance of the sand dune features, with intensive use directed to sand dune areas of lesser significance or sensitivity."

"Sand Dune Management and Protection - Department Operations", Commission Policy, Department of Natural Resources, 6/14/85, p.3.

state. Thus, its role in a comprehensive management scheme, while important, is somewhat limited.



Public Health Code

One major concern of sand dune development is maintenance of a safe supply of drinking water. One approach has been inspection and permitting administered by local public health departments pursuant to the Public Health Code. Tapping into municipal waste and drinking water supplies is not a feasible alternative for most of the coastal dune area. As a result, septic tanks and water wells are the primary alternative selected. The Michigan Department of Public Health recommends a minimum of 100 feet from a septic tank to any water body and an equal separation distance between a well and septic tank in sandy soils. However, the actual regulations employed are established by local public health departments. Some sanitarians privately express concern that even these (new larger) distances are inadequate with nitrate laden waste and, where multiple dwellings rely on a single septic system, thereby concentrating waste disposal in a small area of sandy soil.

Natural Resources Commission Policy

The above described statutes establish a piecemeal state policy towards development in sand dunes and along coastal shorelines. The overriding state interests in sand dune management and protection have not as yet been legislatively delineated beyond the public purposes expressed in the above statutes. Given the importance and uniqueness of sand dunes as expressed earlier, this must be viewed as an omission of considerable consequence.

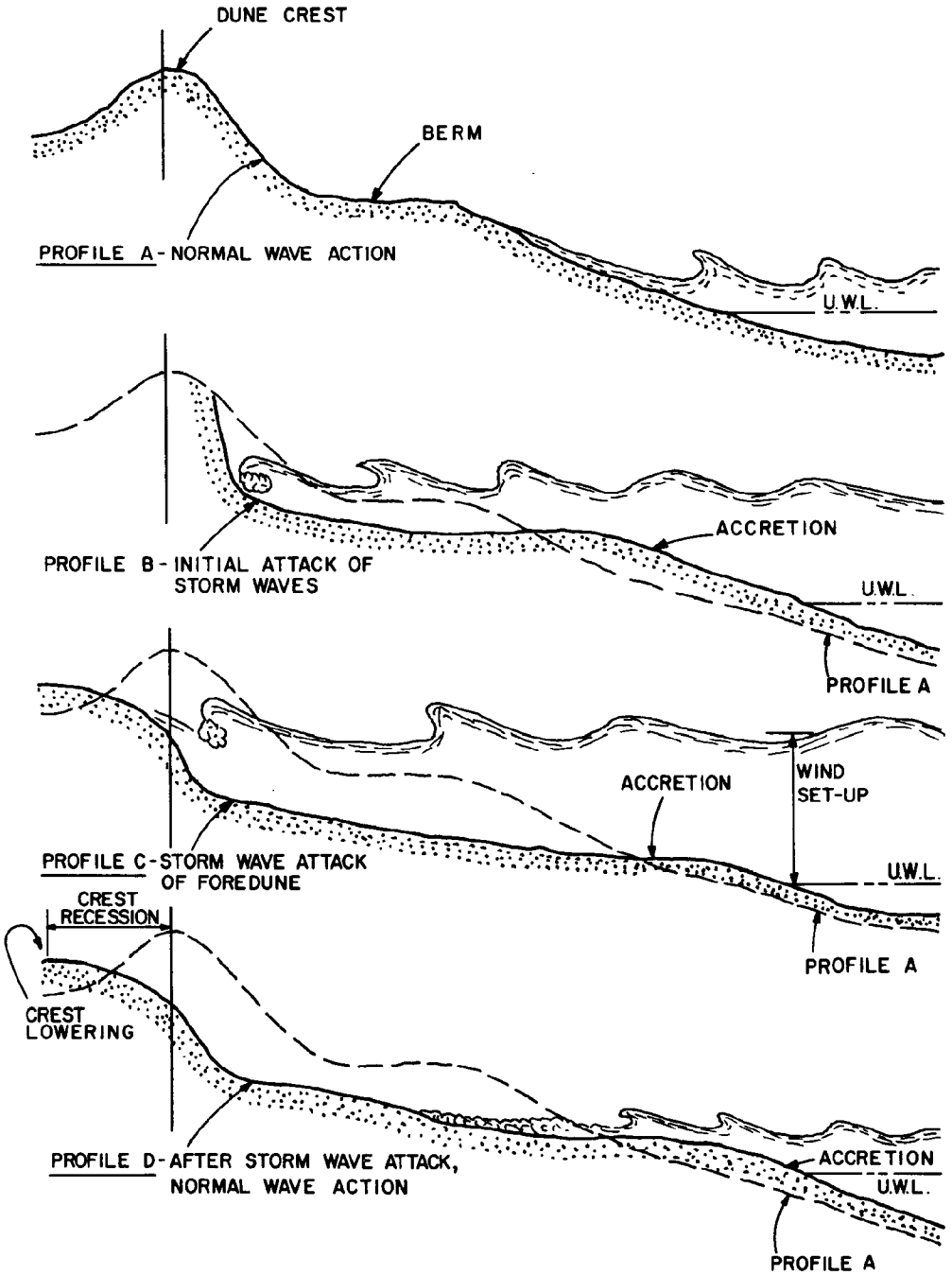
To partially address this omission, the Natural Resources Commission adopted a policy statement on sand dunes at their June 14, 1985 meeting. This policy recognizes the importance and uniqueness of dunes and directs that *"Department operations shall respect Michigan's dune formations and make every effort to manage, protect, enhance, and preserve their natural character."* However, the policy is limited only to DNR activities in sand dune areas designated under PA 222. The policy also establishes a procedure for the acquisition and disposal of land in designated sand dune areas. Additionally, the policy establishes management objectives on state owned sand dunes, provides that grants and financial assistance programs to local governments should seek to minimize the direct and indirect impact on sensitive dune areas, and that a sand dune research, education and technical assistance program be established. It does not address private development on nonpublic lands, however.

Other DNR Efforts

As a part of its continuing coastal zone management program, the Department of Natural Resources has maintained an active interest in sand dune development. In 1984-85, the Division of Land Resource Programs convened a special advisory committee to advise them on appropriate means to protect sand dunes from unwise development. That effort led to the development of an outline of local zoning regulations and state statutory provisions that a majority of the committee felt were necessary to protect sand dune resources. This report is a continuation of

that effort. Chapter Five will summarize these recommendations in more detail.

Storm Wave Attack on Erodible Shoreform



Chapter Five

ALTERNATIVES FOR SOLVING THE PROBLEM

This Chapter opens with an examination of three state sand dune management programs. It then describes three state-local shared sand dune management alternatives. Next, the specific recommendations of the Sand Dune Advisory Committee are summarized. Specific statutory changes are then proposed. Other nonregulatory techniques are briefly discussed before the final section of the chapter presents a summary analysis.

Other State Initiatives

Following are brief summaries of sand dune management programs from Georgia, North Carolina and Washington. Each of these programs has elements that are unique, and may be instructive as Michigan considers refinement of its own program.

Georgia - Shore Assistance Act of 1979

"The General Assembly finds and declares that coastal sand dunes, beaches, sandbars, and shoals comprise a vital natural resource system, known as the sand-sharing system, which acts as a buffer to protect real and personal property and natural resources from the damaging effects of floods, winds, tides,and erosion. It is recognized that the coastal sand dunes are the most inland portion of the sand-sharing system and that because the dunes are the fragile product of shoreline evolution, they are easily disturbed by actions harming their vegetation or inhibiting their natural development. The General Assembly further finds that offshore sandbars and shoals are the system's first line of defense against the potentially destructive energy generated by winds, tides, and storms, and help to protect the onshore segment of the system by acting as reservoirs of sand for the beaches. Removal of sand from these bars and shoals can interrupt natural sand flows and can have unintended, undesirable, and irreparable effects on the entire sand-sharing system, particularly when the historical patterns of sand and water flows are not considered and accommodated. Also, it is found that ocean beaches provide an unparalleled natural recreation resource which has become vitally linked to the economy of Georgia's coastal zone and to that of the entire state. The General Assembly further finds that this natural resource system is costly, if not impossible, to reconstruct or rehabilitate once adversely affected by man-related activities and is important to conserve for the present and future use and enjoyment of all citizens and visitors to this state and that the sand-sharing system is an integral part of Georgia's barrier islands, providing great protection to the state's marshlands and estuaries. The General Assembly further finds that this sand-sharing system is a vital area of the state and is essential to maintain the health, safety, and welfare of all the citizens of the state.

"Legislation introduced in the state House this week offers the prospect of new steps to protect Michigan's Great Lakes sand dunes from destruction resulting from industrial and commercial developments."

"The new bill expands on a 1976 law that limited mining of the dunes and proposes steps to limit real state and other commercial developments that could damage the dunes.

"Rep. Jondahl noted that it could be a difficult political issue between the state and some local units. It should not be a political issue. The dunes are too precious a natural resource to become a political bargaining chip. They must be preserved."

"More Action to Save Dunes", Editorial, Lansing State Journal, Saturday, June 21, 1986.

> *Therefore, the General Assembly declares that the management of the sand-sharing system has more than local significance, is of equal importance to all citizens of the state, is of state-wide concern, and consequently is properly a matter for regulation under the police power of the state. The General Assembly further finds and declares that activities and structures on offshore sandbars and shoals, for all purposes except federal navigational activities, must be regulated to ensure that the values and functions of the sand-sharing system are not impaired. It is declared to be a policy of this state and the intent of this part to protect this vital natural resource system by authorizing the local units of government of the State of Georgia to regulate activities and alterations of the ocean sand dunes and beaches and recognizing that, if the local units of government fail to carry out the policies expressed in this part, it is essential that the department undertake such regulation."* (Ga. L. 1979, p. 1636, Section 2.)

The Georgia Shore Assistance Program includes regulation of 100 miles of shoreline in 6 counties to protect sand dunes and related sensitive shoreland resources. Sand dunes are regulated seaward for three miles and inland to the landward boundary of the "*dynamic dune field*".

A three person Shore Assistance Committee within the Georgia Department of Natural Resources is the chief administrative body with authority to issue orders and to grant, suspend, revoke, modify, extend, condition or deny permits. No construction or erection of a structure or alteration of the natural topography or vegetation is allowed without a permit, except for reconstruction of structures damaged less than 80% (by other than wave action). A sixty day review and approval period is authorized. Structure placement, shore protection and shore alteration are all regulated activities.

Regulation or erection of structures applies landward to the first occurrence of either "*live native trees twenty feet in height or greater*" or to a coastal marshland; or to an existing structure. This has proven to be very difficult to administer and has resulted in a zig zag line of regulation. Structures within coastal flooding areas must be erected on stilts and must meet stringent building codes based on hurricane wind loads. There are no state minimum setbacks per se. Instead, there are series of standards which are applied on a site by site basis.

Local units of government which adopt ordinances that meet or exceed the standards, requirements and provisions of the state law can be certified as a permit issuing authority for properties landward of the ordinary high water mark. Building height and aesthetic regulations if any, are imposed by local units of government. Local regulations often establish specific setback lines varying between 20 and 50 feet back from the crest of the most seaward stable dune. Shoreline engineering activities and submerged lands activities are regulated by the state, although local units can enact more stringent standards. The Georgia Department of Natural Resources also provides technical assistance to local governments and has developed a model shorelands ordinance for local consideration.

For additional information contact:
Marsh & Beach Section
Georgia Department of Natural Resources
1200 Glynn Avenue
Brunswick, GA 31523-9990

North Carolina Administrative Code, Title 15, Subchapters 7H 7M (1979)

> *"Declaration of General Policy:*
> *It is hereby declared that the general welfare and public interest require that development along the ocean and estuarine shorelines be conducted in a manner that avoids loss of life, property and amenities. It is also declared that protection of the recreational use of the shorelines of the state is in the public interest. In order to accomplish these public purposes, the planning of future land uses, reasonable regulations and public expenditures should be created or accomplished in a coordinated manner so as to minimize the likelihood of damage to private and public resources resulting from recognized coastal hazards."*

The North Carolina approach focuses on nonstructural solutions to minimizing coastal hazards and to protecting public rights in ocean front property (walking, swimming, surf-fishing, sunbathing, estuarine and marine productivity). Nonstructural measures for shoreline erosion include land use planning and land classification, establishment of setback lines, subdivision regulations and management of vegetation. Only structural solutions with the least effect on natural processes are permitted. There is a strong public education and disaster prevention component to the program.

Areas of environmental concern and statewide significance are identified and local units are urged to take resource management initiative through appropriate planning and regulatory controls. These are to be prepared consistent with established statewide objectives and standards to insure uniformity and consistency within an integrated and comprehensive management approach.

The State is charged with identifying areas of environmental concern (AEC), these are land and water areas in which uncontrolled or incompatible development might result in irreversible damage. Specific development activities which are to be permitted are also established at the state level. A state permit system exists to control development within designated areas of environmental concern. "Minor development" activities are regulated by permits from an approved local permitting agency. "Major development" activities (those greater than 20 acres or 60,000 square feet of building, or which involve natural resource excavation or drilling) are required to get permits directly from the state agency. The general criteria and standards determining permit approval or denial are identical. They include consideration of the size of the development, the impact of development in areas of environmental concern, how often the class of development is carried out, whether there would be major or irreversible damage to the natural resource, whether protected public rights or interests would be jeopardized, and consistency with state guidelines and local plans.

"Ocean hazard areas" are subject to even more restrictive provisions. These include *"beaches, frontal dunes, inlet lands, and other areas in which geologic, vegetative and soil conditions indicate a substantial possibility of excessive erosion or flood damage."* The primary cause of these hazards

> *"are the constant forces exerted by waves, winds and currents upon the unstable sand that form the shore. During storms, these forces are intensified and can cause significant changes in the bordering landforms and to structures located on them. *** The location and form of the various hazard area landforms, in particular the beaches, dunes and inlets are in a permanent state of flux responding to meteorologically reduced changes in the wave climate. For this reason, the appropriate location of structures on and near these landforms must be reviewed carefully in order to avoid their loss or damage.* ***As a whole, the same flexible nature of these landforms which presents hazards to development immediately on them, offers protection to the land, water & structures located landward of them.*** *The value of each landform lies in the particular role it plays in affording protection to life and property. *** Overall, however, the energy dissipation and sand storage capacities of the landforms are most essential for the maintenance of the landform's protective function."* (Emphasis added).

