Fish Pond Ice and Winter

Ice over the fish pond during cold winter months.

By Stephen M. Meyer

Q. In the October 1997 "Ponds & Pond Fish" column you discussed the problems of keeping koi outdoors all winter in the northern U.S. You noted that the fish are sensitive to cold temperatures and the decline in dissolved oxygen in the water.

"Aquarium Online" in the same issue discussed cool water tanks. In the third paragraph it stated that colder water holds more oxygen. This seems to contradict your column. Moreover, I remember a "Ponds & Pond Fish" column in a past issue about dissolved oxygen. The chart showed that as water gets colder the dissolved oxygen levels increase. So, which is it?

A. I went back to my October 1997 issue to see what I wrote. I can see how the text might be confusing — you know, the editor is supposed to catch these things. First, colder water does indeed hold more dissolved oxygen.

The discussion in my October 1997 column about lower levels of oxygen in winter pond water was referring to the situation where the pond's surface becomes covered with ice. That is why I went on to advise using a pond deicer.

Colder water holds more oxygen. So winter pond water at 36 degrees Fahrenheit will have a very high concentration of dissolved oxygen compared to, say, 75 degrees in summer — all other factors being the same. However, once an ice sheet forms over the pond it acts as in impenetrable membrane, trapping gases in the water and preventing gases from entering the water from the atmosphere.

As the fish respire and bacteria respire, oxygen in the water is depleted. Carbon dioxide, sulfur dioxide and other gases build up. The ice cover does not allow these gases to percolate out into the air, nor does it allow oxygen to re-enter the water. So, a low dissolved oxygen condition evolves.

Should the ice remain for long, the fish would almost certainly suffocate. In areas where the water gets cold during winter, but ice formers infrequently, the water will tend to stay highly saturated with oxygen.