

The Power of Water: Lake Superior

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Hi! I'm Jesse Schomberg and you're listening to the Sea Grant Files. Today I'm going to be talking about the power of Lake Superior and some ideas on how that power might be harnessed in the future.

Lake Superior has the power to attract beachgoers, with places like Brighton Beach and Park Point drawing in large crowds during the summer. There have been stretches of warm weather in the past few years that inspired people ... people that normally would be hesitant ... to plunge right in. With more people in the lake, it is important to remember that the power of water can create dangerous situations.

Five people drowned in Lake Superior in August 2017. Two of the five happened in Duluth just off of Park Point even though the National Weather Service had issued a Beach Hazard statement for Dangerous Swimming Conditions, which was in effect at the time of the tragedy.

In a face-to-face survey of Minnesota Point beach users in 2013, 14% of people surveyed said that they never heard of rip currents, 75% could identify how to escape one, and only 58% said that they could identify signs of a rip current.

Even with a warning system, the dangers of these rip currents aren't fully understood by the public, which is one of the reasons it's so important to talk to your family and friends about Great Lakes rip currents. Yes, the Great Lakes are big enough and powerful enough to develop rip currents!

Rip currents are powerful channels of fast moving water that are strongest near the surface where people are swimming. These currents can extend into the lake up to 1,000 feet, reach 100 feet wide, and travel up to 5 mph, moving faster than an Olympic swimmer. The currents move out from shore and the risk comes as people who are caught in these currents try fighting them to get back to shore. Fatigue and panic increase the risk of drowning.

If caught in one of these currents, don't fight it. Instead, swim parallel to shore and work your way back to land at an angle.

It's also important to remember that these currents are driven by waves; thus the adage "stay dry when the waves are high!". To spot rip currents, look for:

- A channel of churning, choppy water.

- A different color to the water.
- A break in the incoming wave pattern.
- Foam, sticks, or other objects moving away from shore.

In addition to rip currents, Lake Superior has the Keweenaw current. It's been estimated that the Keweenaw Current, at its peak flow, carries as much water as the outflow of the Mississippi River. Gitche gumee has powerful upwellings and downwellings and seiches that help move nutrients through the food web. The downwellings can make pulling up a commercial fishing net nearly impossible at times.

The power of Lake Superior can be deadly, damaging and important to the lake's food web; it might also provide a source of renewable energy in the near future.

The Electric Power Research Institute estimates the total wave energy resources along the United States coastline equals about 2,600 terawatt-hours per year. ... that's enough to power the world several times over. Currently, human civilization consumes around 18 Terawatts of energy, namely in the form of fossil fuels and alternatives such as solar, wind, hydropower and others.

Converting wave power into electricity is a more complex process than converting other renewable sources of energy like wind and sun. Waves are often unpredictable and their heights and frequencies vary dramatically over time, making wave energy somewhat unreliable.

Wave energy can be harvested by wave energy converters in several ways: some scientists and engineers are working with long snake-like machines that wriggle with surface waves. Others are capturing energy with something resembling a buoy that bobs up and down. Since these types of wave energy converters rest on the surface of the water, any large storm has the potential to destroy them.

One major problem with trying to capture wave energy in oceans is the corrosive nature of salt. The salt will break down the machinery, causing expensive repairs and replacements. Lake Superior and the other Great Lakes, which proudly boast to have low salt content, could provide a solution.

A study at Michigan Tech looked at the wave potential of Lake Superior and estimated that the machines used could produce 10 kilowatts of power per unit at a cost of three to four million dollars per unit. More research still needs to be done on how to capture

wave energy more efficiently so that it can have more competitive prices with other energy sources, but it's a step towards usable sustainable energy.

From Oregon to Massachusetts, a variety of Sea Grant programs are supporting research to help make waves a safe, clean and affordable alternative energy source.

I'll leave you with this message: Lake Superior is powerful ... it's waves – it's surface and internal waves --- are powerful ... it's currents – it's Keweenaw and rip currents -- are powerful. As Lake Superior continues to be a source of fun for people, remember to stay safe by knowing what to do if you're caught in a rip current and by looking for safety warnings before entering the water.

This episode of the Sea Grant Files was produced by Rachel Wachtler, Sharon Moen, Maija Jenson, KUMD, and me, Jesse Schomberg. For more information or to listen to more episodes of The Sea Grant Files visit Minnesota Sea Grant at www.seagrants.umn.edu. You can also follow Minnesota Sea Grant on Facebook or Twitter. Thanks for listening.