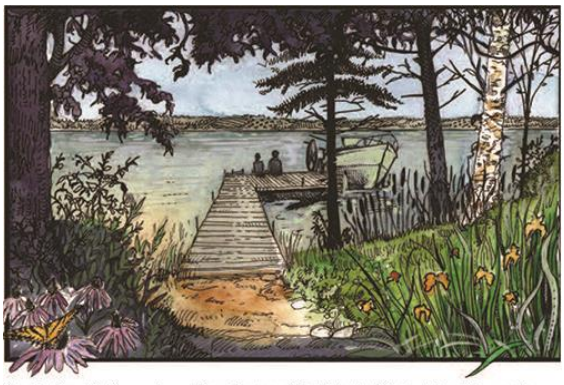
Ice Berms *by Jennifer Buchanan*

Shoreline property owners know all too well the damage that ice can cause to inland lake shorelines. With each winter, property owners hold their breath waiting to see how their shorelines held up against the ice. While some winters can be fairly brutal to shorelines, others seem to have little impact. Even more perplexing is when one property is absolutely devastated, yet the neighboring property is untouched. Each spring, Tip of the Mitt Watershed Council receives countless calls from property owners who are frustrated with winter's outcome and are looking for advice on restoring their shorelines. While there truly is no one structure, plantings, device or contraption that can guarantee ice will not harm your shoreline, there are a few things you can do to limit the degree of damage.

The most unmistakable form of ice damage is an ice ridge or berm. Ice ridges are caused by the pushing action of a lake's ice sheet against the shore. Certain conditions, such as ice at least five inches thick, little or no snow cover and significant temperature fluctuations, may increase the likelihood of more aggressive ice shove. Cracks form in the ice because of different contraction rates at the top and bottom of the ice sheet. Ice cracks also develop because the edges of the ice sheet are sometimes firmly attached to the shore. When water rises in the cracks and freezes, the ice sheet expands slightly. Rising air temperatures warm the ice, leading to additional expansion, which exerts a tremendous thrust against the shore. Alternate warming and cooling of the ice sheet leads to additional pushing action, causing the ice to creep shoreward and scrape, gouge, and push soil and rock onto the land and into mounds.

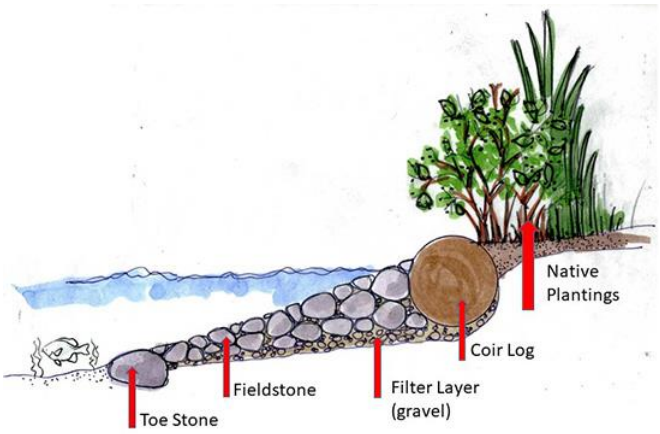
Many shoreline property owners feel ice ridges are unsightly and block their access to the lake. The typical response is to flatten the ridges and hope for the best. While the desire to return the shoreline to its previous condition is understandable, it is important to note a few reasons why leaving an ice berm can be beneficial to the lake. One benefit is the berm's ability to prevent contaminants from entering the lake. The berm acts as a barrier to nutrient-rich runoff. Nutrients collect on the landward side of the mound and over time, build fertile soil where plants thrive. The root systems of this nearshore plant community help to protect the shore from erosion and soak up additional nutrients. Additional benefits include the shade and habitat offered by nearshore plants, which keeps water temperatures cool and provides nesting and spawning areas. Ice ridges also work to protect the shore from the lake itself. For example, a small ice ridge formed one year is followed by additional pushes in ensuing years. The ridge is fortified by jamming rocks into it. Furthermore, the roots of the nearshore plant community bind together the soil and rock to form natural shoreline protection.



Graphic: *Glenn Wolff, www.glennwolff.com Courtesy of The Watershed Center at Grand Traverse Bay*

The most resilient shorelines tend to have two key components. The first is a greenbelt (a buffer of vegetation along the shoreline) comprised of native grasses, perennials and shrubs that will stabilize and strengthen the shoreline. Although ice may shear the

tops of these plants, their deep network of roots tend to stay intact. In spring, these plants will sprout and provide renewed stabilization soon thereafter. The other component is a relatively flat shoreline profile. When ice moves shoreward it will either push accordion-style on the shoreline itself or it can slide up and over the shoreline. The first scenario occurs when the shoreline is more vertical in nature and the water depth is deeper along the shoreline. The other scenario occurs when the water depth is shallow and the shoreline is gradually sloped or there is a revetment that allows ice to slide up the shoreline (and not at it). One method oftentimes used on high-energy inland lakes is to construct a fieldstone revetment. The size, composition, and configuration of the fieldstone should be tailored to the site based on its location, fetch, water depth, and wind speed. There are formulas that can be applied to determine these specifications. In general, larger rocks are no match for ice shove. Conversely, rocks that are smaller, but large enough to withstand wave erosion, are better. Smaller fieldstone act like ball bearings and roll the ice up the shoreline slope, which should be relatively flat with a maximum steepness of 3 (horizontal): 1 (vertical). And although the ice may move some of the smaller fieldstone, landowners can put them back in place each spring without a lot of expense or effort.



So if you find your shoreline has a newly formed ice berm, first consider if you can live with it the way it is. If not, perhaps you only need to lower the berm for dock and boat access. Also consider whether adding fieldstone along the shoreline will help prevent future ice damage. Please note, if you have plans for any shoreline work that will extend below the Ordinary High Water Mark (OHWM), be sure to apply for a permit from the Michigan Department of Environmental Quality.

If you have any questions regarding shoreline best management practices, please visit www.watershedcouncil.org or call our office at 231-347-1181.

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