

# *Fish & Wildlife*



## **Fish & Wildlife Topics**

**Fish and Wildlife Introduction**

**Oxygen Consumption and Types of Fish**

**Benefits of Aeration**

**Wildlife and Waterfowl**

**Preventing Winterkill of Fish**

**Hunting**

### **Fish and Wildlife Introduction**

It is no secret that fish and other aquatic organisms require oxygen to survive and grow. Dissolved Oxygen (DO) is naturally added to the water through diffusion at the air/water interface and through oxygen producing processes, like photosynthesis. Often times, however, these naturally occurring oxygen sources are not enough to keep up with the demand in your pond or lake (as discussed in the Aeration page).

Within a pond ecosystem, there are many organisms that depend on oxygen, but to a varying degree. Generally speaking, the larger the organism, the more oxygen it requires to support life. Therefore, the fish in your pond or lake will be the largest oxygen consumers per organism, since they are the largest. This also means they will be the first to suffer during periods of low oxygen.

## Oxygen Consumption and Types of Fish

Fish are typically split up into three categories, coldwater, cool water, and warmwater species. Coldwater species, as the name implies, require cold water to survive and, as discussed in the Temperature Solutions page, cold water has the ability to hold more dissolved oxygen than warm water. Therefore, these species typically inhabit deeper lakes and ponds in the Northern climates, spring fed streams and lakes with a constant cold water supply, or lakes in high altitude that are cold. Rainbow Trout, Brook Trout, Cutthroat Trout, and Golden Trout are just a few examples of coldwater species. These species grow best in water that is in the 50's and 60's degree range Fahrenheit. The minimal amount dissolved oxygen required for coldwater species is 5 PPM (parts per million). When oxygen levels drop, the lethal levels for cold water species is 2-3 PPM.

Cool water species require cool, but not cold water for survival and growth. These species can survive in warmer water than the previously discussed coldwater species, but still must be in water that is in the 60's and 70's degree range Fahrenheit for growth. Some commonly sought after cool water species are Walleye Pike or Walleye for short, and Muskellunge or Musky for short (as seen in the pictures below). Cool water species require slightly less oxygen for survival and growth than the coldwater species. Minimal levels of dissolved oxygen for cool water species is 4 PPM and lethal levels are around 2 PPM.



Walleye caught in Northern Wisconsin.



Musky caught in Northern Wisconsin.

Warmwater species require warm water, and since warm water holds less dissolved oxygen, they require less oxygen to survive and grow. Warmwater species grow best in water that is 80 degrees Fahrenheit or warmer, depending on the exact species. Some common warm water species are Large Mouth Bass, Catfish, Bluegill, and Tilapia. Minimal levels of dissolved oxygen for warmwater species is 2-3 PPM and lethal levels are around 0.5-1 PPM.

Within each category, the oxygen consumption rates vary according to size and species. The below table shows some typical oxygen consumption rates of adults and juvenile fish in each category. The numbers are in pounds of oxygen per 100 pounds of fish per hour.

Coldwater Adults = .02

Coldwater Juveniles = .03

Cool Water Adults = .025

Cool Water Juveniles = .035

Warmwater Adults = .03

Warmwater Juvenile = .05

The above numbers are averages and can increase directly after feeding, moving, or through general fish stress. This also may seem to contradict the information in the opening paragraphs, but remember there are many more juvenile individuals in 100 Lbs. of fish than there are adults, therefore the oxygen consumption is slightly higher per 100 Lbs. of fish.

## **Benefits of Aeration**

The best way to prevent low oxygen level related fish kills and lack of growth is to add supplemental aeration. Adding aeration will also allow for greater densities of fish, which is extremely important in aquaculture or fish farming applications. As discussed in great deal in the Aeration page, there are several types of equipment available for adding aeration to your pond or lake and each has its own strengths and weaknesses. A way to compare each is to consider the Standard Aeration Efficiency, or SAE. This is the measure of the pounds of oxygen per horsepower per hour that is added by the aeration device. You must also consider your specific application and what will work best for you.

The added oxygen will allow the fish to survive and grow quicker. When fish feed, they use a lot of oxygen. The oxygen is used through metabolic processes for physically feeding and also through in digestion. The available oxygen in the water decreases during and after feeding because the fish use up a lot, as well as bacteria that are decomposing the excess feed (and there always is some). Therefore, added oxygen through aeration, your fish will be able to feed more often and feed safer because you are decreasing the chances of a quick oxygen drop, fish stress, and possibly death.

You will be able to tell if your pond or lake has dangerously low oxygen levels. Typically the fish will begin to gather near the surface and actually gulp for air or "shark" their backs out of the water. Since a lot of the naturally occurring dissolved oxygen is from the air/water interface, the closer to the surface the fish are, the more oxygen available. However, this can be dangerous because this is also where the warm water is and being near the surface makes easy picking for predators like Great Blue Herons and King Fishers. If this is noticed, it is vital that aeration is added to the pond to prevent your fish from dying.

