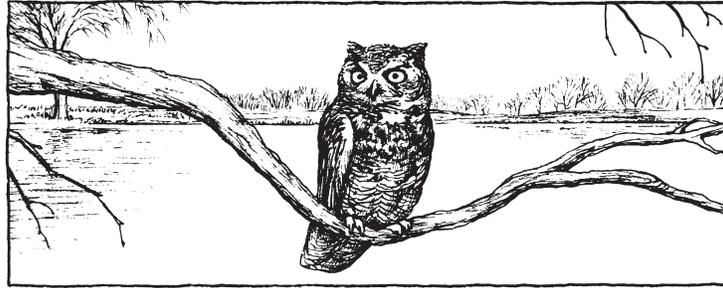


STILLMAN NEWSLETTER



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ICE ESCAPADES

-- Mark Spreyer

Joy in looking and comprehending is nature's most beautiful gift.

-- Albert Einstein

Winter is full of magical gifts waiting to be opened. Sometimes, an exaggerated fear of nature makes it difficult for us to appreciate some of these gifts. In particular, I'm thinking of lake ice.

Safety Disclaimer

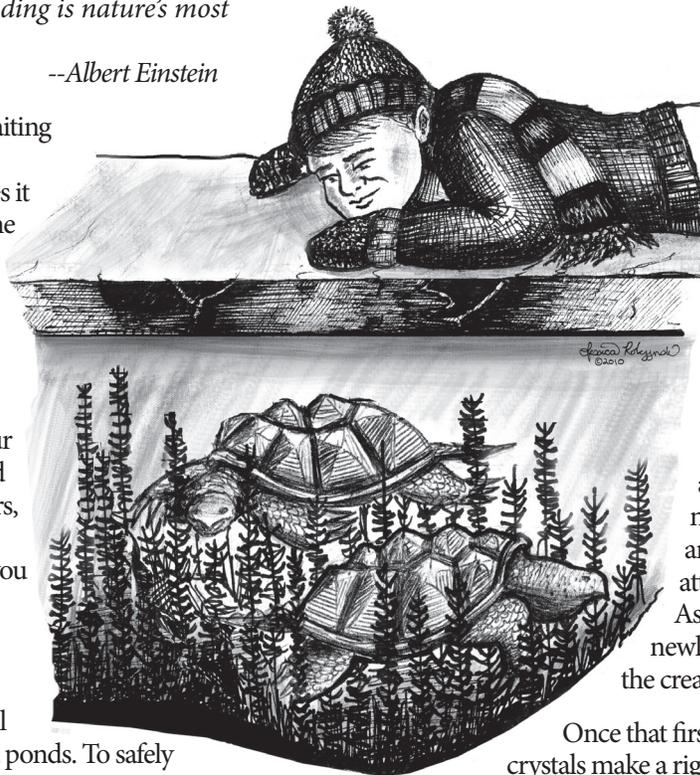
Stillman's Board of Directors would send me packing if I didn't make it quite clear that our nature center's ice-covered pond is off limits to hikers, snowshoers, cross-country skiers, ice skaters, unicyclists, overweight deer... you get the picture.

That said, every winter folks across the northern two-thirds of our continent have wonderful experiences on frozen lakes and ponds. To safely do so, all you need is a little common sense.

Speaking of which, the Minnesota Department of Natural Resources has put together a practical chart (see p. 2) to help guide you when considering a lake-top stroll. I recommend you use it.

Crystal Construction

While I type this, a thin layer of ice is forming across the surface of Stillman's pond. With Einstein's words in mind, that's the "joy in looking" part. Comprehending the process unveils a fascinating thermodynamic push-and-pull.



We all know that water freezes at 32°F. As an ice cube floating in a glass of water illustrates, liquid water is denser than solid water. To be precise, water is densest at 39°F.

Once all of the pond water, from top to bottom, is 39°F, the surface layer expands as it continues to cool. When it reaches 32°F, the liquid water solidifies and, as the molecules slow, heat is given off.

Years ago, while watching ice crystals close over a recently-abandoned ice fisherman's hole, I noticed that the crystals formed in an irregular pattern, as if they had attempted to spread and then stalled. As it turns out, the heat given off by newly formed crystals puts a brief hold on the creation of the next crystal.

Once that first skim of ice covers the pond, the crystals make a right-angle turn and grow down. As the

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surface layer thickens, the pond's heat is trapped under the ice, and the downward growth of ice crystals slows.