The public purposes of the ocean hazard area regulations include minimizing loses to life and property resulting from storms and long term erosion, preventing encroachment of permanent structures on public beach areas, and reducing the public costs of inappropriately sited development. Setbacks are a minimum of 120 feet landward from the first line of stable natural vegetation and much further where lands are rapidly eroding (the value is calculated at 30 times the long term annual rate unless it is less than 2 feet/year then it is 60 times that rate).

If a primary dune exists on or behind the lot on which the development is proposed, the development must be landward of the crest of the primary dune or the long term erosion setback line, whichever is farthest from the first line of stable natural vegetation. For existing lots however, where locating the development behind the crest of the primary dune would preclude any practical use of the lot, development may be located seaward of the primary dune. In such cases, the development must be located behind the long term erosion setback line, and must not be located on, or in front of a frontal dune. [A primary dune is the first mound of sand located landward of the ocean beaches. Where there is a primary dune it is also a frontal dune; where there is no primary dune, the frontal dune is the first mound of sand located landward of the ocean beach having sufficient vegetation, height continuity and configuration to offer protective value.] If no primary dune exists, but a frontal dune does, the development must be set back behind the frontal dune or behind the long term erosion setback line, whichever is farthest from the first line of stable natural vegetation.

Because of increased potential for loss, and hazards to the public, large structures must be set back even further. For all multifamily residential

structures (including motels, hotels, and condominiums) of more than 4 units or 5,000 square feet of total flow area, and any nonresidential development greater than 5,000 square feet, the erosion setback line is twice the minimum setback line established earlier, but not less than 120'. If the erosion rate is greater than 3.5 feet/year, the setback line is 30 times the long term rate plus 105 feet.

No significant removal or relocation of frontal dune sand or vegetation is permitted. Growth inducing public facilities are permitted only under rare circumstances. Other minimum lot size and setbacks under local law still apply.

Prior to permit issuance, the applicant is required to provide written acknowledgment that s/he is aware of the risks associated with development in the hazardous area and the limited suitability of this area for permanent structures.

Relocation of structures requires permit approval. They must be relocated the maximum feasible distance landward of the present location. All structures in the ocean hazard area must be built on pilings and be constructed to withstand a 100 year storm event. All walls below the 100 year base flood level must be designed to break away without jeopardizing the structural support of the structure. A few accessory structures and uses are permitted seaward of the oceanfront setbacks. These include campgrounds (without permanent structures), parking, outdoor tennis courts, decks, accessory gazebos and sheds (if less than 200 sq. feet).

On nonconforming lots of record, single family residential structures may be permitted seaward of the applicable setback line if fire standards are met. These standards require: setback at the maximum feasible distance possible and at least 60 feet landward of the vegetation line, as well as behind the landward toe of the frontal dune; on special pilings; with a ground floor no more than 1,000 square feet or 10% of the lot size whichever is greater; and compliance with all other regulations of the statute. Special regulations are also provided for development within inlet hazard areas.

North Carolina has about 310 miles of ocean front shoreline, almost all of which is beach and dune environments. The management program is comprehensive, includes all shore environments (not just dunes), and is consistent.

For additional information contact:

Office of Coastal Management
North Carolina Department of Natural Resources &
Community Development
P.O. Box 27687
Raleigh, NC 27611

Washington Shoreline Management Act

Washington's Shoreline Management Act, Chapter 90.58 RCW was adopted to fill the void in local regulations protecting the state's wetland environment and to foster a regional approach to shoreline land use

regulations. The broad objectives of the Act are clearly reflected in its statement of purpose:

> *The legislature finds that the shorelines of the state are among the most valuable and fragile of its natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration, and preservation.*
>
> *...Guidelines [and master programs] for shorelines of state-wide significance ... shall give preference to uses in the following order of preference which:*
>
> > *(1) Recognize and protect the state-wide interest over local interest;*
> > *(2) Preserve the natural character of the shoreline;*
> > *(3) Result in long term over short term benefit;*
> > *(4) Protect the resources and ecology of the shoreline;*
> > *(5) Increase public access to publicly owned areas of the shorelines;*
> > *(6) Increase recreational opportunities for the public in the shoreline;*
>
> ***
>
> *...Alterations of the natural condition of the shorelines of the state, in those limited instances when authorized, shall be given priority for single family residences, ports, shoreline recreational uses including but not limited to parks, marinas, piers, and other improvements facilitating public access to shorelines of the state, industrial and commercial developments which are particularly dependent on their location on or use of the shorelines of the state and other development that will provide an opportunity for substantial numbers of the people to enjoy the shorelines of the state.*
>
> ***
>
> *...Permitted uses in the shorelines of the state shall be designed and conducted in a manner to minimize, insofar as practical, any resultant damage to the ecology and environment of the shoreline area and any interference with the public's use of the water.*

One particularly noteworthy characteristic of this program is the effort to give preference to ***shoreline dependent land uses*** such as certain industries, transporation facilities and port facilities. The Act regulates all designated lands and activities adjacent to water bodies with a special emphasis on wetlands and floodplains. There are no special sand dune regulations per se, but the designated dune areas subject to regulation extend inland beyond the 200 foot shoreline limit to accommodate dune environments. Activities regulated include land use, permanent docks and piers, bulkheads, structure locations, backfilling, land subdivision, houseboats, density, dredging, and marinas. Local units of government are authorized to prepare and adopt shoreline regulations consistent with state guidelines but only after preparing a comprehensive ***master program*** for shoreline management. This is essentially a comprehensive plan for the entire shoreline in each community. The master program must be coordinated with other land use plans, zoning and subdivision regulations, as well as with shoreline plans of adjoining communities. Once the master program and local regulations are certified as meeting

state policy requirements, they are adopted as state regulations, but administered locally.

The entire coastal shoreline is designated as being of statewide significance. Uses on these shorelines must favor public and long-range goals.

Four "environments" are used as the basis for organizing regulations. These are classified as "natural", "conservancy", "rural" and "urban". This approach recognizes the necessity of having suitable locations for some water dependent land uses .

All development must comply with the Act but only "substantial development" is required to get permits. Substantial development means any development exceeding $2,500 in value, or which materially interferes with the normal public use of the water or shorelines of the state. There are a few specific exceptions including farming. Permits are obtained at the local level, and go thru a complicated series of state mandated procedural requirements and a variety of local procedures. There appears to be little uniformity of process. The State Department of Ecology and the Attorney General are to be notified of all permits issued by a local government and may appeal any final order granting pemits within 30 days. Conditional uses and variances go thru standard local review procedures. There are no state established minimum setbacks or structure placement requirements. Instead, each local required master program and associated regulation must insure that it meets the protective objectives of the state statute and administrative guidelines. This lack of specificity has generated considerable litigation and variation in adopted standards.

For additional information contact:

Shoreland Division
Department of Ecology
Baran Hall
Mail Stop PV-11
Olympia, WA 98504

Many other states have developed sand dune and shoreline management programs including:

California	Sand dunes & shorelines
Florida	Sand dunes & shorelines
Maine	Sand dunes & wetlands
Maryland	Shorelines
Oregon	Sand dunes & shorelines
Virginia	Sand dunes & wetlands
Wisconsin	Shorelines

It is instructive to note that separate sand dune management programs are the exception. More comprehensive shoreline management programs are the norm. The three state programs described above each illustrate a different approach to management of the shoreline environment. Each has unique attributes worthy of consideration in the development of alternatives for Michigan. Table I illustrates some of the key aspects of

these programs. Each provides an important role for local government, but also places the primary responsibility for standard setting on the state.

Table I

SUMMARY OF THE STRUCTURE OF THREE STATE SAND DUNE/SHORELINE MANAGEMENT PROGRAMS

	Georgia	North Carolina	Washington
Extent of Regulation	100 mi of ocean shoreline inland to the landward boundary of the "dynamic dune field"	310 mi of ocean shoreline is classified into "areas of environmental concern" (AEC) and "ocean hazard areas". All dune lands are included	Entire shoreline to a depth of 200', farther for wetlands and sand dunes (to their full extent)
How Determined and Regulated	-- areas mapped by DNR -- by setbacks	-- mapped by DNR -- by setbacks	-- mapped by DNR -- by local setbacks (no minimum state established setbacks)
Activities Regulated	No construction or erection of a structure or alteration of the natural topography or vegetation is allowed without a permit; includes shore protection devices	--major developments (all multifamily units>4 units or 5,000 sq. ft) by state permits --minor devels.(everything else) by local permits	land use, docks, piers, bulkheads, structures, backfilling, land sub-division, density, dredging, marinas
Permits Required	Yes	Yes	Yes, but only for "substantial devels" unless local units require others
State Role	Handles all permits for shoreline and submerged lands structures and for dune dev. permits unless locals adopt their own	Establishes criteria, approves local ordinances, approves major devels	Establishes criteria for local "master progs" reviews and approves each one
Local Role	--can adopt local regs. which meet or exceed state law & subsequently be certified as a permit issuing authority --can have bldg. ht. & aesthetic controls	Same as Georgia	Must prepare a "master prog" (plan) for shoreline. Issues development permits & notifies state of each one

The activities subject to regulation are quite similar, however, only the Washington approach recognizes the important distinction between shoreline dependent land uses and all other uses. The North Carolina program is the most comprehensive, has the greatest setback requirements, and provides for state control over "major projects". The Georgia program uses a three person "Shore Assistance Commission" within the Georgia DNR to administer the program.

The actual structural setback, design and construction requirements of these three programs vary considerably based on local hazard conditions and the integrity of the soils. Concern is relatively uniform however, over the basic public health, safety and general welfare considerations. Aesthetic issues, while important, take a back seat to health and safety. In Michigan however, aesthetic issues are increasingly being brought forward by citizens and local officials in development review processes. Additionally, Michigan courts have recently been sympathetic to aesthetic controls as part of the local zoning scene (see Robinson Township v. Knoll, 410 Mich 293, 1981). The aesthetic qualities of sand dune and shore line environments are such that a special emphasis may be necessary to insure new efforts are initiated to protect the natural appearance and beauty of the shore.

State & Local Management Alternatives

The basic sand dune management alternatives that could be considered in Michigan appear to be: 1) state establishes regulations and administers a permit process; 2) state establishes a management program but it is entirely locally administered; or 3) various combinations of state-local shared responsiblity.

State Administered Program

A strictly state administered program in Michigan would require the establishment of either a new bureaucracy or more likely, additions to the existing one. The positive aspects of this approach include a statewide view of the resource, the development of uniform standards and procedures, and a greater chance for equal treatment of all applicants since the same standards and procedures would be employed. Some negative aspects of a state administered approach include the need to hire additional staff, the possibility that the approval process could be longer than if administered locally, and a perceived loss of local control over a part of the land development process.

Locally Administered Program

A strictly locally administered program could range from more specific permissive enabling authority allowing a community to regulate dune development if it wanted to (and no governmental entity to regulate if the authority to do so was not siezed), to mandatory requirements for local regulation based on rigid statutory standards (this raises Headlee Amendment concerns and would probably require state funding). The positive aspects of these approaches include maintenance of local land use control, and the possibility/probability that local governments would be controlling shoreline development more rigorously than they are at the present. Some negative considerations include difficulty in assuring uniform treatment or application of development regulations, the lack of a "watchdog" agency or authority (other than the Michigan Environmental

Protection Act), and the possibility that if regulation is optional, local governments may choose not to regulate at all. This may be a very real fear considering that in the 16 years since the passage of PA 245 of 1970 only eight local governments have adopted and had approved high risk erosion area regulations. While the Shorelands Protection and Management Act does not require local adoption of these regulations, it does authorize local administration if they are adopted. Where local high risk regulations are not adopted, the DNR administers the permitting process.

State-Local Shared Program

Many combinations of shared state-local responsiblity are possible. All three of the state programs reviewed above had the following common elements:

State

- declares sand dunes to be of statewide significance
- focuses protection on the long-term benefits rather than the short-term consequences
- recognizes the importance of protection of the natural character of the shoreline (not just sand dunes)
- focuses on nonstructural, regulatory solutions and development that is compatible with the shoreline environment
- does identification and mapping of areas subject to regulations
- establishes regulatory criteria
- reviews local plans and ordinances for consistency
- handles permits in communities that don't take on the responsibility
- or in the case of North Carolina, also handles projects above a certain size or impact (major developments)

Local governments

- prepare plans and regulations per statute and rules
- have option to take on or reject the regulatory responsibility
- may have more restrictive use, area, setback, height and aesthetic regulations than established by the state

Additionally, a shared state-local program could be structured:

- so local governments could enlarge the area of regulations but not decrease it
- so that appeals on any local decision could be taken to the state
- so that the state handles permitting during an interim period
  - or, automatically allowing local governments to administer unless they took action not to (thereafter they could add it to their plans and ordinance at their own pace); this would also require either an oversight or an appeal process to the state
- to provide for an intermediary level (i.e. county) to take on the responsiblity if municipalities and townships didn't.

Other techniques

Purchase/acquisition

Some shoreline areas, because of their unique natural characteristics, should be purchased outright, or have their development rights acquired either entirely or by a conservation easement. To accomplish this requires a thorough evaluation of all sand dune areas and a prioritization for determination of those of statewide significance. Areas with unique plant/animal communities, geologic or geomorphic conditions, special scenic attributes, or significant potential for recreational use should lead the list of sites for potential acquisition.

In a few cases it may be necessary to acquire sites because dune regulations, as applied to a particular parcel, leave no reasonable use alternatives. This is likely to occur only where existing parcels are extremely small and are very close to shore where erosive forces continue to diminish property size. One way to minimize this potential is to explicitly establish provisions for development on nonconforming lots of record as of the time the regulations went into effect. While avoiding the taking issue, it will also entrench areas where uses were established under less restrictive provisions. On the one hand, this could be politicallly unpopular and on the other hand, it may merely delay government involvement until natural erosion forces relocation or destruction of the lot or structure anyway. The North Carolina program has a particularly complete set of nonconforming use regulations.

Tax Incentives

If, after a comprehensive shoreline inventory, it is clear there are a lot of lands that are classified as having significant public values, but for which there are not sufficient funds for acquisition, then it may be desirable to offer various tax incentives for owners to either release or tie up the development rights. Existing provisions under the open space portion of the Farmland and Open Space Preservation Act would permit this in a sand dune area. However, because the local unit of government has to incur the lost property tax revenues, it is not as attractive a proposition as it would be if the state absorbed the cost.

