Seiches in Lake Superior

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Intro: This is Superior Science News. Today's program explores the occurrence of seiches in Lake Superior.

A seiche is a little-known phenomenon that occurs within the Great Lakes. They are standing waves that occur in an enclosed body of water. Minnesota Sea Grant Director Stephen Bortone says researchers have spotted seiches in Lake Superior.

"They're caused by anything that would cause a pressure change. That pressure could be a storm that occurs and then stops, a heavy rain that takes place and then stops. They could take place from a heavy flood that occurs in that area. They might even occur because of a landslide close to the shore, a ship passing by--anything that's going to cause a significantly sized pressure change in an area."

Seiches can cause large amounts of water to be moved in a short period of time. However, Bortone says they're not as threatening as other weather phenomena.

"It's not like a tidal wave or a tsunami impact where these giant waves come crashing into the shore. It's not like that. It's a subtle shift in these basins. In your bathtub, it's pretty dramatic, but, if you think of the Great Lakes as being a giant bathtub, by the time the water sloshes back and forth, from one side to the other, many hours have passed."

Even so, Bortone says they do pose a risk to shippers and possibly people walking along the shoreline.

"The water levels on the shore might go up a few feet to eight or ten feet. There's been some that have been 20 or 30 feet in other parts of the world. That may take place over a few hours, so it's unexpected. It can cause some prob--it might cause flooding along a coastal sidewalk where people walk. It could cause some problems with ships floating in the harbor or tied to a dock where they've been tied up at a certain height and now the water drops out from underneath the boat. So, there are some interesting effects."

Duluth Seaway Port Authority Facilities Manager Jim Sharrow says those effects have had negative impacts for some ships in Lake Superior.

"We've seen some very severe impacts at the ore loading dock in Two Harbors when a seiche would hit. On a couple of occassions, a seiche came through the harbor and created such current that a thousand footer loading could not be held at the dock and all of the cables let go. In one of these instances, a thouand footer did significant damage to one of the loading shuttles. But another one of these, it took

the shuttle right off the dock basically and there was well over 100,000 dollars worth of damage."

Sharrow says seiches are unpredictable and can catch shippers off-guard.

"We've seen that at Sault Ste. Marie where a seiche would come through that was unexpected and this was before there was a good communication line to the captains that the water was dropping, and there have been some instances of ships that rubbed bottom because of a sudden water level change. They've seen changes of over three feet in a matter of minutes. When ships are coming through with about 18 inches of clearance to the bottom, they have to be very aware of that."

Sharrow says ships now have a much better notification system for changes in water levels than they did fifteen years ago. Bortone adds that, although scientists can't forecast a seiche, they are identifying conditions where seiches are more likely to occur.

"There's a program. It's an oceanographic observation system for the Great Lakes. It's actually for all the United States. There are some stations out there that measure long-term things like wave height and wave energy and they measure things like temperature and basic water conditions. So, we're getting good basic monitoring data that wasn't available a few years ago, and this will help examine some of the features of seiches that are out there."

Sharrow says ships are doing whatever they can to keep an eye out for them.

"I think monitoring the water levels and vigilance around docks that might be affected by a seiche with currents and the like I think is the only thing I know of that could help you prepare to react and respond to one."

Bortone: "I think our weather service is a lot better predicting strong winds and weather conditions than say it was ten, twenty years ago. The example of Lake Michigan where one set up last summer, when those conditions arise, there was actually a warning or prediction ahead of time that there may be a seiche in that area and that's just through experience and much better weather prediction."

For Superior Science News, I'm Marie Zhuikov.

Outcue: This is a production of the Minnesota Sea Grant Program at UMD and KUWS Radio.