Kasco offers Pond Aerators, Aerating Fountains, and Water Circulators that can limit the chances of fish die off because of the aeration they provide. The Pond Aerators are the most efficient at adding oxygen because they do not use energy to provide a display. If you are just looking to add oxygen for your fish, this is the best choice. If you would like some aeration and a nice display, an Aerating Fountain is a great choice. They will not add as much oxygen per horsepower per hour as a Pond Aerator, but will give you a beautiful

display. The Water Circulators are great at creating directional flow and mixing water. They add oxygen by moving oxygenated water from the surface to the bottom and deoxygenated water from the bottom to the surface so it can diffuse oxygen into it from the air. These also work great along with a Pond Aerator or Aerating Fountain.

## **Wildlife and Waterfowl**

Aeration and water movement also benefits wildlife that uses your pond. The added oxygen will help balance your aquatic ecosystem and make for better water quality. It will also help maintain your water quality with the influence of the typical Canadian Goose residents of your pond. Some people really enjoy having resident geese and other waterfowl using their pond, others absolutely hate it. Either way, the waterfowl are supplying your pond or lake with nutrients from their waste (also your lawn, beach, etc.). These added nutrients can wreak havoc on your pond as discussed in the Nutrient Solutions page, if left alone. If the nutrients aren't dealt with, they will be available for plant growth that can take over your pond. The added oxygen allows for a speedier decomposition process which turns the organic sludge into carbon dioxide. That carbon dioxide is then vented off into the air and this venting is much quicker with water agitation, which Kasco products cause. This process of decomposition and venting of carbon dioxide is known as bioaugmentation.

If you are one of the first types of people described above, and enjoy wild waterfowl and/or have domestic waterfowl that use your pond, Kasco also offers items that provide them a safe haven during the winter months. Kasco Water Circulators and De-Icers will provide an open water area that will attract wild waterfowl during the winter months and also provide your domestic waterfowl a place to swim during the winter. The trick to de-icing is moving the warm water at the bottom that is heated by the earth to the surface, which keeps the water open. It is also important that the water not splash at the surface. This is why Kasco Pond Aerators and Aerating Fountains do work well in winter applications. When the water is splashed into the air, it is exposed to the cold longer. The water cools faster, and as the winter progresses, your pond can turn into a giant ice cube. Using a Kasco Water Circulator or De-Icer will successfully move the warm bottom water to the surface without splashing and keep an area open.

## **Preventing Winterkill of Fish**

The open water is also a welcome site to the fish in your pond. During extreme winters, there is always a chance for winterkill of your fish populations. This usually occurs in shallow, small ponds. During the winter months, the main source of oxygen is from plants through the photosynthesis process. When ice levels become very thick and/or there is a large amount of snow on top of the ice, sunlight cannot penetrate into the water. Without sunlight the plants begin to die and stop producing oxygen, plus when the dead plants are decomposed, the bacteria are using up a lot of oxygen. If this continues throughout the winter, the fish will begin to die off due to lack of oxygen, usually the larger fish first.

Luckily, winterkill can be prevented. As discussed earlier, cold water has the ability to hold more dissolved oxygen than warm water. In the winter, the water is very cold and has the ability to hold more than enough oxygen to support the fish in your pond; it just needs to be exposed to the air so oxygen from the air can diffuse into the water. This is where Kasco comes in. Using a Kasco De-Icer or Water Circulator, you can keep the water open so oxygen has a chance to diffuse into it and your fish can survive. A large open water area is not needed to prevent winterkill either. Only about 1% of the total surface area of the pond or lake needs to be open to prevent winterkill. In larger ponds or lakes, it is recommended to have several smaller

open water areas, rather than one large area. Fish will migrate to the areas of higher oxygen during low level times, also. Remember to check with local regulatory agencies about requirements of marking off open water areas along public water ways and always be extremely careful around open water in the winter.

## Hunting

Kasco Water Circulators and De-Icers can assist your waterfowl hunting efforts as well. The success of the waterfowl season greatly depends on the weather. If it stays warm through the fall, the birds prolong their flights south. If fall temperatures cool quickly, your season can be cut short by ice. If the birds see an area iced over, they will keep flying until they find open water. Duck and goose hunters have used Kasco Water Circulators to provide open water during cold stretches in the fall. Since most waterfowl blinds do not have an electric source close by, most hunters that use Kasco Water Circulators will bring a generator and head out to the blind a few hours early. Running the Water Circulator awhile before the morning breaks will de-ice an area in front of the blind and will attract the waterfowl to your area. The success and size of the area de-iced is dependant on things like water depth, length of operation, temperature, amount of existing ice, positioning, and bottom contour, but you should be able to get an area of open water to hunt over. This will help prolong your hunting season and hopefully your successes.



Kasco Marine, Inc.

800 Deere Rd., Prescott, WI 54021

[www.gotalgae.com](http://www.gotalgae.com) \* [www.kascomarine.com](http://www.kascomarine.com)

[info@gotalgae.com](mailto:info@gotalgae.com)

Phone (715) 262-4488 - Fax (715) 262-4487