

# Sauble Beach

Spring 2003

## Sand Dune Conservation

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### Special points of interest:

- Dunes on the shores of Bruce County are relic sand deposits, left here thousands of years ago.
- Dunes are a non-renewable natural resource.
- Dunes are vulnerable to human impacts.

A dune may be simply defined as a mound or ridge formed by the deposition of sand. These geologic landforms develop when an abundance of sand combines with wind, vegetation and geography. Dunes along the eastern shores of Bruce County have formed over the last 3000 to 4000 years, since post-glacial Lake Nipissing began to recede. These dunes are formed from post-glacial lake deposits which preceded the present Lake Huron shoreline. The sand deposits at Sauble Beach are contained between two major headlands — Chief's Point and Frenchman's Point. This is a closed system and there are no sources of sand available upshore or downshore of this area.

The dunes of Sauble Beach are comprised of fine sands, and as a result, they are particularly vulnerable to erosion—from stormwaves and from wind. People's indiscriminate use of dunes can damage or destroy thousands of years of geologic processes in one instance.

Prevailing winds have concentrated dunes along the eastern shores of Lake Huron. There are a lack of dunes on the western shores of Lake Huron. We in Ontario are fortunate, then, to have some of the best beach and dune systems on the lake. However, even on the eastern shores of the lake, dune systems are limited in geographic area. Pinery/Ipperwash, Point Clark, Inverhuron, Saugeen Shores and Sauble Beach are the main dune systems along Lake Huron. Of these, the largest dune complexes - Pinery (2,532 ha) and Inverhuron (288 ha) - are within Provincial Parks, and so their management and conservation are more straightforward. The other dune systems have little formal management or stewardship arrangements.

What starts to become clear is that in the 'big picture', Lake Huron's dune systems represent an extremely small land mass. Yet these are the areas of the lakeshore that attract thousands of people each summer. All ecosys-



*Dunes at Sauble Beach*

tems have a certain threshold for being able to absorb human impacts. Dunes, in particular, have a very low threshold.

Research has demonstrated that dune vegetation is sensitive to damage by human disturbance. Dunes are vulnerable to wind erosion once the anchoring vegetation on them is damaged or destroyed. Without effective conservation measures, we stand to lose an already limited resource. To protect these fragile ecosystems, efforts will be needed to become more sensitive to the vulnerability of these important coastal features and their importance to Lake Huron's shores.

## Beach and Dune Processes

Sand dunes and beaches must be managed as one system. Dunes depend on beach sand for their formation, particularly during low water level periods, and beaches need the sand reserve held in the dunes during high lake levels and storm events.

Sand is continually being eroded and deposited on the shore by waves. Storm waves will erode the beach, taking the sand offshore, and forming a sand bar. The sand bar acts as a temporary protective berm, absorbing wave energy that would otherwise reach the shore causing even more erosion.

Once the storm subsides, gentle waves will gradually bring the sand from the sand bar back to the shore and re-attach it to the beach.

Once onshore, the sand is then prone to movement by wind.

Dunes form when sand is carried by the wind from the beach towards the land. The wind transports the sand in three ways: in **suspension**, by lifting the smaller, lighter fractions into the airstream and carrying them for long distances; by **saltation**, as heavier grains are moved in a series of 'hops' and 'jumps' along the beach surface; and as **surface creep**, in which sand particles are rolled along the surface as a result of wind forces or the impact of descending saltating particles.

While wind strength is important, the quantity of sand moved is also influenced by how long the wind is blowing from a particular direction. Wind duration is an important consideration, and knowing the prevailing wind directions at certain

times of the year can help with determining management strategies for dune conservation and restoration efforts. Winds with the greatest intensity and duration on the eastern shores of Lake Huron tend to be during the late fall, winter and early spring months.

As well as wind speeds and duration, the prevailing water level plays a significant role in how much sand transportation will take place. During high water levels, more of the beach is submerged and the width of dry beach is less. As a result, less beach is exposed to wind erosion. Conversely, during lower water levels, more beach is exposed and greater wind erosion of the beach is possible. Therefore, periods of dune building tend to occur during lower water levels. Periods of natural dune erosion tend to occur during high lake levels when storm waves erode the base of the dune and carry that sand to offshore bars.

What is fundamental to understand is that sand dunes and beaches must be managed as one system. Dunes depend on beach sand for their formation, particularly during low water level periods, and beaches need the sand reserve held in the dunes during high lake levels and storm events.

When the wind encounters an obstacle such as a clump

of vegetation, the wind speed is reduced and the sand grains fall out under gravity, resulting in sand deposition. As the sand accumulation continues, a dune is formed. Dunes form when there is an adequate sand supply and onshore winds of sufficient velocity to move the sand. As the dune builds, it becomes a major obstacle to the landward movement of wind-blown sand. Thus, the dune serves to conserve sand in close proximity to the beach system.

