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DANGER, Thin Ice!

When is ice safe? There is no sure answer. Ice is tricky, and just because a lake or stream is frozen doesn't mean the ice is safe.

To understand the factors involved in the strength of ice, it's necessary to understand how ice forms on lakes and streams and a few of its physical properties. Here are the key points to remember, some of which are based on research by the U.S. Army Cold Regions Research and Engineering Laboratory in New Hampshire:

- You can't tell the strength of ice just by its appearance, the daily temperature, thickness, or whether the ice is covered with snow or not. In fact, the strength of ice is based on all four factors—plus the depth of the water under the ice, the size of the water body and its chemistry, the distribution of weight on the ice and local climatic factors.
- Generally speaking, new ice is much stronger than old ice. Ice formed by the direct freezing of the water of a lake or stream will be stronger than ice formed by melting snow, refrozen ice, or ice made by water that bubbled up through cracks and froze on the surface. Four inches of new ice may be strong enough to support a person, while a foot or more of old, "rotten" ice may not.
- The ice cover can be several inches thick in one spot yet only an inch thick nearby.
- The cover of snow insulates ice, slowing down the ice-forming process. The additional weight of the snow can also decrease the weight-bearing capacity of the ice cover.
- If you hear ice "booming" or cracking on cold days or during still evenings, it doesn't necessarily mean the ice is dangerous but merely that it's changing shape, expanding and contracting, as the temperature changes.
- Ice is weaker near shore. The buckling action of a lake or stream over the winter continually breaks and refreezes the ice along its shores.

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- The ice over flowing water can be dangerous, especially near shore, around inflows and outflows, at bridges and on lakes with large numbers of springs. The ice on straight, smooth-flowing stretches of a river is safer than that over bends in the river. River mouths are dangerous because the current undermines the ice and creates weak spots. A potential danger spot on lakes is an open portion completely surrounded by ice, because winds force the exposed water beneath the ice and melt it from below.

- Fluctuation in water level and the actions of birds and fish can also weaken ice. Schools of carp, for example, create thin spots, or even open water, in ice cover by congregating in one location while circulating the water below with their fins.

Tips for Going Out on the Ice

Once you understand the physical properties and problems with ice, you can understand why ice is so unpredictable and why the only absolute rule for ice safety is to stay off. If you like ice fishing, cross-country skiing, ice skating, snowmobiling or ice boating, however, staying off the ice is going to put a crimp in your winter fun. So, for those who venture onto the ice, whether on foot or by vehicle, here are some tips to lessen your chances of a breakthrough:

- Clear, solid ice uniformly four inches thick is usually sufficient to hold a single person walking on foot. Ice fishing requires at least four inches of ice, and a snowmobile, five inches. Automobiles and light trucks require at least eight inches to a foot of ice. (Remember these are merely guidelines: The factors mentioned previously must also be considered.)

- Before you head onto ice, check with a local bait shop operator, resort owner or ice angler about areas where the ice is known to be thin or where aeration operations have created open water.

- Refrain from driving onto the ice in a car or truck. It is illegal to do so on some lakes, particularly in urban areas, but driving onto the ice in a vehicle on any lake—especially early or late in the season—is simply a matter of an accident looking for a place to happen. If you must drive on the ice, be prepared to leave your vehicle in a hurry. Unbuckle your seat belt and make a simple plan of action in case you

break through. Some safety experts recommend keeping the vehicle's doors open and the windows rolled down for an easy exit.

- If you do drive onto the ice, prolonged parking is not recommended, especially if the thickness of the ice is marginal. Vehicles should be moved from time to time so the ice can resume its previous position and shape. Parking a vehicle in one spot too long tends to weaken the ice around it.

- Vehicles parked close together may depress the ice beyond its limit, causing it to break. A vehicle surrounded by ice cracks is in great danger, as it has only the buoyancy of the single un-cracked piece it is sitting on to support it.

- If you drive across ice that has cracked and refrozen, cross the cracks at right angles and avoid parking near them.

- Often vehicles will establish "roads" leading from shore to the current ice fishing hot spot. After repeated use, these roads may cause the ice to weaken, so those may not be the safest routes to take.