As an alternative, additional tax credits could be offered for dune lands donated to the state or local government or to a nature conservancy. This direct form of monetary incentive is a tool that should only be used in unique circumstances. It would require authorizing legislation.

Education & Technical Assistance

Education as to the value, benefits and extent of sand dunes will be an important part of whatever planning and management strategy is adopted. It is doubtful that a broad enough segment of the general public or of local elected officials adequately understand at the present, what the unique attributes of Michigan's sand dunes are--and why they need significant protection.

Debate over a proposed protection statute will raise awareness, but much more needs to be done. Any management program needs to build in funding and staff for education. General public education and specialized education of local officials, planners and administrators will be critical. This will also require a well-staffed, broad-based, technical assistance

program. Local units of government will need detailed assistance with the preparation of revised plans, zoning regulations and with permit administration if they are given a major role in the management program. Most of this assistance will be concentrated in the early years of the program. An effective state-local management program with shared responsibilities, may well depend on the adequacy of technical assistance provided by the state.

Alternatives Considered by Advisory Committee

A Citizen's Sand Dune Advisory Committee was created in 1984 by the DNR at the request of the Governor to develop, review, and evaluate proposals for protection and management of sand dunes. A report was issued by the Committee on January 10, 1985. The Committee report recommended that legislation was needed to provide for the protection of sand dune formations that are in private ownership. A majority of the Committee agreed that the following concepts should be included in sand dune legislation:

1. A citizen committee of concerned interests should develop the criteria and land use standards required by the legislation, with public involvement.

2. The criteria and land use standards should be established through the administrative rule process.

3. Local units of government should have the opportunity to protect sand dunes through adoption of zoning regulations which equal or exceed the standards set forth in the administrative rules.

4. The Department of Natural Resources should review all local zoning ordinances to assure that they meet the established criteria and standards. The Department should provide assistance to local governments in developing zoning ordinances.

5. The Natural Resources Commission should adopt regulations applying to development and use of sand dunes where:

a. A local zoning ordinance does not meet the state standards, and the local government will not adopt an acceptable ordinance;

b. An acceptable local ordinance has not been adopted within 5 years; or

c. The local government elects not to adopt an acceptable ordinance.

6. An appeal process should be specified for local governments to contest a decision by the Department of Natural Resources.

7. During the period of time from enactment of the legislation to approval of the zoning ordinances, the local governments should notify the Department of proposed land developments in sand dunes. The Department should be allowed 60 days to respond to the proposal. If a local government does not have a zoning ordinance in effect, the Department should be able to review and approve projects during this interim time period.

One committee member, John M. LaRose, Executive Director of the Michigan Townships Association, dissented. His reasons were relayed in a letter dated December 17, 1984 to the Director of the Department of Natural Resources. The basic points of that letter are reproduced below:

"From the outset, there has been agreement within the Committee that sand dunes are a geographical phenomena and a limited natural resource which should be protected. MTA, recognizing sand dune formations as a truly unique and valuable part of Michigan's shoreline, has worked with the Committee toward a means of preserving this natural resource. It has never been our intention to block the process of giving sand dunes the protection they deserve."

"MTA supports the concept of a comprehensive sand dune protection and management policy. We also are in agreement with the Committee that this policy should be enacted through legislation."

"In its present form, the draft legislation takes control of zoning away from local units of government. By providing that the state can supersede local zoning in sand dune areas, the legislation essentially establishes state zoning. This is not acceptable to us."

"Currently, our records indicate that 44 townships have designated sand dune areas within them. We believe that the zoning of these areas should remain a function of these townships. Under the proposed legislation, if a township's zoning ordinance did not meet certain state criteria, the state would step in and zone the area. While we are assured that local units would be represented on the committee establishing this criteria, the state would still have final jurisdiction over zoning in sand dune areas. There is no guarantee that the state criteria would be acceptable to all of the townships involved."

"During the process of discussing this proposal, we continuously indicated our support of the concept that a zoning ordinance should be in place in sand dune areas. To this end, we were willing to allow the state to step in when a local unit did not establish their own ordinance. Furthermore, the local units are very willing to accept recommendations, suggestions and comments regarding individual zoning ordinances from the state. We cannot, however, advocate allowing the state to zone sand dune areas when a township has established its own zoning ordinance."

"We cannot support legislation which will take away local control."

The MTA continues to maintain this position and currently opposes HB 5667 which is somewhat modeled after the Advisory Committee's recommended legislative structure (see Sept. 1986 Capitol Currents, MTA, Vol.6, #11, p.2). Under HB 5667, local units would have until 1990 to adopt protective legislation, if they failed to do so, then the State through the DNR, would enforce dune regulations.

The MTA position would appear to suggest that any zoning regulation adopted by a township and applicable in a designated sand dune area should apply irrespective of the degree of protection afforded, simply because a township had zoned. Under this position, the only time state

imposed regulations would apply is when there was no local zoning in effect.

While this position maintains maximum flexibility for individual townships, it fails to recognize the need to insure protection of the long-term statewide interests in sand dunes. It also creates the obvious possibility that a township would someday authorize a land use that is extremely destructive of a sand dune, but which would not be subject to dune protection requirements because the township chose not to include that use in its dune protection regulations. A similar destructive result could occur by the grant of variances from restrictive provisions. Either of course, would fail to achieve statewide dune protection objectives and would place the burden on other persons to take court action, probably relying on MEPA, to litigate any local decisions that were destructive of dune environments.

If, as this report suggests, sand dunes are imbued with significant public interests to be worthy of special consideration in development review procedures, then it will be imperative that some entity, whether it be the state, region, county or municipality be charged with the responsiblity and granted the authority to insure that certain minimum protection standards are met. And if they fail to do so, that another level of government be charged with the task and granted the authority to act.

Nevertheless, protective standards should provide maximum flexibility to local governments to fashion regulations within the scope of protective legislation. If a local government did not take action to protect dune lands, the next "higher" unit of government (township → county → state), should be authorized to assume that responsiblility. Maximum flexibility for local governments will place a greater administrative burden on the watchdog state agency. However, given Michigan's tradition of local control and the strong local opposition to direct state land use control, this tradeoff may be both necessary and desirable. Additionally, allowing local units of government a number of options for achieving a desired level of sand dune protection is likely to create the least disruption of the local planning and zoning program, and hence be greeted with greater enthusiasm than might otherwise be the case. An effective sand dune management program will require a partnership between state and local authorities. As in any partnership, duties and responsibilities must be clearly defined at the outset and authority must exist for one partner to act if the other fails to adequately do so.

"As noted previously, environmental area regulations have not as yet been litigated in Michigan. Upholding such regulations would, however, be consistent with prior decisions concerning Great Lakes submerged lands and the state Environmental Protection Act. The national trend in these type of cases strongly suggests that environmental regulations in sensitive shoreland areas will be upheld against challenges based on the taking issue. Utilizing a nuisance abatement approach, the Wisconsin Supreme Court declared in Just v. Marinette County:
".....An owner of land has no absolute and unlimited right to change the essential natural character of his land so as to use it for a purpose for which it was unsuited in its natural state and which injures the rights of others...""

"Legal Analysis of Local Shoreland Ordinances (Final Draft)", by Jerry Mitchell, Staff Attorney, CUPPAD Regional Commission, for the DNR, May 1978, p.55.

Chapter Six

UNIQUE ADMINISTRATIVE PROBLEMS

Allowing Municipalities to Participate That Are In Undesignated Sand Dune Areas

Because of the technical detail and professional approach used as the basis for barrier dune designations under PA 222, and because lands within the barrier dune are the most sensitive to alteration, it seems logical that the barrier dune should serve as the geographic basis of special sand dune regulations. Unfortunately however, only shoreline areas designated under PA 222 have had the barrier dune boundary mapped. There are numerous other areas that may qualify as sand dune areas using slightly different criteria for designation. Present criteria should be evaluated for appropriateness, revised as necessary, and any new areas identified as a result should be mapped, designated, and have the barrier dune delineated. Until this is completed, local units of government should be authorized to identify and regulate development on sand dunes not currently regulated under PA 222.

Interim Controls

Depending on the legislative structure for sand dunes regulation, it may be necessary to authorize the imposition of state controls over sand dune development until local regulations could be adopted or put into place. The Citizens' Sand Dune Advisory Committee and HB 5667 both propose such an approach. One simple form of interim control worth considering is for the statute to establish a minimum setback from the edge of the beach, for all single family residential structures of a specified minimum lot size, until the local unit adopted its own ordinance. No other use would be permitted for a period of time. This would provide an incentive for local control yet also provide a modicum of protection. In a community with zoning already in place, the statute could allow any use permitted in the applicable zoning district, but placement of structures at the statutory setback line until a local sand dune development provision was enacted that met state standards.

Providing Local Incentives for Regulation

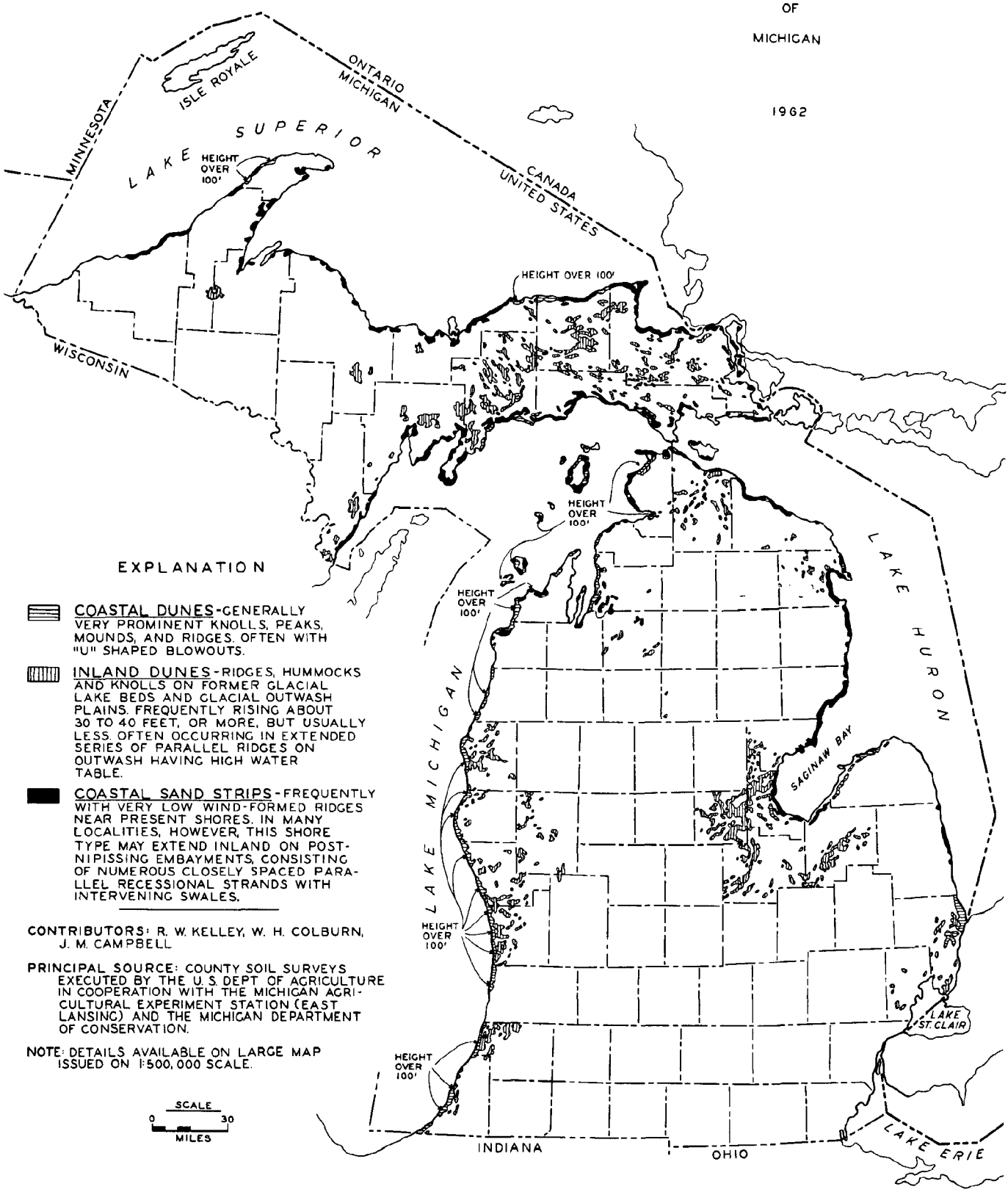
If the regulation of sand dunes is an optional local responsibility, there is a strong possibility that many communities may choose not to accept it, thereby leaving the administrative task and any associated "grief" to another governmental level. This has occurred with sand dune management in Georgia and with the high risk erosion program in Michigan. For some communities, the opportunity to retain local control through zoning will be incentive enough. The offer of training and technical assistance from state officials, while essential to the success of such a program, may provide an incentive for other communities to adopt local dune regulations. Additional incentives however, such as provision for the collection and retention of review fees, should also be seriously considered if broad local participation is to be achieved.

"Long ago a mother bear and her two cubs were driven into Lake Michigan by a raging forest fire. They swam and swan, but soon the cubs tired and lagged far behind. Mother bear reached the shore and climbed to the top of a bluff to watch and wait for her offspring. But the cubs drowned. Today "Sleeping Bear," a solitary dune overlooking Lake Michigan, marks the spot where mother bear waited. Her hapless cubs are the Manitou Islands." (Chippewa Indian legend)

Taken from a brochure/map of Sleeping Bear Dunes National Lakeshore, Michigan, National Park Service, U.S. Department of the Interior.

SAND DUNES OF MICHIGAN

1962



EXPLANATION

COASTAL DUNES-GENERALLY VERY PROMINENT KNOLLS, PEAKS, MOUNDS, AND RIDGES. OFTEN WITH "U" SHAPED BLOWOUTS.

INLAND DUNES-RIDGES, HUMMOCKS AND KNOLLS ON FORMER GLACIAL LAKE BEDS AND GLACIAL OUTWASH PLAINS. FREQUENTLY RISING ABOUT 30 TO 40 FEET, OR MORE, BUT USUALLY LESS. OFTEN OCCURRING IN EXTENDED SERIES OF PARALLEL RIDGES ON OUTWASH HAVING HIGH WATER TABLE.

