



US Army Corps  
of Engineers  
North Central Division

# GREAT LAKES LEVELS

Update Letter No. 72 3 July 1991

## SHORELINE PROPERTY OWNERSHIP

### How prepared are you?

Many lakefront property owners find themselves in a never ending battle with the forces of nature, especially erosion. In the last 25 years, Great Lakes water levels have been consistently more above average than below. In fact, for most of the lakes, new maximum lake levels have been set twice during this period.

The long-term and short-term relationships between erosion, recession rates, and fluctuating lake levels have not been determined completely and are open to many theories. What is agreed upon, is that the rate of erosion, or short-term effect, accelerates when a shoreline is subject to wave and storm action. It is also generally agreed upon that erosion at low-water levels sets the stage for accelerated erosion at high-water levels.

Experience has shown that a storm which coincides with high or rising lake levels can cause severe damages due to both inundation and erosion over a larger and unexposed area. During high water periods, storms seem to cause further acceleration of short-term effects. In many cases, erosion is temporary, with full or partial recovery of beaches and dunes following a period of erosion.

For many persons living along the lakeshore, any bluff or dune recession, even if it is temporary, is too much. If a structure is endangered by erosion, relocation or abandonment of the structure may not be an option. Some method of shore protection may provide additional years of life for the structure.

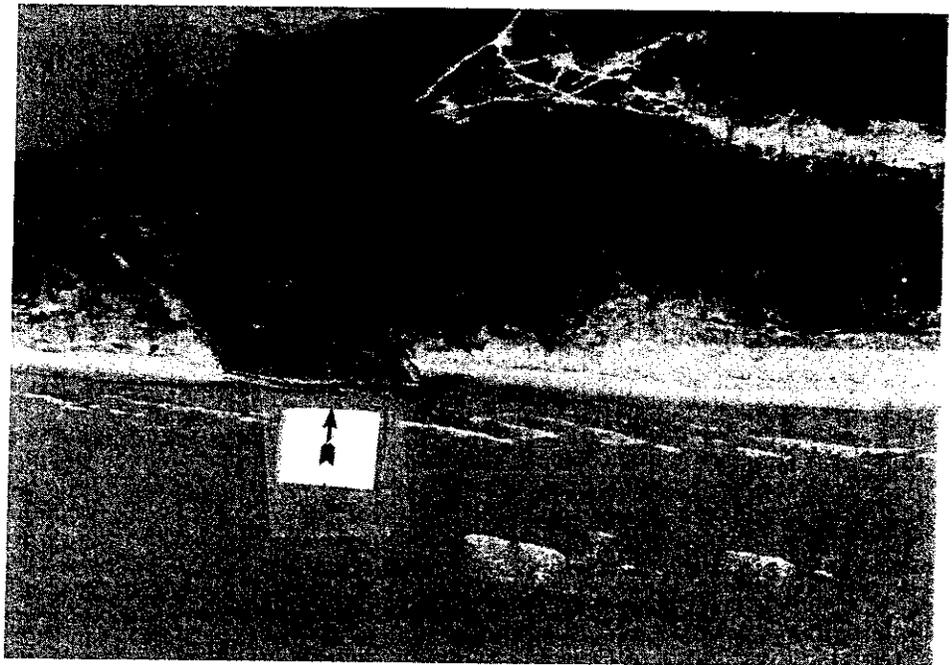


Figure 1. Rebuilt erosion protection at Berrien County, Michigan.

### Before you buy

If you are considering buying shoreline property, give serious thought to what that property may look like years from now. If the property will be purchased as a long-term investment, this may affect your ability to sell or the price you can get for your property. If you are planning on eventually retiring to your lakefront home, what will the situation be 20, 30, or 40

years from now? All shore protection structures have finite lifetimes (see Figure 1). If your property needs shore protection, will you be able to afford it, maintain it, or replace it on your retirement income? The construction and maintenance of a shore protection structure requires a long-term commitment of money, time, and effort and may not be successful even at that.

and several Federal agencies. For example, the Michigan Department of Natural Resources (MDNR) has an excellent study which documents long-term bluff recession rates for the state of Michigan.