Sand dune grasses are plants which have specifically adapted to the dune environment. The structure of these grasses can resist sand abrasion, wind breakage and water loss. They have adapted to extreme heat (dunes can reach temperatures of 60C in summer!) as well as nutrient deficient soil. Confronted by high winds capable of blowing seeds many kilometres away, these plants have evolved a dual system of reproduction. In addition to the conventional seed production, they send out horizontal stems called 'rhizomes' under the surface to push up new growth short distances away. The massive underground root systems that develop provide the dune with structure, making them far more durable than they would be otherwise.

## Impacts to Dunes

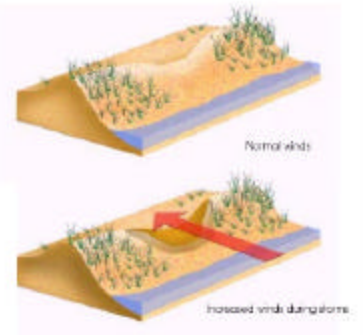
Dunes are fragile systems and trampling by beach goers destroys the vegetation and results in deterioration of the dune. Destruction of vegetation makes the dunes unstable, increases wind erosion and causes the coastline to recede. As trails are established along frequently used routes through the dunes, the vegetation is destroyed and the wind begins to carry sand from the exposed area. The continual loss of sand deepens the trail. Sloughing away of sand

from the trail's sides widens it. As a greater area is exposed to wind erosion, a blowout or washout may develop.

As blowouts develop, sand blows inland, often outside of the beach-dune system. When it does this, it represents a loss to the system.

This inland migration of sand can result in substantial maintenance costs to the town as it forms drifts on the roads, covers lawns and

gardens, and clogs storm drains. A blowout also represents a breach of the dunes shore protection capability. This breach can allow storm waves to erode much larger segments of the shore than would otherwise be the case. In any case, blowouts are usually quite costly.



Formation of a blowout. Destruction of dune vegetation exposes the dune to wind erosion.

## Why Conserve Dunes?

Aside from the ecological imperative to protect dunes as critical coastal features and habitats, are there any economic reasons to protect dunes?

Consider the following: During the high water levels of 1985-86, millions of dollars were spent to protect coastal properties and municipal waterfronts along Lake Huron. The average cost of an armourstone revetment, for example, was \$2000 per linear metre.

Sand dunes have long been known by scientists and resource managers to be nature's shore protection. They outperform their structural counterpart by their ability to give and take with the dynamic processes

at work along the shoreline. Using \$2000/m as the amount that would be required to replace dunes with conventional shore protection, it becomes apparent that the value of dunes to a community can be great.

For example, Sauble Beach's 3 kilometres of beaches and dunes amount to about \$6 million in shore protection alone. This does not include the aesthetic value of the dunes, important to tourism, or the ecological value of the dunes, important to naturalists and educators.

By conserving its dunes, the community of Sauble Beach is preserving a multi-million dollar asset.

Effective sand dune stew-

ardship is a function of balancing environmental, social and economic interests. Often in the past, the environment was left out of the equation.

Where beaches are considered simply an economic resource to be exploited, natural systems have been compromised and have led to a loss to the community, in environmental, social and economic terms.

“Effective sand dune stewardship is a function of balancing environmental, social and economic interests”.

## The Lake Huron Centre for Coastal Conservation

P.O. Box 178  
Blyth, Ontario, Canada  
N0M 1H0

Phone: (519) 523-4478  
Fax: (519) 523-4929  
Email: [coastalcentre@lakehuron.on.ca](mailto:coastalcentre@lakehuron.on.ca)

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[www.lakehuron.on.ca](http://www.lakehuron.on.ca)

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## What's Next?

Over the course of the summer, the Lake Huron Centre for Coastal Conservation will conduct a preliminary ecological evaluation of the dunes at Sauble Beach using ABC method which determines the Abiotic, Biotic and Cultural elements of the beach and dune environment at Sauble Beach.

With this fundamental information, a management plan process can be initiated that seeks to identify the dune conservation measures that need to be adopted at Sauble Beach that will meet the needs of the community and the needs of the dune system.

In addition to the Coastal Centre's work, students from Wilfred Laurier University will be conducting research on the geomorphology of the dunes at Sauble Beach.

This project will work toward meeting the following objectives:

1. Maintain the integrity of the dune system.
2. Define access points through the dunes so that people can get to the beach with minimal impact to the dunes.
3. Emphasize public education and awareness about dune conservation and the value of dunes to the

coastal ecosystem.

4. Use approaches that work with natural coastal processes, and not at odds with them.

Community involvement in this process is key to its success. By providing your comments, information (like old photographs of the beach), your time or by making a donation to this project, you will help to focus the direction of conservation efforts at Sauble Beach

For more information on this project, contact Doug Lennox, President of **Friends of Sauble Beach** at (519) 422-1737.