COASTAL SAND STRIPS-FREQUENTLY WITH VERY LOW WIND-FORMED RIDGES NEAR PRESENT SHORES. IN MANY LOCALITIES, HOWEVER, THIS SHORE TYPE MAY EXTEND INLAND ON POST-NIPISSING EMBAYMENTS, CONSISTING OF NUMEROUS CLOSELY SPACED PARALLEL RECESSIONAL STRANDS WITH INTERVENING SWALES.

CONTRIBUTORS: R. W. KELLEY, W. H. COLBURN, J. M. CAMPBELL

PRINCIPAL SOURCE: COUNTY SOIL SURVEYS EXECUTED BY THE U. S. DEPT OF AGRICULTURE IN COOPERATION WITH THE MICHIGAN AGRICULTURAL EXPERIMENT STATION (EAST LANSING) AND THE MICHIGAN DEPARTMENT OF CONSERVATION.

NOTE: DETAILS AVAILABLE ON LARGE MAP ISSUED ON 1:500,000 SCALE.

SCALE
0 30
MILES

PART THREE - LOCAL EFFORTS
Chapter Seven

CASE STUDIES

Following are three brief summaries of communities along the Lake Michigan shore. These case studies are designed to illustrate the range of landscapes, communitys, ownership patterns and nature of development that are found along the shoreline. While these case studies are not representative of all communities along the shore, they do illustrate sufficient diversity to help the reader better understand some of the local issues that must be addressed in effective sand dune management. Accompanying each case description are maps illustrating land ownership and dune geomorphology, except in Arcadia Township where these mapping studies have not yet been completed (because its dune lands have not been designated). These case examples will be more meaningful once recent aerial photos have been interpreted and current land uses mapped. This recent information, based on spring 1986 flights, can then be compared with existing computerized data for the extent of shoreline development in 1968 and 1978 to clearly show change in the extent of development in sand dune areas.

Covert Township, VanBuren County
Covert Township lies between Benton Harbor and South Haven in Van Buren County. The I-196 freeway parallels the shoreline about one mile inland just east of the Blue Star Highway. The Township is home to the Van Buren State Park and the Palisades Nuclear Power Plant. The population of the Township was 2,706 persons in 1980. Fifty-four percent of the township population is black. Twenty-nine and one-half percent of the township residents had an income below the poverty level in 1979. The principal economic base is the nuclear power plant and a high concentration of fruit farms, notably blueberries.

There are relatively few parcels along the shoreline. Most are long and narrow. A few large ones remain undeveloped. See Map A.

The shoreline is characterized by high relief dunes with many forested blowouts and large areas of very low density residential development. The entire shoreline consists of sand dunes in the series I designations under PA 222. The inland depth of the dunes is considerable, extending nearly one mile in places. See Map B.

The Covert Township Master Plan was prepared in May of 1984. The plan depicts all of the land lakeward of I-196, except for one neighborhood unit, as low density residential. *"The intent is to preserve the dunes region as much as possible for its scenic and recreational value for the Township, County and region."* The special character of the area for passive, low intensity use was also alluded to in the recreation section of the plan.

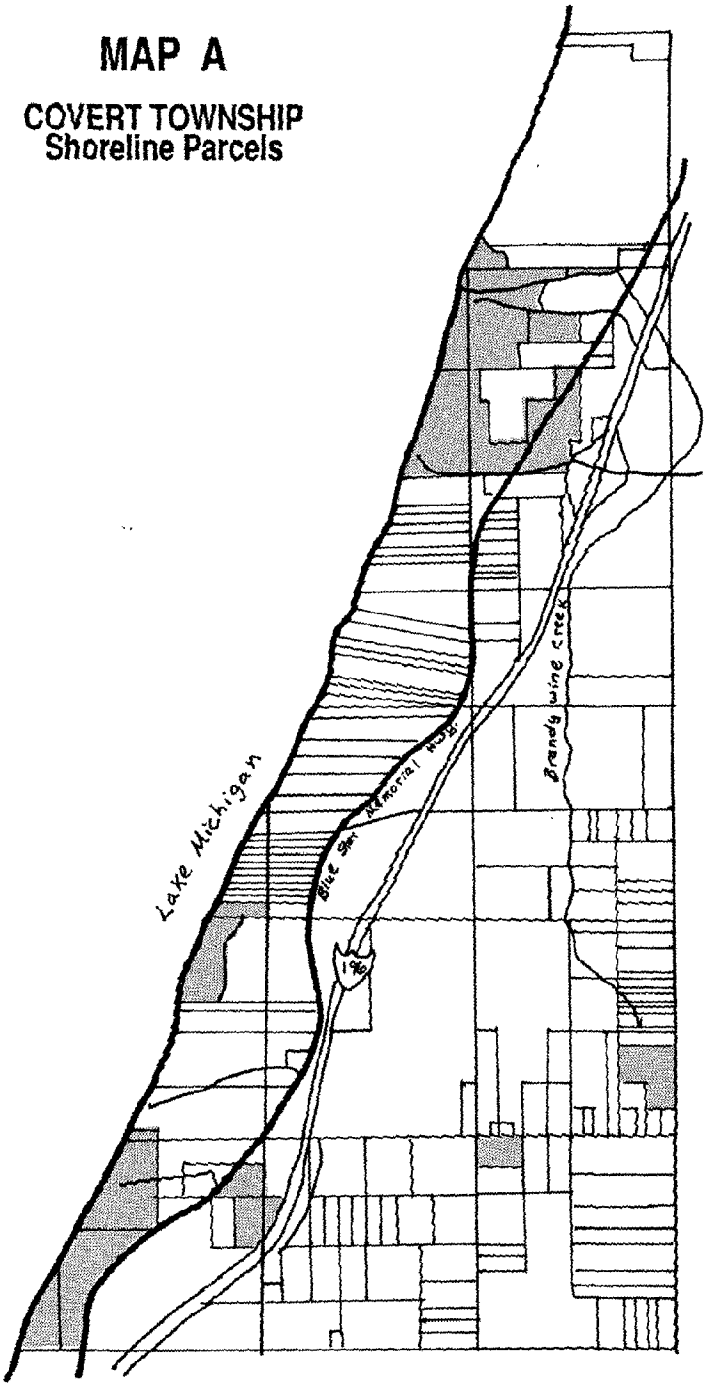
"We have received many complaints from residents along the lake who are losing land and being forced to move their homes back or abandon them all together.

We feel the setbacks allowed by DNR are lenient when considering the losses of the past 20 years. Some of our residents report their home lost as much as 800 feet of land to the lake."

Letter from Robert Koehs, Zoning & Building Administration, Port Sheldon Township, West Olive, MI to Christy Fox, DNR, Division of Land Resource Programs, January 23, 1986.

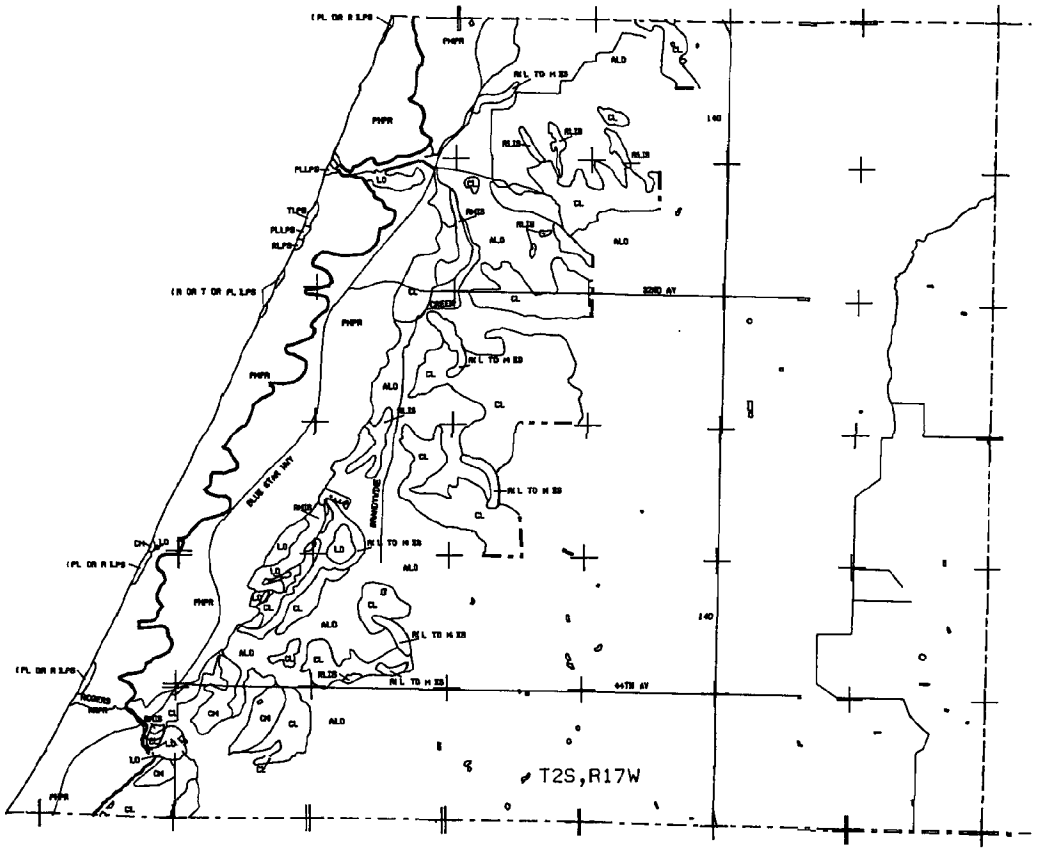
MAP A

COVERT TOWNSHIP
Shoreline Parcels



MAP B

SHORELINES
COVERT TOWNSHIP
T2S,R17W
DUNE GEOMORPHOLOGY



DUNE GEOMORPHOLOGY
CLASSIFICATION CODES

FIRST LETTER (DUNE FORM)

P - PARABOLIC DUNE
R - LINEAR DUNE RIDGE
T - DUNE TERRACE
D - DOMAL DUNE
C - COMPLEX DUNE FIELD
L - INTER-DUNE LOWLAND
F - DUNE FLAT
A - MARGINAL SAND APRON
PL- DUNE PLATFORM

SECOND LETTER (RELATIVE RELIEF)

L - LOW (0-20')
M - MODERATE (20'-80')
H - HIGH (80'+)

THIRD LETTER (ORIENTATION)

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N - NORMAL (PERPENDICULAR)
A - ARCUATE
I - IRREGULAR

FOURTH LETTER (ARRANGEMENT)

S - SINGULAR
R - REPETITIVE (MULTIPLE)

RELATION OF DUNE FORM
TO SUBSTRATUM FORMATION

XXXX - NON-ELEVATED (A)
XXXX - PERCHED (B)
XXXX/ - OVERRIDING (C)

(A) NON-ELEVATED DUNES ARE REPRESENTED BY ONLY THE FOUR (OR LESS) CODE LETTERS.

(B) PERCHED DUNES ARE REPRESENTED BY FOUR (OR LESS) CODE LETTERS ABOVE A NUMBER INDICATING HEIGHT ABOVE MEAN SEA LEVEL OF THE UNDERLYING NON-DUNE FORMATION.

(C) OVERRIDING DUNES ARE REPRESENTED BY FOUR (OR LESS) CODE LETTERS FOLLOWED BY A SLASH (/).

SAND DUNE LINE CODES:

LINE	SYMBOLIZATION
— —	DESIGNATED SAND DUNE AREA
—— -	METES AND BOUNDS DESCRIPTION OF AREA 2 MILES INLAND FROM A GREAT LAKE
- - -	SHORELAND LIMIT OF SAND DUNES 2 MILES INLAND FROM ORDINARY HIGH WATER MARK
—— -	PUBLIC LANDS BOUNDARIES
——	BARRIER DUNE BOUNDARY

A Township Zoning ordinance was subsequently adopted, based on the plan, with a Shorelands One-Family Residential District. All lands between the lakeshore and the Blue Star Highway were put into this category. The district provides for a minimum lot size of 1 dwelling unit per five acres and a minimum lot width of 200 feet in keeping with the environmental sensitivity of the area. Currently, the Township is considering an amendment to the Planned Unit Development (PUD) regulations to make them applicable in the entire 7 mile shoreland area. The PUD option is designed to increase the degree of Township control over the design and use of sand dune lands . The Planning Commission feels that having a PUD alternative in the Shorelands District will not be as destructive to the environment as would development by conventional platted subdivisions. In order to develop under the proposed PUD provisions, the property must be at least 20 acres in size. Additionally, the Planning Commission feels it is necessary to offer a density bonus in order to encourage developers to choose the PUD option. The density bonus would increase the permitted density from one dwelling unit to three dwelling units/five acres.

Significant controversy has arisen over the proposed density increase because of a developers proposal to establish 36 dwelling units on a key 40 acre parcel in the middle of a 700 acre tract with many unique natural features (see Forest Dunes case example described in Chapter One). The main opposition to this ordinance change comes from the Forest Dunes Association, a property owners group encompassing the land in which the parcel in question is located. The homes in this tract are mostly seasonal dwellings at an average density of one dwelling unit/seventeen acres.

This ordinance change has great significance outside the Forest Dunes area as well, since there are three other large shoreline tracts (100+ acres) that are undeveloped (except for a single dwelling). Township officials feel that about 50% of the shoreline is underdeveloped and is likely to be subject to considerable development pressure in the future.

While citizen awareness of the uniqueness of the dune environment is growing, as is awareness on the Township Board, awareness is quite high among staff in several of the county agencies. If awareness were measured only in terms of the existing Township zoning requirements, then the Township would be near the top of shoreline communities, if the results of two surveys of local shoreline regulations are accurate. For example, Covert Township has the most restrictive regulations currently known to be in place concerning "permitted by right" land uses and density, of any reviewed in this project. Single family homes and parks are the primary uses permitted by right. Setbacks must meet those identified by the DNR in high risk erosion areas, and the natural vegetation and character of the shoreline must be retained to a distance 200 feet inland. Not more than ten percent of the land area can be cleared within this protective vegetation setback.

Several other uses are permitted by conditional use permit including utility and public service buildings, private noncommercial recreation areas, and golf courses (and if the PUD provisions are approved, multifamily dwellings). These uses could be very destructive if improperly sited;

especially if site plan review is not required, and if no special attention is given to careful design of access roads.