After you have acquired some knowledge of erosion processes, shore protection alternatives, and their consequences, apply this knowledge to your specific situation. Do you want to go with the current construction methodology, or can you afford to take a chance on a design that is new to your area? Don't be misled into believing that there is one best type of shore protection. A shore protection project must be planned and designed for specific site conditions. Your objectives should be the primary factor in deciding which alternative you select; however, trade-offs or compromises are likely to be required.

If you have a shore protection structure in place now, you should assess its condition. If it is old, deteriorated, or simply not functioning as desired, this may be a good time to have it repaired or replaced. For example, a seawall which shows signs of deterioration may require repair or reconstruction. You may need to determine if shore protection, which is working well at the present time, will continue to provide protection if conditions worsen.

In addition to learning about erosion and shore protection, take some time to learn about the regulations regarding construction in your area. Nearly all shore protection projects require permits. There may be local, state, or Federal regulations prohibiting a shore protection project which may cause adverse effects to the shoreline or to other shoreline residents. There may be restrictions on other alternatives, such as fill. Better to find out now, than when your property is in jeopardy and your permit request is delayed because of the volume of permits being processed.

An occasional photograph, video (dated), or a note in a diary may go a long way in documenting the condition of your property as the years go by. This information may prove invaluable in understanding the shoreline erosion processes.

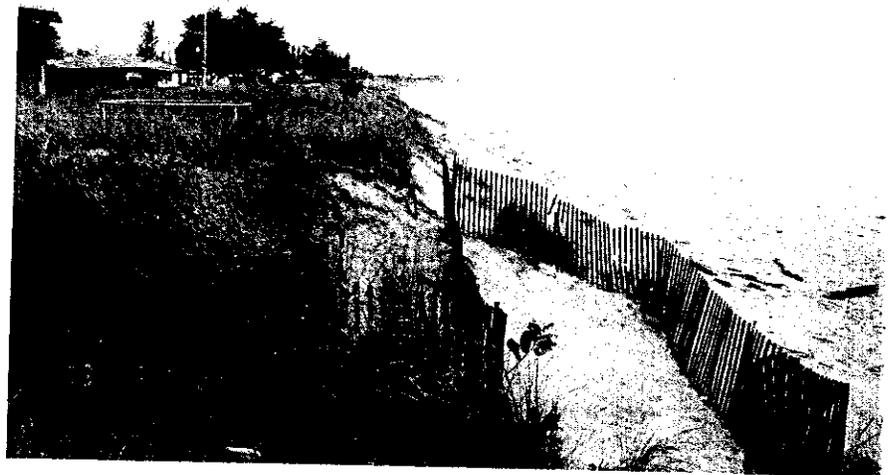


Figure 4. Example of snow fence usage.

### **Become an involved shore property owner**

There are a host of laws and regulations at the local, state, and Federal level which affect you as a shore property owner. You should not be content to let new laws become established without your involvement. Become part of the decision-making process, particularly at the local level where your input is most strongly felt. If there are organizations in your area or region that involve themselves in shoreline issues, familiarize yourself with them. If they have adopted a philosophy with which you agree, consider joining the group.

### **Shore protection at stable or lower lake levels**

There are several actions that you can take now to prepare yourself for future erosion or to repair the damage caused by past erosion. For those of you who own property in sandy dune areas, it is possible to buildup or rebuild eroded dunes by trapping wind-blown sand. During the late fall and winter months, there is a tendency, in many areas, for the wind to blow beach sand inland. With wider beaches now present in many areas, more sand is available for transport. This sand can be easily trapped at the base of dunes using "snow fences" or similar devices (Figure 4).

Table 1  
Great Lakes Hydrology

PRECIPITATION								
BASIN	JUNE				YEAR-TO-DATE			
	1991*	AVERAGE**	DIFF.	% OF AVERAGE	1991*	AVERAGE**	DIFF.	% OF AVERAGE
Superior	2.7	3.3	-0.6	82	13.7	13.0	0.7	105
Michigan-Huron	1.4	3.1	-1.7	45	14.6	14.5	0.1	101
Erie	1.8	3.4	-1.6	53	16.3	16.9	-0.6	96
Ontario	1.2	3.1	-1.9	39	17.2	16.5	0.7	104
Great Lakes	1.8	3.2	-1.4	56	14.9	14.7	0.2	101

LAKE	JUNE WATER SUPPLIES***		JUNE OUTFLOW <sup>2</sup>	
	CFS <sup>1</sup>	AVERAGE <sup>3</sup>	CFS <sup>1</sup>	AVERAGE <sup>3</sup>
Superior	132,000	158,000	76,000	78,000
Michigan-Huron	93,000	204,000	190,000	193,000
Erie	-3,000***	30,000	215,000	214,000
Ontario	16,000	42,000	280,000	261,000

\* Estimated (inches)    \*\* 1900-89 Average (inches)  
 \*\*\* Negative water supply denotes evaporation from lake exceeded runoff from local basin.

