

## **How does the ice form on Rock Lake and what does it look like below the surface?**

You can find the answers to both these questions in this article. Read on to get to know the process of formation and to find out where you can see some actual ice blocks harvested from Rock Lake.

Ice as defined by Webster is a word derived from a Middle English word meaning cold. “Ice is the glassy, brittle, crystalline form of water made solid by cold: frozen water or a piece, layer or sheet of this cold frozen water.” But what do we really know about this ice that covers our lakes seasonally, cools our lemonade or covers our sidewalks and windshields with a glaze? Making Waves will explore this topic in the next several articles, examining this yearly visitor and how it shaped the history and economics of Lake Mills.

Lake ice cover is seasonal (as you may have noticed!) and occurs when the average daily temperature dips below freezing. Once formed, the lake ice thickens as the air gets colder. To understand lake ecology it is important to understand the function of the thermocline. A thermocline occurs when two layers of water with different temperatures set up in the lake. Typical of many northern temperate lakes, two periods of thermal stratification are observed and take place each year. During the summer months, the waters stratify, with the warmer waters at the top of the the water column and cooler waters below. These waters do not mix. As the fall approaches and surface temperatures change the thermocline moves deeper, eventually leading to the complete turn-over of the water column. With all the waters mixed, the temperature of the entire body of water is lowered. This lake science phenomenon was discovered at the turn of the century (not the recent one) and has helped us understand our lakes more completely. This turn-over in the fall also sets up the water temperature perfectly to begin formation of the ice cover.

Not all ice on the lake is created in the same way. There are two major types of ice that form on Rock Lake: congealation ice and snow ice, both defined by how they form.

Congealation ice can result when spontaneous nucleation ice forms on calm night on a super cool lake surface. The ice nucleates and forms crystals very rapidly, spreading across the surface. You have seen this horizontal growth of ice in puddles, creating beautiful frosty patterns on the surface. It is wonderful to walk out on this crystal clear newly formed ice and view the aquatic world below, but it can be dangerous, since it is often not yet strong enough to support the weight of a person or even a child or a pet.

Another kind of congealation ice is formed when surface winds blowing snow, dust and rain hit the surface of the water and cause homogeneous nucleation of ice crystals. These crystals grow in a horizontal pattern also, but are not as clear and have a cloudy look. It is very difficult to tell the thickness of this ice formation.

Snow ice is the second kind of ice formed on lakes; it occurs when snow falls on already formed congealation ice. The ice expands and cracks, the cracks fill with water and blowing snow, and the surface then re-freezes. This crystalline snow ice is easily identified.

There can be all types of ice forming throughout the lake surface at the same time, depending on weather conditions. Snow, wind, and rain continually affect the upper surface. And the ice continues to thicken as more water below the initial layer reaches the freezing point and adds to the thickness from below. Ice harvested recently from Rock Lake clearly shows in one-inch bands this additional layering from below. These local blocks of ice are open for your inspection in front of Tyranena Brewing Company on Owen Street. These huge blocks are a vivid demonstration of how clear and useful the waters of Rock lake once were to harvest and sell.

Above the initial layer of ice the winter weather rages on. Winds polish the surface. Sun warms the surface, and the ice expands, cracks and contracts. Snow falls and covers the ice surface, insulating it from the sun. Snow sifts into the cracks and mixes with water and re-freezes. The surface of Rock Lake ice is constantly changing as winter progresses. Knowing the lake, its inlets and outlets, depths, and aquatic geography are essential to making any travel on the surface of the frozen lake safe.