At an air temperature of around 20°F, it can take less than an hour for the first half-inch of ice to form but nearly ten hours for the ice to become two inches thick.

As the crystals grow, air gets condensed and trapped in the honeycomb of ice crystals, resulting in the milky translucence common to lake ice.

Through the Looking Glass

When ice first forms on a lake, there are other variables to consider besides temperature. If it is windy, the ice will be rough and if it's snowing, the ice can be quite punky.

As a kid, I loved to ice skate but my rink was the lake behind the house. I was sort of a cross-country skater. So, I came to appreciate this quality of ice formation with each passing winter.

One winter, the first ice formed on a calm, snowless, bitter cold night. The conditions were perfect. The ice was smooth, hard, and nearly clear. It was as if all of the lake's surface had turned into a glass-bottomed boat. The west tongue of the lake was filled with aquatic weeds. During the summer, it was hard on sailboat centerboards but a popular destination for anglers. I was skating over this submerged vegetation on that beautiful clear ice when I noticed the weeds moving. While I knew that currents flowed under the ice, this movement was different. The weeds looked like they were being tugged or yanked. In fact, they were.

Shell Station

I got on my knees to take a closer look and I saw two mid-sized snapping turtles moving in slow motion beneath the ice. This was curious since, at the time, I thought turtles "hibernated" in the mud along with the lake's frogs.

While these animals do overwinter near the mud, that does not mean they are inactive. For example, leopard frogs can move a little bit in water that is not far above freezing and snapping turtles, as I observed, do crawl along the bottom during the coldest times of the year. Snappers, which have a tolerance for chilly water, are inactive for only short periods of time.

Leaves to Gills

The clear ice I was peering through allows sunlight to reach the aquatic plants which, in turn, allows the plants to photosynthesize. During photosynthesis, as you may recall, plants take in carbon dioxide and give off oxygen. Sometimes, air bubbles under the ice indicate that submerged vegetation is busy pumping out the oxygen.

Remember, the ice overhead seals the lake off from the air above. Also, organisms living under the ice need dissolved oxygen to

breathe. Fish, which are more active in winter than the animals discussed earlier, use gills to filter out the needed oxygen.

So, what happens if the ice isn't so clear? What if a heavy layer of snow covers the ice for months at a time? Well, if the lake is shallow and rich in nutrients, this could be bad news for the fish. With little light, aquatic plants' ability to photosynthesize and produce oxygen is dramatically decreased. Yet everything from bacteria to fish, which are not limited by the availability of other nutrients, are still consuming dissolved oxygen. Oxygen then becomes the limiting factor.

Evidence of the oxygen limit being reached is indicated by dozens of dead fish surfacing after the ice melts. Known as a 'winterkill,' this phenomena is sometimes blamed on pesticides when it is just nature's way of thinning the a lake's population. Bad news for the fish is good news for the crows, possums, raccoons, and other shoreline scavengers.

Speaking of the shoreline, I just experienced a trauma along the edge of Stillman's pond.

Watch Your Step

As mentioned above, the ice was forming on Stillman's pond when I started this story. The next day, I took my dogs for a walk elsewhere on the property. Shortly before getting back to the kennels, Jamie, the older dog who has difficulty climbing stairs these days, decided to go on an adventure.

I wasn't too concerned since he normally just walks into his kennel after investigating a deer antler or raccoon skull. Unfortunately this day, hours went by and he did not return.

As you might expect, I retraced our steps and then drove around the neighborhood, all the while yelling out his name and listening for barking. Finally, I called the police.

More time passed and then I heard the younger dog bark and saw her look south, across the pond. Most of the pond is not visible from the office, so I took off right away wearing old sneakers, torn pants, and a sweatshirt. Relieved but also concerned, I found Jamie.

He had apparently tried cutting across the pond's thin ice and didn't quite make it. He was violently shivering in a mixture of broken ice and ink-black pond mud, unable to extricate himself. I had only one option: I broke through the ice, went waist deep in the very muddy water, and got the old boy out. We were quite the pair when we got to the fine folks at the **Dundee Animal Hospital**. Thanks to their excellent care, Jamie is back on his feet.

As for me, I was dramatically reminded what it can be like when you aren't careful on the ice. As George Herbert wrote centuries ago, "Trust not one night's ice."