1 Cubic Feet Per Second    2 Does not include diversions    3 1900-89 Average (cfs)

For Great Lakes basin technical assistance or information, please contact one of the following Corps of Engineers District Offices:

For NY, PA and OH:  
 Colonel John Morris  
 Cdr, Buffalo District  
 U.S. Army Corps  
 of Engineers  
 Buffalo, NY 14207-3199  
 (716) 876-5454, Ext. 2201

For IL and IN:  
 LTC Randall R. Inouye  
 Cdr, Chicago District  
 U.S. Army Corps  
 of Engineers  
 River City Bldg. (6th Flr)  
 111 N. Canal Street  
 Chicago, IL 60606  
 (312) 353-6400

For MI, MN, and WI:  
 Colonel Richard Kanda  
 Cdr, Detroit District  
 U.S. Army Corps of  
 Engineers  
 P.O. Box 1027  
 Detroit, MI 48231-1027  
 (313) 226-6440 or 6441

Careful consideration should be given to purchasing a structure in an area of known erosion. As an example, a home located 50 feet from the edge of a bluff with a known recession rate of 1 foot per year or more would be a precarious investment at best. To some extent, the inevitable can be delayed by costly shore protection, but in the end erosion is likely to win.

### **Become a knowledgeable shore property owner**

Very few of us are meteorologists or automotive mechanics; however, most of us understand weather reports and generally how an automobile works because we deal with them on a day-to-day basis. The same rationale should apply to shore property ownership. The benefits, costs, and potential problems associated with a typical shore protection installation should be reason enough to acquire an understanding of shore erosion processes and the types of shore protection available. Figures 2 and 3 are typical protection works. A fully informed property owner is more likely to get effective shore protection at a better price than someone who may rely on information from a single source. It is better to acquire some knowledge on the subject and to investigate options available now, rather than wait until storm waves are breaking against your beach or bluff. Planning ahead can significantly reduce your future stress level.

At the very least, you need to determine your specific situation. If you are presently experiencing erosion, your risk is obvious; however, don't be misled if things appear fine at the present time. Erosion or deposition is still taking place. You may still be at risk when storms occur during periods of rising lake levels. A wide beach alone may not provide sufficient erosion protection. Based upon typical beach slopes found on the Great Lakes, an increase in the average lake level of only a foot can submerge 100 feet of beach. This increase in water depth can allow a higher energy storm wave to reach further up on the beach or reach the bluff itself.

Information on erosion can be obtained from a variety of sources such as local, state, or provincial governments



Figure 2. An example of seawall protection.

