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Summertime and low oxygen levels in ponds go hand in hand. As water temperatures rise, the ability of water to hold oxygen is reduced. Low oxygen levels can result in stressed or dead fish. However, fish losses can be minimized or eliminated with a better understanding of the algae/oxygen relationship.

Most of the oxygen supply in a pond comes from algae in the pond. During daylight, algae undergo the process of photosynthesis, just like any plant or tree on land. Simply put, algae consume carbon dioxide ( $\text{CO}_2$ ) and release oxygen ( $\text{O}_2$ ). At night, however, the process is reversed, and the algae begin to respire. That is, algae consume  $\text{O}_2$  and release  $\text{CO}_2$  like humans, fish, etc. It is for this reason that low oxygen events typically occur in the hours before daybreak. If the algal population produces enough oxygen in the daylight hours to compensate for the oxygen that is removed by all organisms at night (algae, bacteria, fish, tadpoles, etc.), no oxygen-related stress will occur. If, however, not enough oxygen is produced during daylight because of cloudy weather, algae die off, or other interruption to the photosynthetic process; oxygen related stress and loss of fish can occur without aeration. From this one can see how important the algae are to a pond's health.

Oxygen related stress in most fish occurs when oxygen concentrations fall below 3-4 parts per million (ppm). As such, a good rule of thumb for using aeration is to start when the dissolved oxygen (D.O.) is expected to be 3 ppm or less at sunrise.

Aeration is defined in aquaculture as the transfer of oxygen from the air to the water.

There are a variety of types of aerators available; however each has a common goal. That is to create the greatest amount of surface area of water exposed to the air at any one time. Essentially, to be a good aerator, the water must be agitated sufficiently to create the thinnest sheet or smallest drop of water possible. Therefore, if an aerator is not available, and a low oxygen event occurs, an oxygen refuge should be created by reproducing the effects of an aerator. Some examples include a simple pump that sprays pond water high into the air like a fountain. As the water travels through the air and splashes, it has greater exposure to air and will take up atmospheric oxygen, resulting in an oxygen refuge that can help get your fish through the night. For pond water, you should draw no deeper than 24 inches from the surface. This will provide more efficient aeration for your pond.

For additional questions or information, contact P.J. Waters, Auburn University Marine Extension and Research Center, 438-5690.