However, given the previous description of the uniqueness of the shoreland in at least, the Forest Dunes area, even the current low density requirements of the Shorelands District may not be adequate to protect the sensitive dune resources in Covert Township. This points out the obvious need for a systematic evaluation of the entire shoreline to rate and rank the natural features and uniqueness of the dune environments. The low density zoning requirements in Covert Township may help "hold the line", but it is hard to say without further comparative information, that they are sufficient in light of the unique dune resource that appears to exist in the Township.

Norton Shores, Muskegon County

The City of Norton Shores is an affluent, white collar, southern Muskegon suburb with a population of 22,025 in 1980. It is the home of the P.J. Hoffmaster State Park, the Marantha Bible Conference and Mount Garfield, the site of a biannual Motorcycle Hill Climb. There are a number of large parels along the shore north of the State Park that could be characterized as underdeveloped (see Map C). The entire shoreline of the City includes sand dunes included in the Series I designations under PA 222. (See Map D).

The 1981 Norton Shores Master Plan (whose front cover shows a two story house carefully set back among trees behind a low dune area) carefully recognizes the importance and sensitivity of the dune environment, as well as related inland lake and wetland environments. The plan notes:

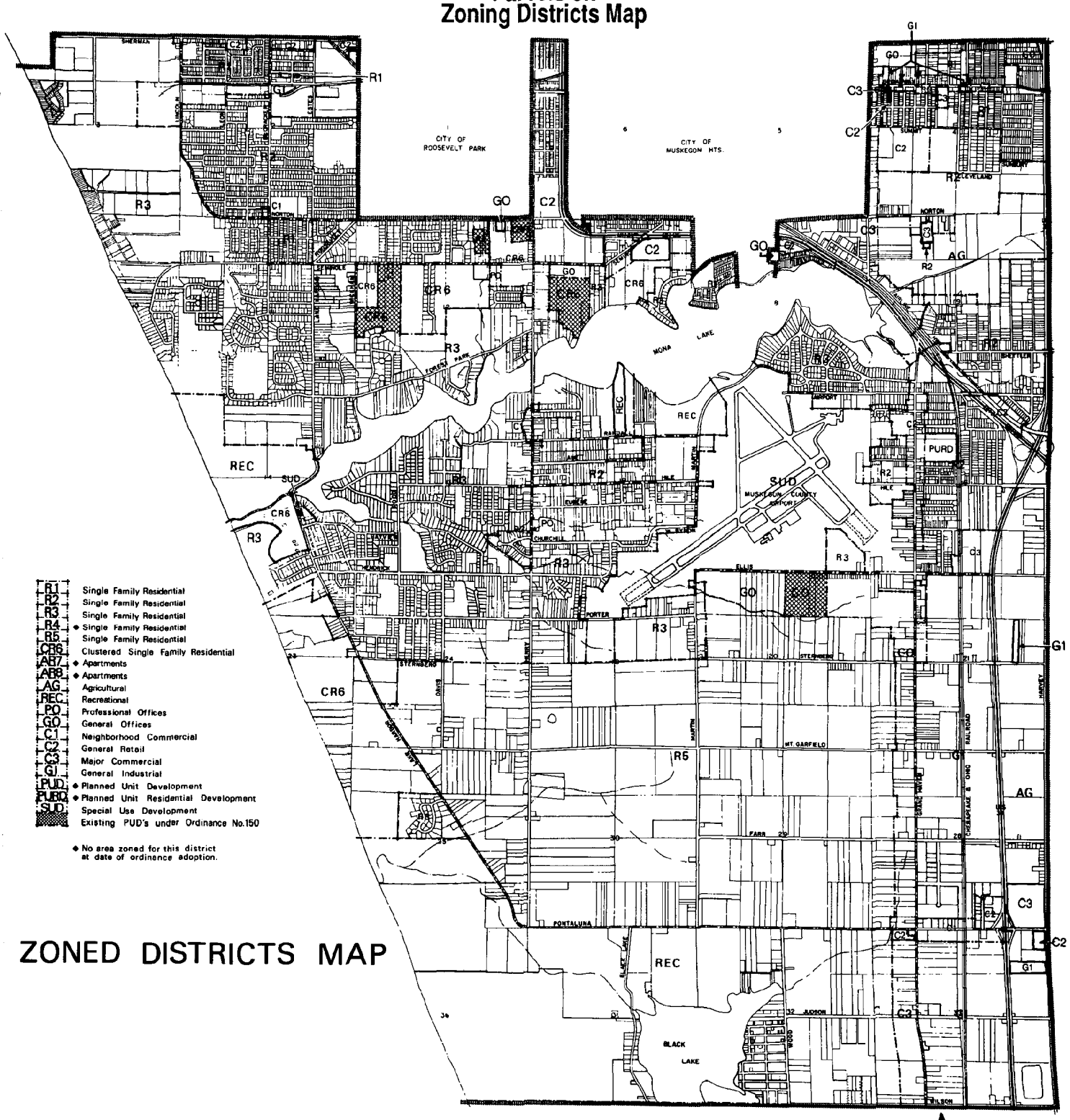
> *"The susceptibility of the dunes to erosion, as well as that of the shorelines of the inland lakes, is a familiar problem. There needs to be found a balance between the use of these land resources by the present population and preserving their value and potential use for the future. If the effect of market forces is to discount the future and disregard the social value of these resources, then government intervention on the part of society and in the interest of the City's future, not presently considered in the economic calculus, is necessary and justifiable."*

The plan places the entire 13 mile sand dune area into a recreation and open space (low density development) category.

In 1981, the City also updated its zoning ordinance using an overlay zone technique to identify sensitive shoreland resources. (See Map E). The ordinance closely follows the plan. Included as separately defined features are areas subject to high risk of erosion (the entire Norton Shores shoreline), a Lake Michigan Dunes Management Zone (which generally follows the barrier dune boundary under PA 222), and a Mona Lake Shoreland Zone. Other sensitive resources including Black Lake, a flood hazard zone, a high watertable zone and an airport approach zone are also separately identified, mapped and subject to special regulations.

MAP C

NORTON SHORES
Parcels on
Zoning Districts Map



ZONED DISTRICTS MAP

Adopted June 16, 1981
Effective June 26, 1981
(Rev. 9/85)

0 1000 5000 10000

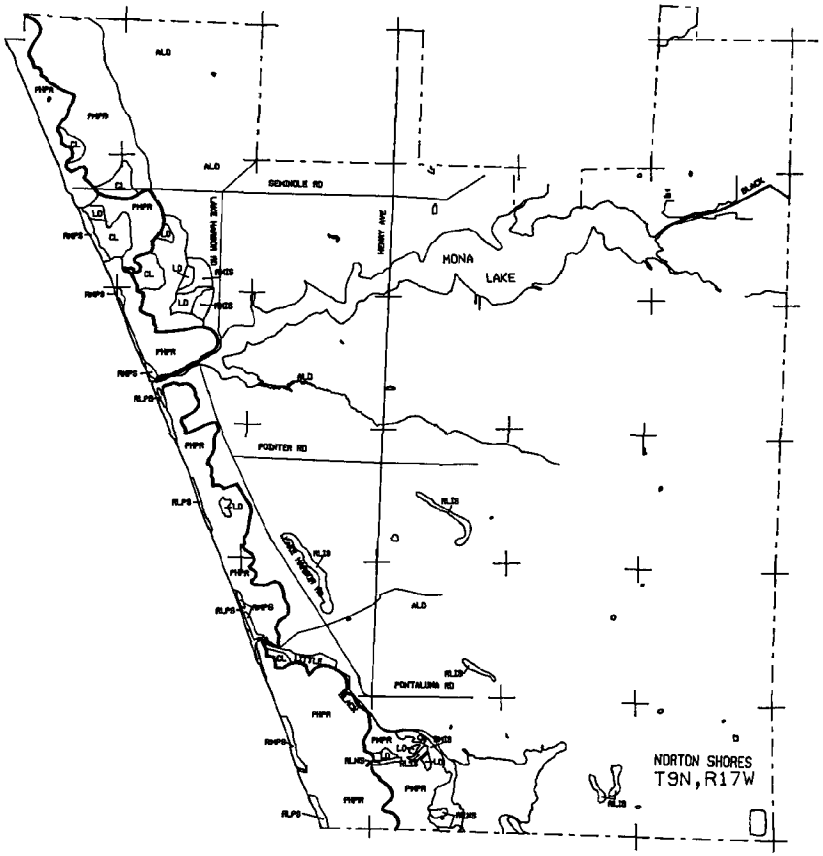
NORTON SHORES, MICHIGAN

LEO JAKOBSON AIP AICP CONSULTANT IN URBAN PLANNING MANAGEMENT AND DESIGN MADISON, WISCONSIN

MAP D

SHORELINES

NORTON SHORES TOWNSHIP
T9N,R17W
DUNE GEOMORPHOLOGY



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- A - MARGINAL SAND APRON
- PL- DUNE PLATFORM

SECOND LETTER (RELATIVE RELIEF)

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- M - MODERATE (20'-80')
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- A - ARCUATE
- I - IRREGULAR

FOURTH LETTER (ARRANGEMENT)

- S - SINGULAR
- R - REPETITIVE (MULTIPLE)

RELATION OF DUNE FORM
TO SUBSTRATUM FORMATION

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- XXXX - PERCHED (B)
- XXXX/ - OVERRIDING (C)

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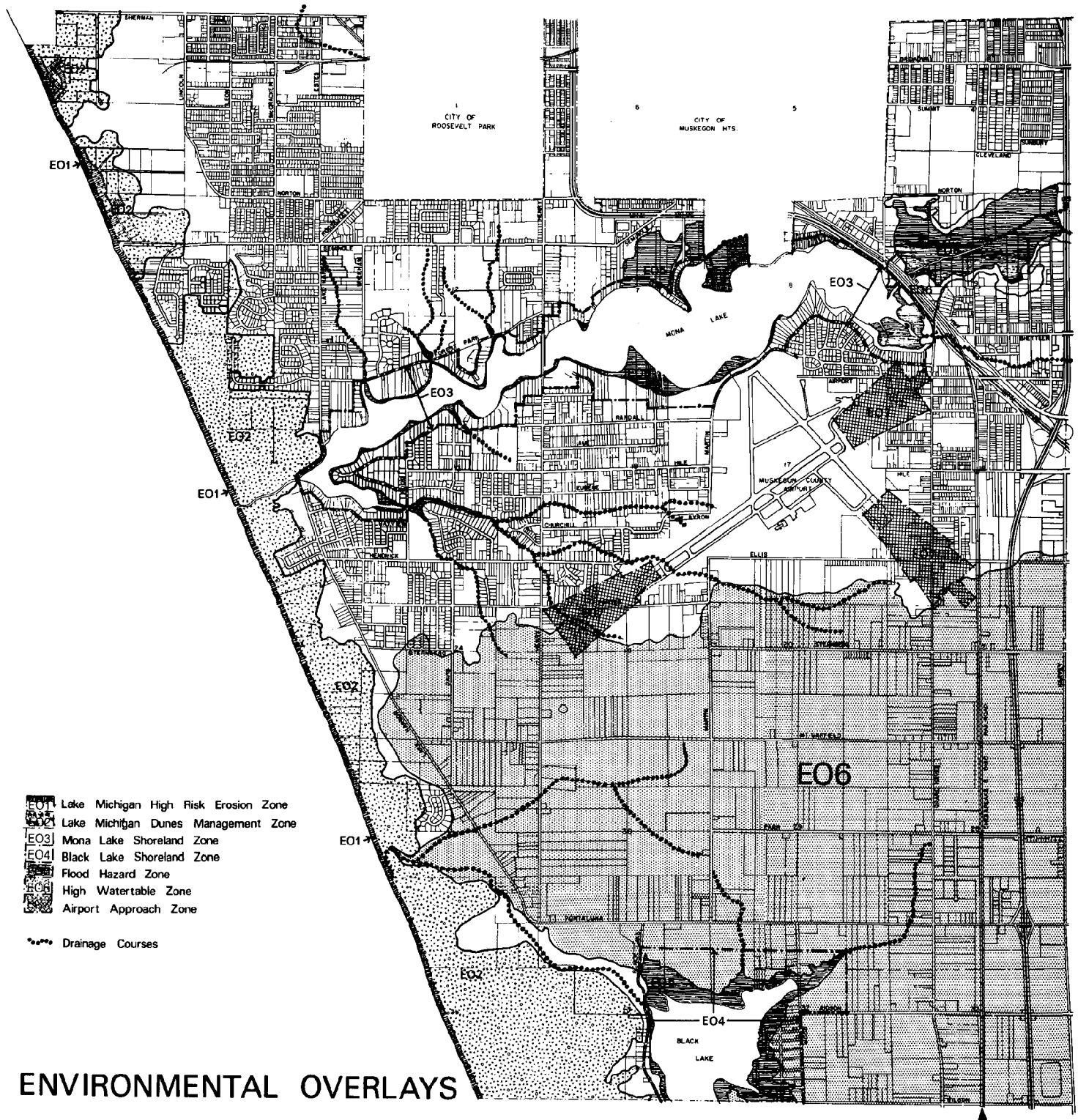
— -	PUBLIC LANDS BOUNDARIES
——	BARRIER DUNE BOUNDARY

MAP E



ENVIRONMENTAL OVERLAYS

Adopted June 16 1981
Effective June 26 1981

0 1000 5000 10000

NORTON SHORES, MICHIGAN

LEO JAKOBSON AIP SAIA CONSULTANT IN URBAN PLANNING MANAGEMENT AND DESIGN MADISON, WISCONSIN

Soil types are used as the basis for determining the extent of the Lake Michigan Dunes Zone and provide the primary basis for the limitations imposed. Development on slopes of more than 12% and developments that would negatively affect native vegetation are severely restricted. Setbacks along Lake Michigan are established at a minimum of 120 feet from the bluffline, this applies to principal structures, wells and septic systems but not to those accessory structures which can be easily moved. No structures are permitted to be built on the windward slopes of primary dunes, and building pads are limited to 3,000 square feet. Separate provisions regulate mining of sand outside the barrier dunes.There are no separate zoning provisions for areas subject to high risk of erosion. However, the uniform munimum setback from the bluffline of 120 feet is greater than the high risk erosion setbacks required under the Shorelands Protection and Management Act.

