

Checking the Ice /Safety
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Go to Lake Ice and read.

<http://lakeice.squarespace.com>

I use a light axe with inches marked off from the axe head.

I can chop blocks from the ice and measure them. It is easier to appreciate the freeze and thaw history of new ice by observing a block on edge with the sun shining through it.

As the sun thaws thin ice, it may cause air bubbles to form within the ice, the clear ice from a subsequent freeze cycle can create a visible layer. Re freezing can preserve the strata and visual record.

The calibrated axe can be drawn up against the bottom of the ice through a hole to measure the thickness of the ice. With inches marked there is no debate as regards to ice thickness.

The axe can be used to bludgeon the ice with the back of the axe head. How the ice cracks tells you a lot. You can skate slowly and bash the ice as you go to find the edge of thin ice before you fall through it.

If you cant chop a block of ice from a thin ice sheet then the ice is likely to be too thin for safe play. I leave the test bocks vertical in the ice so I can come back later and verify temperature history or solar gain affects. It is also easier to observe the ice blocks when they are delicately displayed so the light can shine through. Often I chop blocks out of or nearby obvious hazards, the vertical blocks serve as marks.

I dont think that the axe is the only way. It is my way. I dont like poles or poke sticks or chisels. The axe is also great for whacking off limbs of evergreen to mark holes. When we used to sail ice boats, we marked holes in the ice by stuffing a branch in to the ice to create an easy to see reference mark.

Checking the ice from a high speed ice boat is not recommended. The best way to check the ice is to skate on it with an open eye. Even wing sailors who enjoy unparalleled visibility and control should avoid sailing until the ice has been checked by a skater.

The bottom line: **the ice needs to be strong enough with a safety factor.** If it is cracking due to your load, the ice is warning you to get off now and come back later. Gaging the strength of ice by how thick it is can be misleading. Ice strength is variable dependent on temperature and ice composition. Checking the ice demands experience and familiarity of typical ice conditions.

Spring holes and gas holes are similar in that they both involve a water current focused up against the colder ice sheet. Bubbles can keep the water moving enough that it will not freeze in even the coldest arctic temperatures. Springs upwelling in shallow ponds can create open holes to thin ice sheets. Rain affecting the water table can force ground water in to a cold water body inducing turn over as well as re invigorating springs. Early season holes often signal a wider thin ice sheet around the hole.

Gas holes are nasty traps. Bubbles frozen within the ice can insulate and slow the freeze process. Shell ice over trapped gas bubbles is often very thin and will not support much weight.

Snow can disguise the ice as well as insulate the ice. Drifting snow can be trapped by the moist edges of holes thereby creating a drift which further insulates a hole from the freeze process.

Snow can load up thin ice sheets and submerge them. The slush can freeze to create a thick sheet of ice very quickly. However snow ice is not as strong as clear black ice due to the trapped air and crystal structure relative to clear black ice.

I like to avoid snow ice under 4 inches thick especially as temps rise above freezing.

Black Ice is the stuff we dream of. We all want to skate on clear black ice sheets to view the bottom flashing by, skate on the reflection of the clouds, dreamy daze. The caveat: thin black ice can be treacherous. It is possible to glide a long way on thin black ice before you fall in. Black ice is hard to read. Visual clues as regards to ice strength are subtle.

Self rescue can be exhausting if you have to claw your way through thin black ice sheets which impede progress. I like to wait for the black ice to be around 2 inches thick below freezing before I go skating. I know that I can self rescue from strong black ice which is significantly thin, perhaps 1 3/8 inches thick.

Black ice can be weakened by a thaw cycle. Air bubbles created during a thaw will remain trapped within the ice even after the ice re freezes.

Any ice strength is obviously affected by temperature. Often in the early season we are tempted to venture on thinner black ice sheets as temps rise above freezing. Venturing on to thin ice is purely reflexive; you are suffering from ice deprivation, a long summer or denial. We all know what they say about thin ice. Beware of ice which starts to show significant signs of thaw. Your skates carve up mush instead of shavings. The ice starts to crack and shift under your load. Shooting cracks or zipper cracks are typical warning signs.

When the ice is warning you by cracking or by triggering instinctive uneasy thoughts, **TURN AROUND AND GET OFF THE WAY YOU CAME**. If you doubt the ice, it is very logical to conclude that by getting off the ice to play another day you will not be trapped by the ice today.

Pressure Ridges/Cracks form as the ice sheets thicken and react to expansion and contraction. Often thin ice can be found where the pressure ridges open thick ice sheets. Ice can bridge when forced up away from the support of the water. Be careful with pressure ridges. Ice sheets which submerge can make ramps to the water. Ice bridges can be thin and weak. Broken ice is not able to support you the same way a larger sheet will.

Shorelines can have thin ice where solar gain from the bottom and shoreline keeps the ice from freezing.

As the ice sheet surges due to wind loads, water around the edge of an ice sheet can be moving enough between the ice and the shoreline to keep it from freezing.

