Teatown Trails

A QUARTERLY NEWSLETTER
OF THE TEATOWN LAKE RESERVATION OF BROOKLYN BOTANIC GARDEN

OUR PURPOSE: To maintain forever an unspoiled nature preserve of esthetic and educational benefit to the community and promote, through instruction, a greater awareness, understanding, and appreciation of our natural environment.

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WINTER PUTS A LID ON OUR LOCAL LAKES

Our local lakes will soon be closed for the season. Once again, December's cold is covering them with a canopy of ice. First to freeze are the smaller, shallow ponds. Such ponds may freeze from shore to shore in a single night, though several nights of accumulative freezing are required before ice will safely support a person. Larger, deeper lakes may not freeze until January. Gradually, the ice inches from sheltered coves and shoreline shallows into deeper, more wind exposed areas. Very deep lakes, such as Lake Glenida in Carmel or Croton Falls Reservoir, seldom freeze completely until late January; sometimes in mild winters they remain open.

Before a lake can freeze, the entire volume must be cooled. Water reaches its maximum density at 39.2 degrees F. During the cold nights of autumn, surface waters reaching this temperature become heavier and immediately settle to the bottom. Layer by layer this heavier water builds toward the surface until the entire lake is 39.2 degrees F. Not until then will the surface continue to cool. When cooled below 39.2 degrees F., water becomes lighter and remains near the surface until at 32 degrees F., freezing occurs.

As winter progresses, ice thickens mainly from the bottom though some snow ice also forms on the top surface. A cross-section of ice taken in February reveals a heavy thickness of clear ice topped with several bands of opaque snow ice. Each band of this white snow ice represents a major snowfall and provides a good record of the winter precipitation.

In our area, ice attains its maximum thickness in early February but deteriorates soon after, due to the strengthening sun. Tiny air bubbles in the ice act like little lenses, concentrating the sun's rays. These pockets of air become warm and melt the surrounding ice while the bubbles slowly work their way upward. Soon the ice becomes "honeycombed" or "crystallized" throughout. This porous ice is not as strong as the clear, hard ice of early winter. Even as the ice begins to deteriorate from within, its thickness begins to decrease. The snow ice melts and evaporates off the surface first. At this time, ice near the shores and over shallow areas also begins to lose its grip. Heat from the sun warms the bottom which, in turn, warms the surrounding shallows.

Shallow areas that are the first to cool and freeze in the fall are also the first to warm and melt in the spring. Deep waters hold ice longer. So do lakes where the water is exceptionally clear. Suspended particles in a turbid lake trap and hold the sun's heat, thereby warming the water. The presence of aquatic vegetation at or near the surface will have the same effect.

Adjacent topography also affects the rate at which a lake will melt. Because the sun is on the southern horizon in the winter months, a lake having a high hill to its south receives fewer hours of sun each day. The north shore of such a lake melts first because it receives more sunlight.

Local climatic quirks are another factor. Barger Pond near Shrub Oak (the ice box of Westchester) often keeps its ice into April. Boyd's Corner Reservoir (Kent Cliffs), Reservoir D (Carmel), Lakes Gilead and Glenida (Carmel) and Indian Lake (Peekskill) are also consistently late to thaw. Depth, elevation, water clarity and degree of wind and sun exposure all contribute to the longevity of ice on these lakes.

Because of supporting water beneath, ice, like a ship's hold, can support huge amounts of weight. (Hard ice over 1 foot thick can support an automobile.) Yet an expanse of ice, were it suspended in air, would break under its *own* weight. Ice floats in water with approximately 9/10 of its mass beneath the surface. The whole mass of a frozen lake floats like an ice cube in a glass of water. Contrary to popular belief, there is no air space between ice and water – whether in a lake or in a glass. Have you ever seen an ice cube in levitation? If a lake's water level subsides during the winter, the ice drops along with it by cracking and hinging at the shores.

It is fortunate indeed that ice is lighter than water. Were it not so, our lakes would not only freeze solid, but would probably remain frozen throughout the year. A layer of water would, of course, form at the surface during the summer, but the depths would remain frozen, insulated by surrounding soil and water, much as permafrost persists through the arctic summers.

Technically, ice is a mineral, having a definite chemical composition and crystalline structure. For obvious reason however, rock buffs have to forego keeping specimens of this "mineral" on their display shelves. □