There are many large parcels along the shore north of P.J. Hoffmaster State Park, west of Lake Harbor Drive and south of Mona Lake that are currently in a very low density residential use. Because of the potential for more intensive development, these areas are zoned CR-6, a clustered single-family residential zoning classification that requires PUD-like approval. The minimum lot size is 1 acre, the minimum lot width is 200 feet, and there is a maximum density of four units/acre with the actual amount in sensitive dune environments determined by the Planning Commission on a site by site basis. There are also special controls over destruction of natural vegetation. With the exception of one large parcel, the shoreline north of the City park is characterized by small residential lots that are already built upon. Thus, sand dunes development is most likely in the southern portion of the City in the area zoned for cluster development. The large parcels in this area would be perceived by many as "underutilized" and market forces may pressure conversion from the existing low density single family uses (and some institutional uses) to more intensive uses.

The dune development regulations in the Norton Shores Zoning Ordinance are, along with those in Laketon Township, also in Muskegon County, are the most comprehensive ones identified in this study. While the development density is much higher than that permitted in Covert Township, there are three significant differences. First, the dune environment is quite different in Norton Shores. There is more variation in dune relief closer to the shore, less forest cover, and not nearly as steep a bluff right on the shore. Second, more land has already been converted from its natural state to other uses. Third, the City plans to extend sewer and water services to most of the unserved properties along the shore. Public utilities will reduce the threat of groundwater contamination, but are also likely to increase the demand for a higher density of development in the dunes. The CR-6 development density permitted in the Norton Shores ordinance is more reflective of the market pressure in a suburban area, yet it is still four times less than is permitted in other single family residential districts in the City, and thus is perceived as being quite restrictive. The real questions of *"Should certain dunes be developed?"* and if so, "*How much density can dunes of a particular type tolerate without significant destruction*?" remain unanswered questions in Norton Shores and elsewhere.

In general, proposed development which is reviewed pursuant to the site plan review standards of the Norton Shores ordinance, and/or the CR-6 cluster development provisions, should meet most of the concerns expressed in this report for sand dune development; provided that the basic permitted densities are reasonable to begin with. Certainly the City is to be commended for taking such a comprehensive approach to sensitive environmental resources before the need to do so has become so widely recognized. The density standards themselves however, should be reviewed once more technical information regarding the natural characteristics of dune environments and their appropriateness for particular uses has been developed.

This involves a three step process. First, all dunes must be identified according to a uniform definition and their physical attributes documented. Second, all dunes must be evaluated in light of criteria (as yet to be developed) which reflect a range of public values in the appropriate use of particular dune lands. Third, specific development standards need to be established for those dunes in which development is to be permitted. Such standards would establish the extent of development that can occur without significantly altering or destroying important natural resource values. Each step relies on the collection of important information which is not yet available for all dune lands.

Citizen sensitivity to development in sand dunes seems to be growing in Norton Shores with the City's acquisition and improvement of Lake Harbor Park, formerly the site of extensive sand mining. A recent proposal to add additional dwelling units in dunes on the site of the Maranatha Bible Conference generated some citizen concern over dune destruction. Additional sensitivity could be expected to grow with the implementation of the City's shoreland zoning regulations.

Arcadia and Onekama Townships, Manistee County

Arcadia and Onekama Townships adjoin one another along the lakeshore north of the City of Manistee in Manistee County. They also share the same school district, recreation association, and telephone exchange. They have characteristics similar to many of the rural northern townships along the shore. The population in Arcadia Township in 1980 was 641 permanent residents, in Onekama Township and the Village it was 1,444. The principal economic base is tourism, summer resort residents, and fruit farming. They both also serve as home for many who work in Manistee.

The geography of the area is gently rolling with heavy forest cover and many scenic vistas along county and state roads. Coastal lands range from clay banks to sand dune, with dune heights reaching 234 feet. There are also extensive stretches of low dunes. Only Onekama has sand dunes which are designated under PA 222. However, there are undesignated sand dunes south of the channel at Portage Lake in Onekama Township and south of the Arcadia Lake channel in Arcadia Township. (See Map F).

Portage Lake and Arcadia Lake are both lakes composed of former Lake Michigan bottomland. Each drains into Lake Michigan and has adjoining wetland areas. The Village of Onekama is home to 582 people at the northeastern end of Portage Lake.

Wetland soils and loamy-sand soils dominate each township. The soils are generally rated as good for supporting timberlands of regional and national significance. A large amount of nationally unique farmland soils predominate inland of the coastal dune ridge. These lands are largely in orchard production. Roughly one square mile of coastal and connected inland parcels are enrolled in the Farmland and Open Space Preservation Program in Arcadia Township, and another 86 acres are enrolled in Onekama Township in the Open Space provisions of Act 116 of 1974.

The Michigan Natural Features inventory has identified several special plants and plant communities along the shoreline and near shore area. Manistee County plans depict coastal lands in both townships as either residential or "*special and unique environments.*" The Nature Conservancy owns dune land without lake frontage in Onekama Township.

There are few recorded subdivisions in either township. (See Map G). Those established tend to be clustered around the north shore of Arcadia and Portage lakes, along the sand dunes in Onekama Township and along the dunes north and west of Arcadia Lake. There are many undeveloped platted lots in Onekama Township just north of Portage Point (originally a summer resort association densely platted during the first twenty years of this century). There is also unplatted land along the shore in Arcadia Township. In general, lakeshore parcels outside of platted subdivisions are very large, especially in contrast to Covert Township and Norton Shores.

Dwelling units/square mile tend to be very, very low with less than 19 except around the lakes and dunes where they increase to 200+ (still less than 3 units/acre). Housing units in Arcadia Township increased by 33% from 1970 to 1980 (from 329 to 438) and by 20.3% (from 869 to 1045) in Onekama Township. Onekama Village grew by 18.3% from 268 to 317 dwelling units. Forty-two percent of the housing in Arcadia Township was seasonal in 1980, while 48% was seasonal in Onekama Township and 26% in Onekama Village.

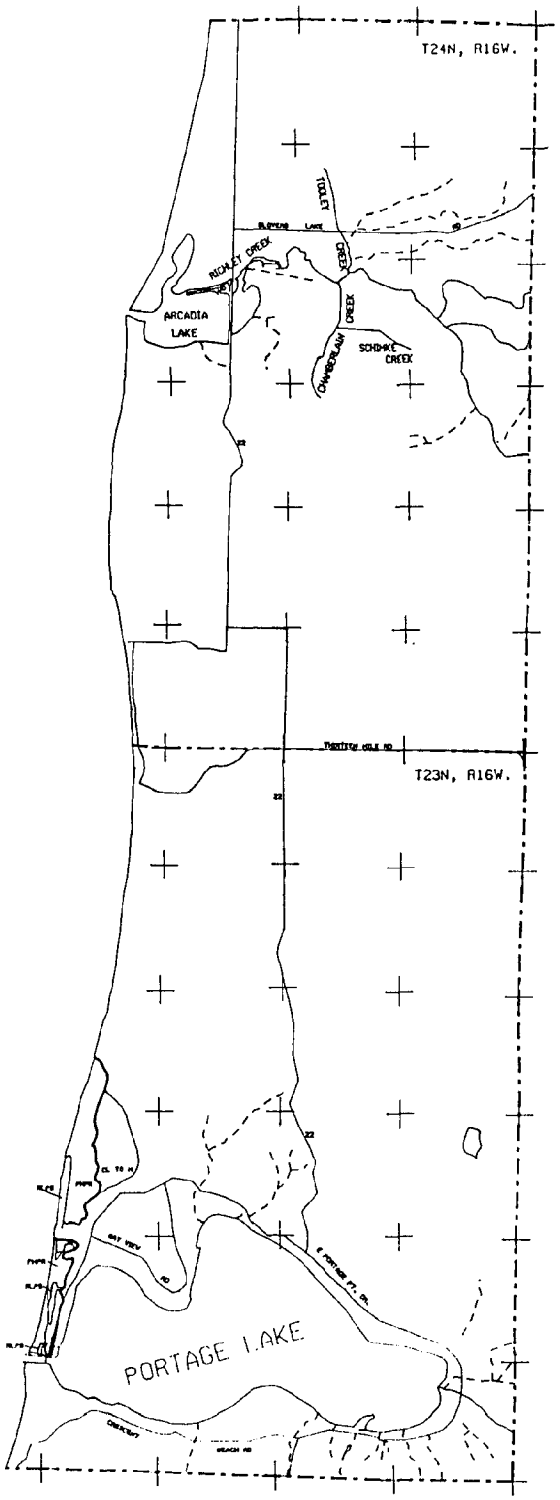
One recently initiated development is a tract of 10.1+ acre lots in section 21 of Arcadia Township. The northern portion of this tract includes sand dunes. As the lots are long and narrow and the access road splits them about 1300 feet back from the shoreline, the potential for additional splits in another decade is great. Local officials expect additional residential resort development along the lakeshore.

Onekama is beginning work on a new future land use plan while Arcadia has no plan. The Onekama Township Zoning Ordinance (current version was adopted in 1980) depicts all coastal lands in one of three Resort-Residential districts. Minimum lot sizes vary from 15,000 square feet to one acre, and minimum lot widths are 100 feet. Uses permitted are primarily single family residential, and associated seasonal and recreation uses such as storage for boats, docks, parks and playgrounds, marinas, motels, churches and schools.

MAP F

SHORELINES

ARCADIA/ONEKAMA TOWNSHIP
T24N,R16W/T23N,R16W
DUNE GEOMORPHOLOGY



DUNE GEOMORPHOLOGY
CLASSIFICATION CODES

FIRST LETTER (DUNE FORM)

- P - PARABOLIC DUNE
- R - LINEAR DUNE RIDGE
- T - DUNE TERRACE
- D - DOMAL DUNE
- C - COMPLEX DUNE FIELD
- L - INTER-DUNE LOWLAND
- F - DUNE FLAT
- A - MARGINAL SAND APRON
- PL- DUNE PLATFORM

SECOND LETTER (RELATIVE RELIEF)

- L - LOW (0-20')
- M - MODERATE (20'-80')
- H - HIGH (80'+)

THIRD LETTER (ORIENTATION)

- P - PARALLEL
- N - NORMAL (PERPENDICULAR)
- A - ARCUATE
- I - IRREGULAR

FOURTH LETTER (ARRANGEMENT)

- S - SINGULAR
- R - REPETITIVE (MULTIPLE)

RELATION OF DUNE FORM
TO SUBSTRATUM FORMATION

- XXXX - NON-ELEVATED (A)
- XXXX - PERCHED (B)
- XXXX/ - OVERRIDING (C)

(A) NON-ELEVATED DUNES ARE REPRESENTED BY ONLY THE FOUR (OR LESS) CODE LETTERS.

(B) PERCHED DUNES ARE REPRESENTED BY FOUR (OR LESS) CODE LETTERS ABOVE A NUMBER INDICATING HEIGHT ABOVE MEAN SEA LEVEL OF THE UNDERLYING NON-DUNE FORMATION.

(C) OVERRIDING DUNES ARE REPRESENTED BY FOUR (OR LESS) CODE LETTERS FOLLOWED BY A SLASH (/).

SAND DUNE LINE CODES:

LINE	SYMBOLIZATION
— — —	DESIGNATED SAND DUNE AREA
— · ·	METES AND BOUNDS DESCRIPTION OF AREA 2 MILES INLAND FROM A GREAT LAKE
- - - -	SHORELAND LIMIT OF SAND DUNES 2 MILES INLAND FROM ORDINARY HIGH WATER MARK
— · —	PUBLIC LANDS BOUNDARIES
———	BARRIER DUNE BOUNDARY