If there has been heavy rain, the ice sheet in the pond or lake will rise up with the water level, the ice along the shore may be submerged, often cracking about 6 to 10 feet away from the

shore. As the water recedes the cracked ice along the shore can also bridge the water beneath if it is supported by the shoreline above the water.

Shorelines are typical places to find weak ice.

Snow drifts can often hide weak ice. The snow insulates the hazard keeping it from freezing. Late season ice can often include slush holes or traps created by a snow drift which has morphed from an obvious drift to weak ice full of trapped air.

Drain Holes form after significant thaw or rain. Water runs over the surface of hard ice seeking a way underneath. Cracks and small holes through the ice can be expanded by warm running water. Drain holes often exhibit signs of significant run off; eroded canyons in the ice are typical.

Gas holes and spring holes can be persistent. Early season hazards which healed up in seasonal cold can be exposed by significant thaws.

Layered Ice: Often ice sheets can be composed of slush, or water trapped between layers of snow ice and black ice. The ice is only as strong as the strongest layer. Be careful to verify all the ice in an ice sheet. Be aware of temperature changes while you are on the ice.

Ice which cracks due to your load is obvious. Radiating cracks or shooting cracks from you are typical. Zipper cracks are typical. It is logical; **get off ice which is warning you that support is marginal.**

On the other hand, as temps start to plummet at the end of the day, or as the sun starts to warm up a cold ice sheet, thick and stable ice sheets can stress relieve by cracking. Cracks are created by compression as well as tension within the ice sheet. The ice can sing a song. The rolling ponging and pinging of happy ice is a winter treat.

Ice gone to needles or candles: After a significant thaw, the ice will break down as it thaws around the grain structure. Tight grained ice can exhibit a needle or candle formation. Even ice which is quite thick, over a foot, can be thawed to needles. An axe is a nice tool for chopping test holes in the ice which do not penetrate through to the water. Chop a hole to see if water comes up through the ice. Observe if there is free surface water trapped within the ice structure. If so, it is time to get off the ice. In the spring it is quite common for the surface of the ice to set up enough that it seems quite strong. Rising temps can quickly thaw the surface layer to leave you stranded in slush far from shore. If the ice starts to feel like a frozen trampoline when you bounce on it, it is time to get off quickly.

Ice strength varies relative to temperature, composition, and clarity. Relative to snow ice which is full of air bubbles, clear black ice is very strong. At the end of the day, if it is not strong enough to support you safely, the composition and temperature of the ice will be moot. Learn to recognize ice condition by experience.

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Zipper cracks created by walking over thin black ice. Illustration shows a thin black ice sheet frozen along a shoreline where the thicker ice submerged due to heavy rain. Kalsin Pond, Kodiak, AK



Zipper cracks in thin black ice. The skater who left these tracks eventually fell through the ice. The ice was about 1 1/8 inch thick. Obviously the same skater ignored the warning signs.

Zipper cracks are typical in black ice which is too thin for safe passage. They are an obvious signal that the ice is marginal. Grassy Pond, Rockport, ME



