Ice Cover on Chandos Lake

In any given winter the number of days of ice cover is determined by the interval between Ice-In and Ice-Out.

Cathy Burgess has been recording Ice-In and Ice-Out data for the last 35 years.

On a trend line basis over this period her data show that the ice is coming in about 8 days later, and is going out about 3 days earlier, resulting in about 11 fewer days of ice cover. Over this period the ice cover interval has ranged from as long as 20 weeks (1989/90) to as short as 10 weeks (2011/12), with the average being about 15 weeks. To show how much variability there is year to year, in 2014, just two years after the shortest ice cover interval of 10 weeks, the ice cover lasted for 19 weeks!

There are many indications of climate warming, and gradual Ice Cover Loss is one of them. Chandos has not had a year where there is no ice cover, but many lakes in the northern hemisphere in the last 30 years have crossed that threshold. Some have also started to have multiple freeze-thaw cycles in the same season. (It has been 80 years since Lake Ontario completely froze over)

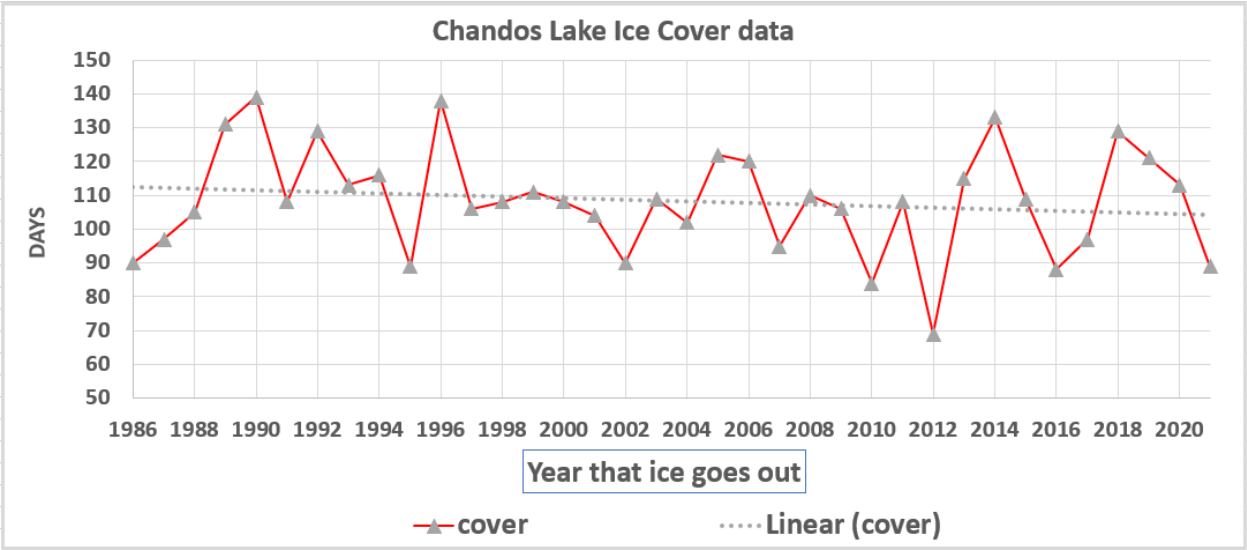
The Ice-In date

A unique property of water is that it is densest at 4 degC. Theoretically this means that the entire water column must reach 4 degC before freezing can begin. As surface waters cool, they become denser and fall, being replaced by warmer waters from below. This process stops when the entire column is at 4deg C. Only then can the surface waters begin to freeze. Chandos Lake is a fairly deep lake, and so there is a lot of heat to extract through this process. If the summer lake temperatures are warmer, and the fall air temperatures are milder, then it will take longer to extract sufficient heat to allow freezing to occur, resulting in a later Ice-in date. (this process is called “the fall turnover “– which also is how the bottom waters get re-oxygenated).

The Ice-Out date

Various factors determine the Ice-Out date: the amount of snow cover; the thickness of ice; spring temperatures; the amount of spring sunshine; the timing and quantity of spring rains.

Here is the graph for Ice Cover at Chandos Lake



A shorter Ice Cover period means there is a longer Ice-Free period. This usually means that the lake will be warmer, and that the decline in bottom water oxygen will be greater, stressing certain fish species and encouraging weed growth. Early springs also affect other biota; along with fish spawning, Loon nesting etc. Climate change also increases the chance for extreme weather events, which can increase the odds of algal blooms, especially if they cause a large amount of rain water to carry nutrients off the land into the warm lake waters.