



THE ATMOSPHERIC RESERVOIR

Examining the Atmosphere and Atmospheric Resource Management

THE ICING ON THE LAKE

By Mark D. Schneider

January is a popular month for ice fishing on North Dakota's lakes and rivers. Regrettably, incidents of vehicles and ice fishing shelters falling through insufficiently thick ice occur each season. There are many factors that determine the formation of ice including the thickness of any current ice, weather conditions (temperatures, winds, and cloud cover) and water currents.

In previous articles, Growing Degree, Heating Degree, and Cooling Degree Days were discussed. Now we introduce the Freezing Degree Day (FDD) and use it to calculate the accumulation of ice. A FDD is defined as the daily average temperature subtracted from 32 degrees Fahrenheit. For example, if the daily average temperature is 17°F, we take 32° minus 17°F and get 15°F. This means that there were 15 FDDs and that is conveniently the average number of FDDs that it takes a lake to accumulate an additional inch of ice in 24 hours. Again, there are other factors that determine how fast and thick ice accumulates, but FDDs are a basic method to estimate the rate.

An existing layer of ice on the surface of a lake works to insulate the water below. Air pockets form in the ice, like the air bubbles inside an ice cube, and these trap

heat much like the multiple layers of blankets or clothes that we're accustomed to using during the winter months. Snowpack on top of existing ice also serves as an insulator by trapping heat. This slows the rate of ice accumulation and is why lakes don't freeze all the way to the bottom even when temperatures remain very cold for extended periods of time. During the coldest of winters, the ice on North Dakota's lakes may be three to four feet thick, but this isn't usually enough to completely freeze lakes unless they are shallow.

The last consideration for lake ice formation is turbulence. A current or some other mechanism mixing the water body can prevent ice formation or at least make it unpredictable. Small, sedentary lakes are usually more predictable because of their lack of significant currents. However, many lakes may have springs that introduce warmer water limiting ice accumulation or entirely preventing the formation of ice. Many stories about Lake Sakakawea have been told over the years where areas with ice in the morning become open water by afternoon on the same day. So, enjoy North Dakota's winter recreation but remain cautious when crossing frozen waterways as some of them can change as quickly as the weather!

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