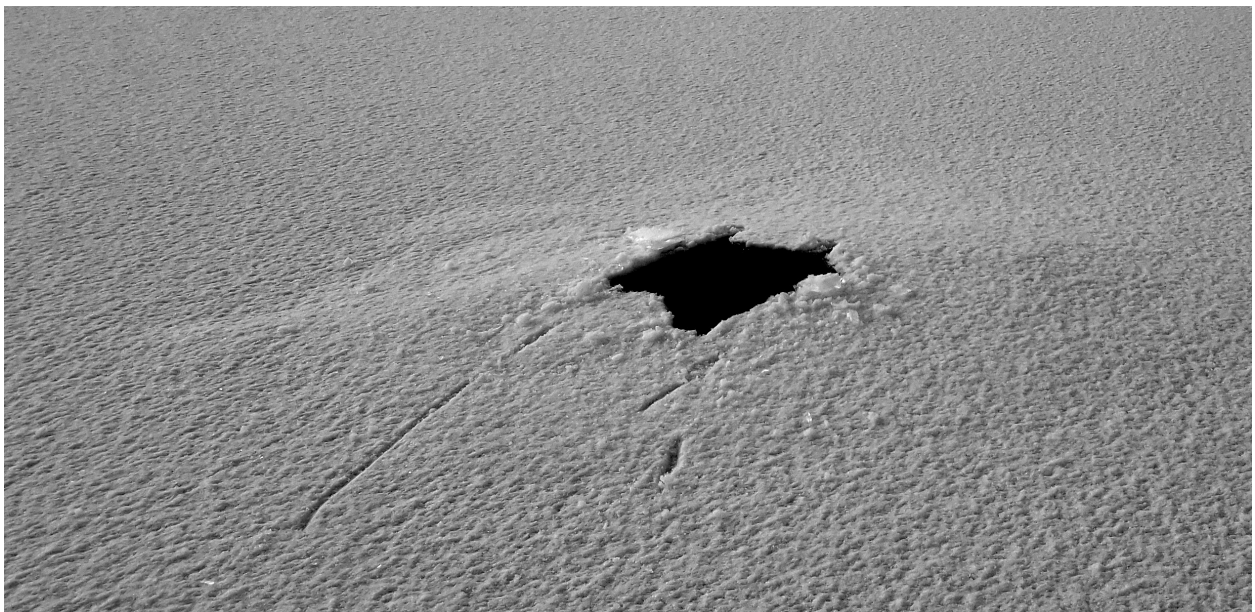
Spring hole, Kalsin Pond, Kodiak AK



Open spring hole. Grassy Pond, Rockport, ME



Gas hole disguised by about 3/4 inch of frost and snow. Buskin Lake, Kodiak, AK



Same gas hole as previous illustration after the thin shell ice has been exposed open to reveal the water. The ice sheet is four inches of hard black ice. The shell ice over the gas bubble was about 1/8 inch thick.



Gas hole with a rime of blown snow which caught in water after a thaw during the new freeze cycle. Now the hole is transforming to a snow drift which will disguise and insulate the thin shell ice over the gas bubble in the middle of the picture. Buskin Lake, Kodiak, AK



Slush hole in relatively strong spring ice. Likely created by a vestigial snow drift. Lake Megunticook, Camden, ME



Checking black ice in Maine. Chopped block of hard, strong, clear black ice. Note the tube with a line on it. We often towed the tube for safety. The tube is a great way to tow cold kids, as well as a way to rescue anyone who falls in.



Chopped block of ice shows distinct layers created by fluctuating temps. Ice is about 4 inches thick with a 3 inch layer of black ice which is full of air bubbles. The black ice in this sample is not as strong as hard clear ice. If temps rose above freezing this ice would get weak quicker than the harder clear stuff. Lake Lee, Kodiak, AK



Calibrated axe. The axe can be drawn up against the underside of an ice sheet through a chopped hole. Zero allows for curve of axe head and a safety factor.



Picks should be worn outside clothing. These have a nice adjustable lanyard so they may be snugged up tight under the collar. Picks worn loose can fling or float behind your neck where you will not be able find them when you are surprised and scared. These picks are attached by a safety string, they include a whistle. The whistle is used to attract attention as well as to warn of danger. Picks in a pocket are useless. Do not remove the safety string; picks which can float away are useless.

Commercially available picks like these cost less than 30 USD. You will not be able to build your own any better or cheaper. Nails and screw drivers sink. Home brewed picks are better than none at all.

Practice with your picks before you have to use them for real.

When the time comes: Turn around and go back the way you came. Logic dictates that the last known strong ice is the ice you were on before it failed. Swim out of the water and pick your way by pulling, not pushing down, on the ice. You swim to stronger ice by staying horizontal. You roll or slither to distribute weight. Attempting to lever yourself out of a hole while your legs are pointed at Davy Jones locker will be hard. **REMEMBER TO GO BACK, TO TURN AROUND.** Be quick. The faster you get out, the less you cool off. It takes a long time to get hypothermia, on the other hand, it is easy to drown when your body shuts down extremities to preserve core temps. It gets harder to get out of the icy trap the longer you remain in it.



Throw lines. Carry one for your partner or give yours to the other person so they may save you. Everyone should have a throw line.

The light weight reel with Spectra line is plenty strong enough. The reel fits in my pocket where it will not freeze, where I can carry it easily. The reel is easy to roll as well. It deploys more accurately than a bag. The reel self cams to its line which makes it easy for anyone.

Commercially available throw bags can be bulky and if they are carried outside a pack, they can freeze. It is tough to throw a wad of frozen rope. Throw bags get left in the car because they take up too much space.

Keep the line in front of you. Do not loop the bitter end of a rescue line to your wrist; you do not want to be dragged off your feet in to the water as well. Wrap the line around your wrist so you can let go if you have to without losing the line. A carabiner and an ice screw are recommended.

Back away, tow the person at the other end on to stronger ice.

Practice can be fun.

CHECK THE ENTIRE ICE SHEET YOU EXPECT TO PLAY ON. BE RESPONSIBLE FOR THE FOLKS WHO JOIN YOU ON THE ICE. PICKS AND THROW LINES SHOULD BE REQUIRED.



This is the hole through black ice about 1 1/8 thick where a skater went through the ice. The same very lucky guy left obvious zipper cracks behind all over the same ice sheet prior to the failure of the ice. The skater ignored obvious warning signs. I was able to visit the scene a day later when the ice was much thicker. Grassy Pond, Rockport, ME



Minimum gear includes a throw reel, picks and a pack bouyed by a water tight stuff sack with warm clothes. Skates are heavy. Warm clothes are nice after you get out. Stuff sack inflated with clothes is a nice floatation device. I also carry a short ice screw with a carabiner.