- If you're on a snowmobile or driving a vehicle, be especially cautious at night or when it's snowing. Falling snow and darkness can obscure spots of thin ice or open holes.

- If you break through the ice, proper clothing can increase your chances of survival. An ordinary nylon snowmobile suit, if it is zipped up, can trap air and slow your body's heat loss. Snowmobile suits with inflatable flotation elements are also available. One of the vest-type, foam personal floatation devices (PFD, or life preserver), worn under your outer clothing, can help keep you warm, conserve body heat and keep you afloat. Don't wear a PFD while traveling across ice inside a car or truck, however; if your vehicle goes under with you inside, a PFD could hamper your escape.

- Carry a couple of large nails or better yet, wooden dowels with nails through them, and a length of light nylon rope with you. The nails can help you pull yourself from the water on slippery wet ice. The rope is for rescuing someone else.

What to Do in a Breakthrough

To help yourself—If you break through while on foot, don't panic. Your heavy winter clothing, especially a snowmobile suit, will not drag you down. Instead, if you remain calm, it provides excellent floatation.

To climb out, turn toward the direction you came and put your hands and arms on the unbroken surface. Work forward on the ice by kicking your legs and using those nails, if you have them, to claw your way onto the ice. If the ice breaks, maintain your position and slide forward again. Once you are lying on the ice don't stand up. Roll away from the break until you're on solid ice. Once you're on safe ice, get to shelter and warm yourself immediately.

To help someone else—Resist the temptation to run up to the hole to give the victim a hand. Keep calm and think out a solution. It does neither the victim nor you any good to endanger your life unnecessarily. Use a rope, or look for a light boat to push across the ice ahead of you. If you are sure the ice will carry your weight, lie on your stomach and extend a ladder, pole or some object ahead of you for the victim to grasp. After being pulled from the water, the victim may require artificial respiration as well as treatment for hypothermia. Seek medical assistance immediately.

To escape a vehicle—If your car or truck plunges through the ice, your problems are compounded. You must now escape from your vehicle in addition to getting out of the water. Your escape should be relatively quick and easy if, as suggested previously, you were driving with the vehicle's doors or windows open and you are wearing neither a seatbelt nor a PFD.

If the vehicle's doors and windows are closed, however, the best time to escape is while the vehicle is still afloat and not—as reported in the past—after it has sunk. Depending on the vehicle and the circumstances, the floating time can vary from a few seconds to two or three minutes. The more airtight the vehicle, the longer it will remain afloat.

Studies from Michigan and the Netherlands on the problems of escaping from submerged vehicles have revealed two facts:

- You won't be able to open the vehicle's doors until the water pressure inside the vehicle is equal to that on the outside. But unless there is structural damage, you will be able to open the doors once the vehicle is completely filled with water.

- Vehicles with engines in front will descend engine-first at a steep angle. In water 15 feet deep or more, such a vehicle may come to rest on its top at the end of its descent.

Remember, your greatest ally in preventing ice accidents is common sense. Assess the condition of the ice and be prepared for breaking through the ice before you venture out on it.

While the vehicle is still afloat, the best escape hatches are the windows, since water pressure from the outside will make it impossible to open the doors. If the side windows are blocked and you don't have any tools handy to break them, try to force the front or rear (above water) window out of its frame by pushing against the corner of the window with your feet or shoulder.

Once the vehicle starts to sink, the amount of time and air you have left to work with are greatly reduced. Water will rapidly displace the air remaining in the vehicle, which will escape through the cab and trunk. An air bubble may remain in the vehicle as it sinks, but such a bubble is unlikely to remain long after the vehicle reaches the bottom.

Once the vehicle is filled with water, you will be able to open the doors, but the time you may need to remove any children or injured persons is gone. This is why it is important to try to get everyone out through the windows while the vehicle is still afloat.

Remember, your greatest ally in preventing ice accidents is common sense. Assess the condition of the ice and be prepared for breaking through the ice before you venture out on it. Five minutes of checking the ice from shore, coupled with systematic regular checks of the ice while you are on it, can make the difference between an enjoyable outdoor experience and a tragedy.

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