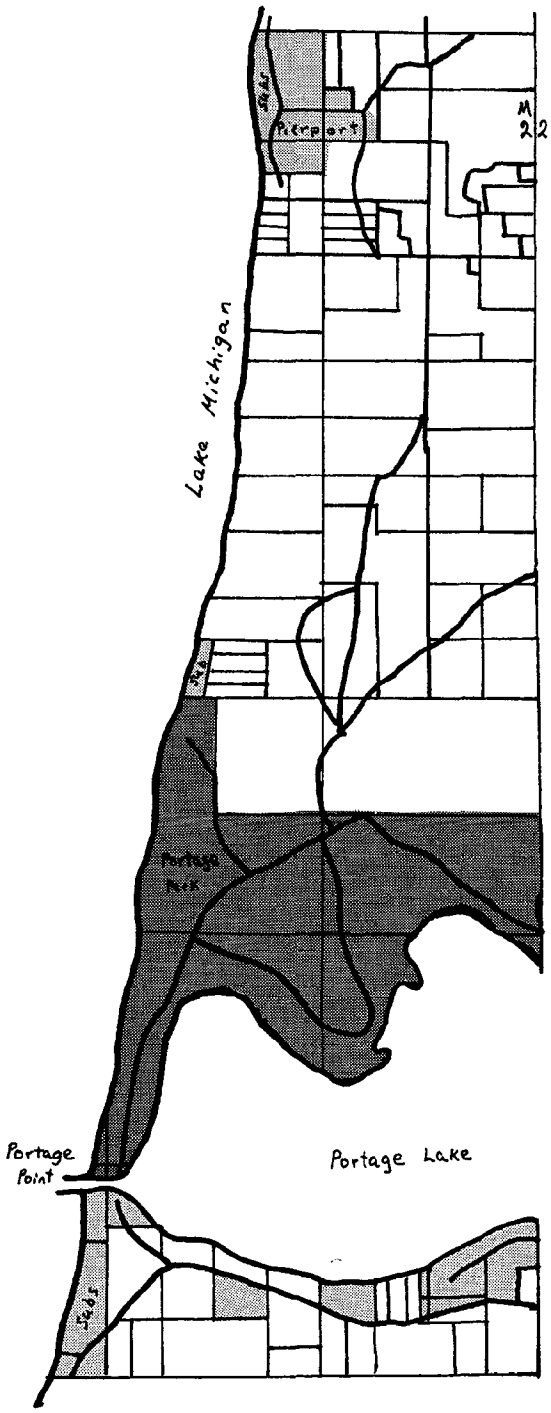
MILES
0 0.5 1 2

MIRIS
MICHIGAN RESOURCE INFORMATION SYSTEM
DEPARTMENT OF NATURAL RESOURCES
LAND RESOURCE PROGRAMS DIVISION
1978 PA 204

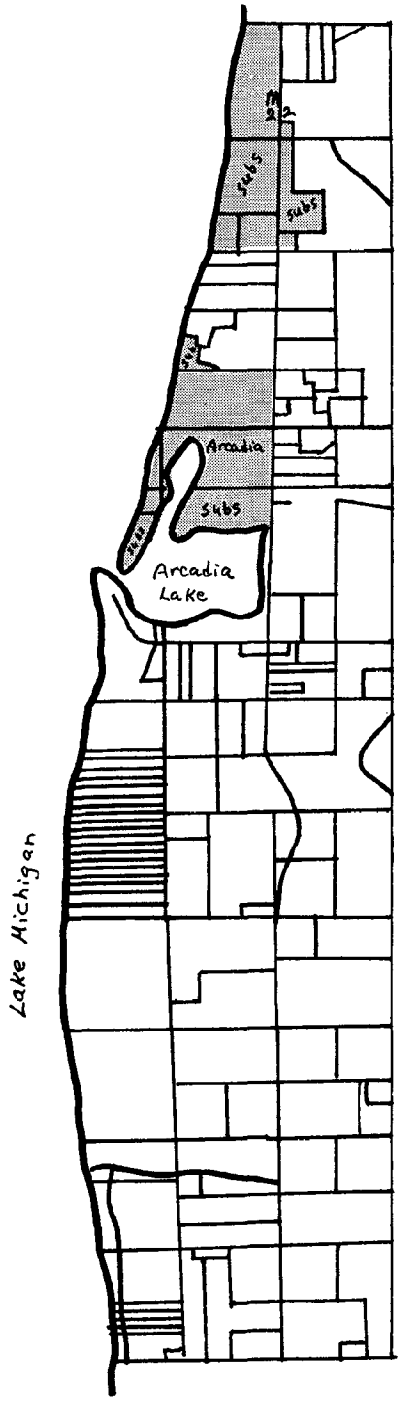
N

DATE: / /

MAP G



ONEKAMA TOWNSHIP
Shoreline Parcels



ARCADIA TOWNSHIP
Shoreline Parcels

DNR studies show the risk of erosion ranges from none to a recommended setback of 85 feet. However, there is a large portion of shoreline where recession rate data was not obtainable. This year there has been serious erosion in areas never experiencing any before. Onekama Township is one of only eight statewide to have an approved High Risk Erosion Overlay Zone with five designated areas with different erosion rates.

The Arcadia Township Zoning Ordinance (adopted in 1974) places all coastal shoreland (except for a narrow piece of land along county road 604) in the Resort-Recreational Residential District. The minimum lot size is 10,000 square feet and minimum lot width is 100 feet. Uses permitted include single family homes, churches, schools, parks and playgrounds. While the DNR has designated high risk erosion areas, the Township has not adopted any regulations to implement these or any other erosion setbacks.

The political and citizen sensitivity to development in sand dunes appears higher in Onekama Township than in Arcadia Township. This concern for the shoreline is reflected in Onekama's approved high risk erosion area setbacks. However, neither zoning ordinance has special regulations for sand dune development. The result is that none of the special considerations regarding low density development, vegetation protection, and careful access design are found in either ordinance. Yet, more land is undeveloped, or in a very low density use in these two townships than in either of the other two case examples. The amount of un- (or under-) developed shorelands is generally greater north of Muskegon than south of it. As a result, a significant amount of destruction could be lawfully permitted on dune lands in either of these townships by simply meeting the relatively high density provisions of the existing zoning ordinances. The principal reason for this result, is of course, because there are no separate provisions dealing with sand dune development, or alternatively for any waterfront development along the entire shoreline. This is the norm, not the exception for shoreline communities along Lake Michigan.

Case Study Summary

When read in conjunction with the examples of sand dune development presented in Chapter One, these case studies present an overview of the present situation and the range of development issues facing those seeking to design an effective sand dune management program. While these examples are skewed somewhat more to areas with un- (or under-) developed sand dunes, together they are felt to be representative of the scope of issues inherent in development of sand dune protection policy.

These case studies illustrate a number of important features about the shoreline:

- diversity of shoreland types
- diversity of local planning and regulatory approaches
- a range of developed and undeveloped land.

They also suggest indirectly, that there is a range in the degree of pressure being placed on sand dune resources. In the case of Covert Township, that pressure is immediate and demands quick action to determine whether threatened dune lands have sufficiently important plant

and animal communities or exceptional aesthetic or other unique features to warrant public or nonprofit acquisition. In the case of Onekama or Arcadia Townships, the threat of large scale development is not immediately present, but the availability of dune and other shore lands are, so destructive development could occur if the opportunity to plan and act prescriptively is not seized.

These cases also include two communities at the forefront of local dune protection programs, Covert Township and Norton Shores. Each has already taken action through planning and coordinated zoning regulations, to restrict sand dune development. It is ironic that Covert Township's density regulations, which are the most restrictive identified, are also felt to not be restrictive enough, given the unique attributes of the dune lands in the Township that are proposed for development. Norton Shores on the other hand, has adopted a comprehensive approach to shoreline development, including in sand dunes, which while not as restrictive as the density regulations in Covert Township, are more sensitive to a wider range of issues associated with dune development. The approaches of each of these communities will be helpful in developing "model" local sand dune zoning regulations.

Onekama and Arcadia Townships, on the other hand, are more representative of the bulk of communities who responded to the local zoning survey described in the next chapter. That is, there is some recognition of the sensitivity of the shoreline in the plans and regulations of some communities (e.g. Onekama), and there is virtually no recognition of any hazards or uniqueness of dunes in many others (e.g. Arcadia). Clearly, a major objective of a comprehensive sand dune management program will have to be education of citizens and local officials as to the values, hazards and uniqueness of sand dune environments.

Chapter Eight

CURRENT LOCAL ZONING EFFORTS

This chapter briefly examines the results of two recent surveys of communities within designated sand dune areas. While only 16 communities appear to have adopted specific provisions to protect development in sand dunes, their efforts are extremely important in preparing a comprehensive sand dune management strategy for Michigan.

Sand Dunes Zoning Survey Results

In the first quarter of 1986, staff of the Division of the Land Resource Programs, DNR sent out a survey to each local governmental unit with boundaries within series I, II or III designations under PA 222. Most of these communities are in the lower peninsula along the eastern shoreline of Lake Michigan, a few are in the upper peninsula along Lake Michigan and Lake Superior. The survey inquired about any zoning provisions that apply specifically to development in sand dunes. A followup letter went out to local units not responding to the original request. The 1986 survey followed a similar survey of most of the same governmental units in early 1984 which inquired as to local regulations of sand mining operations; it was conducted by Geological Survey Division, DNR. The results of both surveys are listed in Table II. Unfortunately, by not surveying all coastal communities, there is no way of knowing whether local units of government in undesignated sand dune areas may already be applying special sand dune development regulations.

Of the 13 cities and villages, and the 54 townships surveyed in 1986, 25 responded, while 10 of 18 counties also responded (41% response rate). The 1984 survey contacted 12 counties, 40 townships and 12 cities and villages. Forty-eight communities responded to the 1984 survey (75% response rate).

Sand dune regulations from three jurisdictions who did not respond to either survey were tabluated since they were already on file with the project staff. Additionally, several communities responding to the 1984 sand dune mining survey had sent along entire zoning ordinances (not just mining regulations). These were examined and where sand dune development regulations were identified, they were included in this inventory. While no effort was made to verify if all dune regulations are still in effect, they are tabulated with that presumption.

Sixteen ordinances have specific regulations over sand dune development. Four are in Berrien County and are all slight variations of model provisions drafted originally by the Berrien County Planning Department. One ordinance is in Van Buren County, it is the Covert Township Ordinance referred to earlier. Two are in Allegan County, one is from Saugatuck Township, and the other is from the Village of Saugatuck. Two are in Muskegon County and include the City of Norton Shores and Laketon Township (both were prepared by the same out-of-state consultant and draw from a Wisconsin model shorelands protection ordinance). Two are in Oceana County and include Claybanks Township and Pentwater Township. Three are in Benzie County and include the County ordinance (covers 3 townships), the Crystal Lake ordinance (nearly

"First, the Oceana County Zoning Commission has prepared a countywide zoning ordinance and zoning map for the five (5) unzoned townships in the County; however, the zoning ordinance has never been implemented even though all the hearing requirements and necessary review procedures have been met. It has been the intention of the Oceana County Board of Commissioners to encourage the unzoned units of government to enact their own zoning plans which can be developed to meet their own specific needs. As an example, four (4) of the townships are coastal townships along Lake Michigan and they have their own unique concerns. Only one (1) of them is unzoned (Golden)."

Letter from Paul E. Inglis, Administrative Assistant, Oceana County, Hart,MI to Christy Fox, DNR, Division of Land Resource Programs, January 29, 1986.

Table II

SURVEYS OF COMMUNITIES IN DESIGNATED DUNE PROTECTION AREAS

Jurisdiction	Designated Dunes (Series #) I,II,III	1984 Survey Response	Sand Mining Controls	1986 Survey Response	High Risk Erosion Controls	Dune/ Shoreline Devel. Controls
BERRIEN CO.		N.S.	?	Y	—	N.R.
Chickaming Twp.	I	Y	S.O.	Y	---	N
Lake Twp.	I	Y	N.O.	Y	Y	Y
Lincoln Twp.	I	Y	S.O.	Y	Y	Y
Hagar Twp.	I	Y	S.O.	Y	Y	Y
Stevensville		N.S.	?	Y	---	N
Bridgman	I	Y	Z.O.		---	N.R.
VAN BUREN CO.		N.S.	?	N.R.	---	N.R.
Covert Twp.	I	Y	Z.O.	N.R.	---	N.R.
S. Haven Twp.	I	Y	N.O.	Y	---	N
ALLEGAN CO.		N.S.	?	Y	---	N
Laketown Twp.	I	N.R.	?	N.R.	---	N.R.
Saugatuck Twp.	I	N.R.	?	N.R.	---	N.R.
Douglas	I	N.R.	?	Y	---	N
Saugatuck	I	N.R.	?	N.R.	---	N.R.
OTTAWA CO.		N.S.	?	Y	---	N
Park Twp.	I,II	Y	N.C.	N.R.	---	N.R.
Spring Lake Twp.	I	N.R.	?	N.R.	---	N.R.
Port Sheldon Twp.	II	Y	N.C.	Y	Y	N
Grand Haven Twp.	I,II	Y	Z.O.	N.R.	---	N.R.
Grand Haven	I	N.R.	?	Y	---	N
Ferrysburg	I	Y	S.O.	Y	---	N
MUSKEGON CO.		N.S.	?	N.R.	---	N.R.
Laketon Twp.	I	Y	Z.O.	Y	Y	Y
Norton Shores	I	N.R.	?	Y	Y	Y
Muskegon	I	N.R.	?	N.R.	---	N.R.
Roosevelt Park	I	Y	N.O.	N.S.	---	N.R.
OCEANA CO.		N.S.	?	Y	(prepared but not implemented)	
Claybanks Twp.	I	Y	Z.O.	Y	---	N
Benona Twp.	I	Y	Z.O.	N.R.	---	N.R.
Golden Twp.	I	Y	N.O.	N.R.	---	N.R.
Pentwater Twp.	II	Y	Z.O.	N.R.	---	N.R.
Pentwater	II	N.R.	?	Y	---	N.R.
MASON CO.		N.S.	?	Y	Y	N
Pere Marquette Twp.	I	N.R.	?	Y	Y	N
Hamlin Twp.	I	Y	Z.O.	N.R.	---	N.R.
Summit Twp.	II	N.R.	?	N.R.	---	N.R.
Grant Twp.	I	N.R.	?	N.R.	---	N.R.
Ludington	I	N.R.	?	Y	---	N

Table II

SURVEYS OF COMMUNITIES IN DESIGNATED DUNE PROTECTION AREAS

Jurisdiction	Designated Dunes (Series #) I,II,III	1984 Survey Response	Sand Mining Controls	1986 Survey Response	High Risk Erosion Controls	Dune/ Shoreline Devel. Controls
MANISTEE CO.		N.S.	?	Y	---	N.R.
Manistee Twp.	II	N.R.	?	Y	Y	N
Onekama Twp.	II	Y	Z.O.	Y	Y	N
BENZIE CO.		Y	Z.O.	N.R.	---	N.R.
Blaine Twp.	II	Y	C.Z.	N.R.	---	N.R.
Gilmore Twp.	II	N.R.	C.Z.	N.R.	---	N.R.
Crystal Lake Twp.	II	Y	Z.O.	N.R.	---	---
Lake Twp.	II	Y	Z.O.	N.R.	---	N.R.
Platte Twp.	II	Y	C.Z.	N.R.	---	N.R.
Elberta	II	Y	Z.O.	N.R.	---	N.R.
Frankfort	II	Y	N.C.	Y	Y	N
LEELANAU CO.		N.S.	?	Y	---	N.R.
Centerville Twp.	II	N.S.	?	N.R.	---	N.R.
Cleveland Twp.	II	Y	Z.O.	N.R.	---	N.R.
Empire Twp.	II	Y	Z.O.	Y	Y	N
Glen Arbor Twp.	II	N.R.	?	N.R.	---	N.R.
Leelanau Twp.	II	Y	Z.O.	Y	---	Y
Leland Twp	II	Y	Z.O.	N.R.	---	N.R.
Empire	II	Y	N.O.	Y	---	Y
CHARLEVOIX CO.		N.S.	?	N.R.	---	N.R.
St. James Twp.(B.I.)	III	N.S.	?	N.R.	---	N.R.
Peaine Twp. (B.I.)	III	N.S.	?	N.R.	---	N.R.
EMMET CO.		Y	Z.O.	Y	---	N
Wawatom Twp.	II	N.R.	C.Z.	N.R.	---	N.R.
Bliss Twp.	II	N.R.	C.Z.	N.R.	---	N.R.
Cross Village Twp.	II	N.R.	C.Z.	N.R.	---	N.R.
Readmond Twp.	II	N.R.	?	N.R.	---	N.R.
Mackinaw City	II	N.R.	?	Y	---	N
MACKINAW COUNTY		N.S.	?	Y	---	N
Brevort Twp.	I	Y	N.O.	Y	---	N.R.
Hendricks Twp.	I	Y	N.O.	Y	---	N
Moran Twp.	I	N.R.	?	Y	---	N.O.
CHIPPEWA CO.		N.S.	?	N.R.	---	N.R.
Bay Mills Twp	III	N.S.	?	N.R.	---	N.R.
LUCE CO.		N.S.	?	Y	---	N
McMillan Twp.	III	N.S.	?	N.R.	---	N.R.