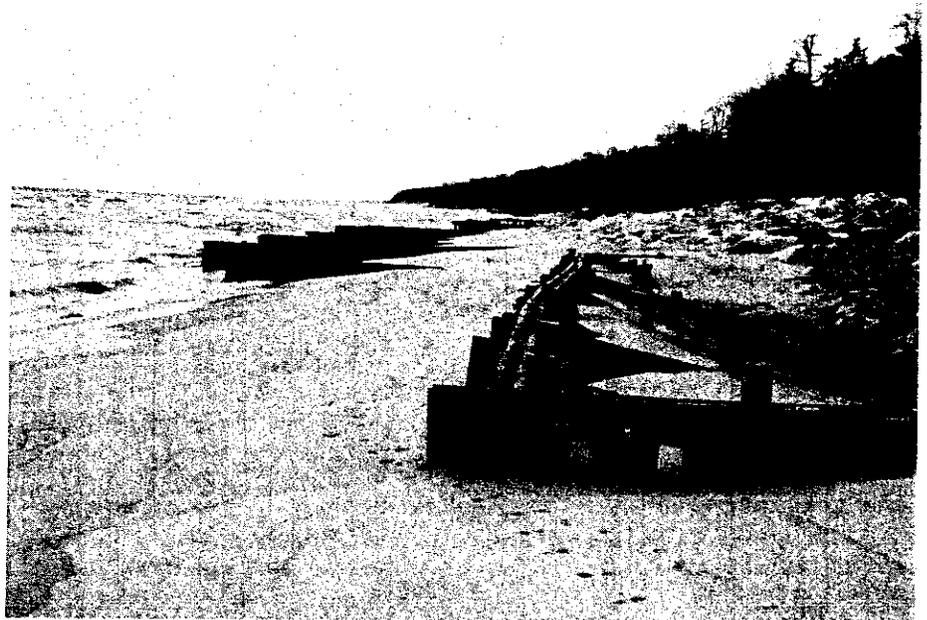


Figure 3. An example of groin protection.

The small dunes formed at the base of the primary dunes will act as an additional barrier against future erosion of the primary dunes and may repair previously eroded dunes. Bare bluffs and dunes can be stabilized by regrading the slope or planting vegetation on the slopes. Vegetation on dunes and bluffs should not be disturbed unless it can be shown that it contributes to the erosion problem.

Much of the Great lakes coastline is comprised of relatively tightly packed glacial material such as till or clay. This consolidated layer is usually overlain by a layer or layers of relatively loose unconsolidated material such as rock, gravel, or sand. The layer of unconsolidated material can be very thin. Nearshore dredging of sand or removing rock and stone from in front of your property or otherwise disturbing this overlayer may expose the consolidated layer underneath to erosional forces. Lowering the lake bed has the same basic effect as raising the lake level. The height and energy of waves that reach the shoreline increase, which can lead to more erosion.

If you decide to construct or modify a shore project, you may want to apply in advance for the appropriate local, state, and Federal permits. A permit is generally good for several years. You may keep the permit in abeyance, delaying construction until such time as it may become necessary. In addition, the permit can be extended if desired. When lake levels are high, there is a significant increase in permit applications which increases the permit processing time. Having a permit beforehand will ensure that you are not delayed by any possible processing bottlenecks.

The various Corps of Engineers district offices and field offices throughout the Great Lakes can be contacted to provide guidance to anyone with questions regarding erosion or shore protection. The Corps has several publications available, including "Low Cost Shore Protection," and "Help Yourself." These help to explain the basics of erosion processes and shore protection. You may request a copy of these booklets, free of charge, from your local Corps district office.

### IJC board's public meeting

The International St. Lawrence River Board of Control held its first regular annual meeting with the public Thursday evening, June 27, 1991, in Kingston, Ontario. It was a successful meeting which provided those interested in Lake Ontario and the St. Lawrence River the opportunity to learn about the system and its operation and to discuss any issues of concern. The IJC commissioners, board members, and their staffs availed themselves to listening and discussing pertinent matters. These included concerns about boating and marina operation in the river, as well as lake shoreline concerns regarding sand dune development. Mayor Helen Cooper of Kingston expressed her appreciation for the opportunity to present the issues as seen from the viewpoint of the city of Kingston. The opportunity for learning about the system, as well as about the policy and decision-making process, was provided by a number of technical and procedural presentations and several current publications which were distributed at the meeting.

Mr. Gordon Durnil, U.S. Chairman of the IJC; Mr. Robert Kingston and Brigadier General Jude W. P. Patin, Cochairmen of the St. Lawrence Board; and Mr. Thomas Wigle, Canadian Member of the board, made presentations at the meeting.

Additional opportunities will be afforded the public in the future to attend similar meetings. The next public meeting of the St. Lawrence Board is planned to be held in the United States next year. It is noted, however, that the commissioners and board members and their staffs are always available to address issues and concerns via letters and/or telephone calls.

The International Niagara Board of Control will meet with the public the evening of September 12, 1991, in Fort Erie, Ontario. The International Lake Superior Board of Control will meet with the public the evening of September 17, 1991, in Sault Ste. Marie, Ontario. Further details on these two meetings will be provided in future updates.

### Lake survey history

Copies of "Lake Survey History" can be obtained from the following:

Detroit District,  
U.S. Army Corps of Engineers  
Attn: Mr. Mike Perrini  
Box 1027  
Detroit, Michigan 48231-1027

Checks should be made payable to the following:

FAO, Detroit District, USACE  
in the amount of \$10.50.



Jude W. P. Patin  
Brigadier General, U.S. Army  
Commanding General and  
Division Engineer