Table II

SURVEYS OF COMMUNITIES IN DESIGNATED DUNE PROTECTION AREAS

Jurisdiction	Designated Dunes (Series #) I,II,III	1984 Survey Response	Sand Mining Controls	1986 Survey Response	High Risk Erosion Controls	Dune/ Shoreline Devel. Controls
SCHOOLCRAFT CO.		N.S.	?	N.R.	---	N.R.
Manistique Twp.	III	N.S.	?	N.R.	---	N.R.
Doyle Twp.	III	N.S.	?	N.R.	---	N.R.
Mueller Twp.	III	N.S.	?	N.R.	---	N.R.
ALGER CO.		N.S.	?	N.R.	---	N.R.
Burt Twp.	III	N.S.	?	N.R.	---	N.R.
KEWEENAW CO.		N.S.	?	N.R.	---	N.R.
Allouez Twp.	III	N.S.	?	N.R.	---	N.R.
Houghton Twp.	III	N.S.	?	N.R.	---	N.R.
Eagle Harbor Twp.	III	N.S.	?	N.R.	---	N.R.
Totals	**NA**	**Yes = 34** **N.R. = 22** **N.S. = 29**	**S.O. = 4** **Z.O. = 18** **N.O. = 7** **N.C. = 3** **C.Z. = 6** **? = 47**	**Yes = 36** **N.R. = 47** **N.S. = 1**	**Yes = 12** **No = 0** **--- = 72**	**Yes = 7** **No = 22** **N.O.= 1** **--- = 54**

N.S. = Not Surveyed
N.R. = No Response
N.C. = Not Covered
C.Z. = County Zoning
S.O. = Separate Ordinance
Y = Yes
N = No
Z.O. = Zoning Ordinance
N.O. = No Ordinance
N.A. = Not Applicable
--- = Not Asked and Can't Tell
? = Don't Know Because Wasn't Surveyed Or No Response Was Received

identical with the County) and the City of Frankfort ordinance. The last two ordinances are from Leelanau Township and the Village of Empire, both Leelanau County communities.

Eleven of these ordinances use overlay zones, four are separate (conventional) zoning districts (the City of Frankfort Critical Environmental District, the Claybanks Township Costal Zone District, the Saugatuck Township Lakeshore Residential District and the Covert Township Shorelands One-Family Residential District) and one is a PUD ordinance (Empire). The four in Berrien County are integrated with High Risk Erosion Area requirements while the Leelanau Township ordinance relies heavily on an environmental impact analysis process for its protection. Many of the ordinances also authorize PUD's in sand dunes, all permit single family homes. All have restrictive provisions related to removal or alteration of native vegetation, almost all greatly restrict grading and filling. All have special slope or erosion control provisions. Most do not directly address aesthetics outside the purpose statements, but clearly consider them in building height, siting and vegetation requirements. The Laketon Township ordinance regulates development on high (nonsand) bluffs the same as development in sand dunes.

No community permits development shoreward of the foredune, or the minimum high risk erosion area line. All require development in dunes set back at least 90 and up to 200 feet from the foredune ridge, bluffline, floodplain line or edge of perennial vegetation. Most also regulate location of wells and waste disposal facilities, accessory structures, access drives, pathways, and tree cutting for views. One prohibits off-road vehicle access, several regulate the type of structure permitted on steep slopes, three differentiate between locations on high versus low dunes, and all appear to have been enacted in the last ten years. Only Saugatuck Township (and Onekama Township, mentioned earlier) have state approved high risk erosion area ordinances, but several other ordinances include high risk erosion area setbacks, relying on the DNR data even though their ordinance has never received DNR approval.

Effectiveness of Present Approaches

Each of these communities deserves special commendation for recognizing that sand dunes are a unique environment that requires separate and special consideration in the development review process. One curiosity of Table II is the fact that three communities responding to the survey indicated that they have no regulations over development in sand dunes, and yet it turns out they do. Several considerations could explain this inconsistency. First, in some communities the local zoning official did not prepare the survey response. Second, there could have been miscommunication because in some communities special shoreline, or environmental regulations focus more on the water aspects of the environment than on the dunes, despite the fact that the regulations still would apply to dune as well as other near-shore areas. Another reason could be because the area of dunes in the community is small, and hence it may have been felt that they were insignificant in a statewide survey. Of course, the possibility also exists that other communities responding that they had no dune regulations actually do. If so, it is unfortunate that they are unable to be included here.

"Also, I have just recently submitted, for your Department's review, a copy of the proposed Manistee Township Permanent Zoning Ordinance which incorporates the Shoreland Protection and Managements Act's regulations into the Zoning Regulations. Under the old Zoning Ordinance, these regulations have been honored principally in the breach. I suspect the reason for this is due to lack of local authority for control under these regulations, lack of public awareness of the existence of the regulations, and a natural reluctance by members of the public to take the time and effort to secure the additional permits needed from your Department. Once the regulations are incorporated into the new ordinance, it is the intent of Manistee Township to see that all future development along the shoreline complies with these regulations."

Letter from Richard M. Wilson, Jr., Attorney, Gockerman, Wilson, Broberg & Saylor, P.C., Manistee, MI to Christy Fox, DNR, Division of Land Resource Programs, May 28, 1986.

Chapter Nine

SUMMARY

This Chapter briefly summarizes some of the key observations made in this report.

Chapter One

A wide variety of examples of sand dune development are presented in this Chapter. They include everything from massive dune reshaping for a residential subdivision in Grand Beach to state parks and highways, motorcycle hill climbs, ORV use, mining and hang gliding. The primary emphasis is on permanent alterations for residential development, because residential use appears to be the land use most in demand for sand dune areas. Examples ranged from existing single family detached subdivisions to condominiums. All examples were chosen to represent the range of activity taking place in sand dunes and to illustrate that not all sand dune development activity occurs in "designated" sand dune areas.

The amount of available undeveloped and in some cases "underdeveloped" (according to some persons) land in sand dune areas is still quite large north of Muskegon. Some sand dunes with unique natural characteristics also exist south of Muskegon, notably in Covert Township in Van Buren County. If state policy is to be changed to regulate sand dune development in order to preserve public values, then action will need to be taken soon.

Chapter Two

Establishing public policy on sand dunes is not an easy task. There are a wide range of public perceptions and values that are often in conflict. The views of property owners, recreationists, environmentalists, developers/realtors, various local and state officials are all a little different. Each view is affected by special interests and concerns. The public values in sand dunes include economic, aesthetic, recreational, and ecological ones. Maximization of one value may result in loss of value to another. Consequently, sand dune development policy should be comprehensively developed with multiple use concepts in mind. However, the legislative foundation for these decisions should be stronger than exists at present. New public policy must both establish preservation criteria for unique dune environments, and development compatibility standards by type of dune and use. Some dune lands may warrant total preservation for passive use, others may be able to assimilate more intensive uses. In order to accomplish these objectives, new information needs to be collected, including a detailed inventory on the total extent and character of existing dunes, and their sensitivity to conversion to various uses.

The definition of the sand dunes in the Sand Dune Protection and Management Act may need to be modified if it is to be the basis of such an inventory. Currently only sand dunes meeting the statutory definition of *"more than 50% of unconsolidated sand"* are designated. Yet many miles of dunelands not meeting this geologic definition exist along the Great Lakes shoreline. Once identified, these dunes also need to be designated and the extent of their barrier dune mapped. The barrier dune is "*the first*

"Loss of dune areas in Mackinac County adversely affects the natural aesthetics of our area, which bears a direct relationship to our economic livelihood; i.e., tourism expenditures upon which we are nearly solely dependent."

Letter from Gary L. Reid, Director, Mackinac County Economic Development Corporation, St. Ignace, MI to Christy Fox, DNR, Division of Land Resource Programs, Lansing, MI, April 25, 1986.

dune assemblage whose forms display the greatest relative relief within the officially designated 'sand dune areas'". The barrier dune appears to be the appropriate boundary for regulatory purposes. Once the inventory is complete then detailed studies of the individual characteristics and "carrying capacity" (a concept discussed in Chapter 7) of particular dune areas needs to be undertaken. Together this information is needed to develop a management program that is sensitive to the unique characteristics of particular dune areas, and the communities within which they are located.

Chapter Three

Perhaps the most important point in Chapter Three is the recognition that Michigan's sand dunes are unique, fragile and *"once destroyed, ... are unlikely ever to regain their present significant size and extent."* Of Michigan's 3,200 miles of Great Lakes shoreline, only 270 miles have been designated as sand dunes. The dunes have unique economic, recreational, and ecological characteristics. It is these characteristics that give rise to the public values discussed in Chapter Two. However, they also share many common attributes with other forms of waterfront development, and policy questions regarding appropriate use and development of sand dunes should be evaluated in light of these waterfront characteristics.

State and local authority for sand dune development policy is clearly authorized by the State Constitution and three zoning enabling acts. Additional legislation will however, be necessary to set forth the parameters for a comprehensive management program.

Chapter Four

The current statutory structure for regulation of development in sand dunes is discussed in this Chapter. Focus is directed to the Shorelands Management and Protection Act, the Sand Dune Protection and Management Act, the Soil Erosion and Sedimentation Control Act, the Public Health Code and Natural Resource Commission Policy. Principal observations include:

1. the importance of carrying through on the original intent behind the Sand Dune Protection and Management Act to gather the information necessary for a comprehensive management program;

2. the Natural Resources Commission has directed that *"Department operations shall respect Michigan's dune formations and make every effort to manage, protect, and preserve their natural character."*

3. recommended standards for setback of well and septic facilities from the shoreline may not be adequate in sand dune areas, and may not be adopted by local health departments who set their own standards.

4. the overlapping area of regulation of high risk erosion areas under PA 245 and designated sand dunes;

5. there is a problem for some local soil erosion control administrators in administering current requirements on long narrow sand dune parcels, especially with regard to driveways (beyond 500 feet). This could be corrected by a change to administrative rules, or by adoption of more restrictive local standards;

Chapter Five

The first part of this Chapter examines the sand dune management programs of Georgia, North Carolina and Washington. Each program involves a state-local partnership approach, but relies on different degrees of state standard setting. Table I on page 39 illustrates the basic components of each of these programs. The activities subject to regulation are similar in each program. Only the Washington approach recognizes the important distinction between shoreline dependent land uses and all other uses. The North Carolina program is the most comprehensive, has the greatest setbacks and provides for state control over "major projects". The Georgia program uses a three person commission within the DNR to administer its program.

The balance of the Chapter examines three options for sand dune management as well as other techniques that may be useful in structuring an effective program for Michigan. The three alternatives considered include a state administered program, a locally administered program, and a shared state-local program. Other techniques include purchase/acquisition of dunes, tax incentives, public education and technical assistance. The January 1985 findings of the Citizen's Sand Dune Advisory Committee are also examined.

Chapter Six

Three unique administrative problems with the development of any management program are briefly presented in this Chapter. The first recognizes the time that may elapse before all sand dunes are designated and fall under a protection program. It is recommended that local governments be given an opportunity to identify and regulate dune development in "undesignated" areas prior to completion of these studies. Likewise, there may be a need for interim state controls over sand dune development while local governments prepare the necessary regulations. If so, it is suggested that such a process be specifically provided for in the enabling legislation. Third, various incentives to encourage local regulation of sand dune development are introduced with a recommendation they be studied further.

Chapter Seven

Case studies of Covert Township, Norton Shores and the Townships of Arcadia and Onekama are presented in this Chapter. They illustrate the range of diversity that exists among sand dune communities. The extent and availability of dune lands, the threat of development and the natural characteristics of these lands vary considerably. Equally significant is the difference in local plans and regulations affecting dune development. These vignettes indirectly argue in support of a flexible dune management strategy that recognizes the diversity of the shoreline and the communities along it.

"A dune buggy's lugged tires, the condominium developer's bulldozers or a sand mining operation can destroy the dunes' tenuous hold on stability. And then, with a huff and a puff, the scenic spectable can be blown away."

"The Dunes", Detroit Free Press, Sunday, July 21, 1985, p.8.

Chapter Eight

Table II in Chapter Eight presents the results of two surveys of local shoreline communities to determine the extent of local sand dune development and mining regulations. These surveys, along with supplementary information, revealed that sixteen communities of 85 surveyed have adopted some form of regulation over development in sand dune/shoreline areas. While the extent of regulation varied widely, from very permissive to quite restrictive, it reflects a growing awareness of the uniqueness and fragility of sand dunes and a desire in some local units of government to minimize unnecessary sand dune destruction. These ordinances provide useful information as to the essential characteristics of a regulatory approach.

Conclusion

This report provides background information on the existing status of state and local sand dune development regulations and on policy questions surrounding creation of a comprehensive statewide approach to sand dune management. It is hoped that this information will be useful in the development of an effective management program that recognizes both state and local responsibilities and concerns, as well as finds an acceptable method for resolving conflicts among the competing uses for dune lands, while recognizing the public values as well. Any such method must be based on sound technical information which attempts to balance use based on protection and wise management principles; so that the values of these unique natural features will not be lost forever. The lack of important, but not as yet collected information, should not prevent the rapid development of comprehensive state sand dune policy -- beginning with strengthening sand dune legislation. Waiting until more information is collected before acting, will only insure that miles and miles of sensitive dune lands will be transformed to other uses without adequate assurance that unnecessary degradation of the natural dune environment will be prevented.

"How much wind is required to move sand?" The threshold at which sand begins a slight movement is 7-8 miles per hour. A gentle breeze of 8-12 mph can roll fine sand but no real movement of medium size grains begins until about 20 mph. Strong breezes of 25-31 mph can move coarse grains of about 1 millimeter (1/25 inch), and a gale of 39-46 mph can temporarily lift sand well over 100 feet into the air. Hurricane force winds exceeding 75 mph can roll 2- to 3-inch pebbles and cobbles.

Geologic Sketch of Michigan Sand Dunes, Michigan Department of Natural Resources, Geological Survey, Pamphlet 5.

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