

# COCAHOE WATER QUALITY

Water quality may be the most important factor in cocahoe minnow production. This fact sheet introduces parameters that must be taken into consideration when raising fish. A number of factors must be managed properly to ensure good survival and health of fish.

## Dissolved Oxygen (DO)

Dissolved oxygen is the most important factor to successfully maintain live bait. DO is often measured in parts per million (ppm) or milligrams per liter (mg/L), and the ideal range for live fish is 6 to 10 ppm of oxygen. At no time should oxygen be allowed to fall below 4 ppm.

DO problems may be chronic or acute. The most common chronic DO problems are caused by (1) overloading systems with too many fish and (2) warm, stagnant water. In addition, overfeeding, and uneaten feed can cause ongoing oxygen problems. The first sign of oxygen-related stress is usually an abrupt lack of activity, followed shortly by minnows crowding up at the surface and gulping for air or congregating near a water inlet or air stone.



Figure 2. Air stones are an effective method to oxygenate water. Photo: Jill Christoferson

DO problems can usually be corrected by reducing the number of minnows per gallon of water (to about 1 pound of fish per 10 gallons of water). Other methods to improve oxygen levels include pumping tank water through spray nozzles, but avoid creating strong currents that can damage or exhaust fish. Some facilities use electric agitators to maintain sufficient levels of oxygen, but again care should be taken to avoid creating excessive currents that can damage or exhaust live bait. Low-pressure air pumps and air stones can also be used to aerate tanks. An alternative in some situations is to use a low flow of compressed oxygen through an air stone; however, care should be taken not to super saturate DO from an oxygen bottle.



Figure 1. Electric surface agitator used to increase oxygen and water flow. Photo: Greg Lutz

## Chlorine

Chlorine or chloramine is added by water companies to tap water to remove bacteria. Even very low concentrations of chlorine or chloramine can cause damage to the gills of minnows. Chlorine or chloramine in tap water can be removed by adding commercially available products such as sodium thiosulfate, or chlorine can be removed by aerating the water overnight.

### Note:

Chlorine will evaporate out of tap water over a few days, but chloramine will not and needs to be chemically removed.



Figure 3. Use of shade cloth in outdoor pools can slightly reduce temperature over warmer months. Photo: Craig Gothreaux

## Temperature

Cocahoe minnows can tolerate a wide range of temperatures but cannot tolerate sudden temperature changes. The ideal temperature range for most bait holding systems is usually between 60 °F and 80 °F. Avoid direct sunlight on systems during most of the year to minimize unwanted heating (Figure 3). Under some limited circumstances, indoor fans can be directed across the surface of holding tanks to provide for evaporative cooling.

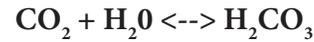
## Alkalinity

Ideally, baitfish systems that rely on biological filters should have water with alkalinity ranging from 100 to 250 ppm. In most instances, higher alkalinity will not cause problems, but lower levels may reduce the ability of biofilters to

break down ammonia into less toxic products. Alkalinity is a measure of carbonate and bicarbonate in water, and baking soda (sodium bicarbonate) can be added to water as needed to maintain alkalinity levels at or above 100 ppm. Alkalinity also provides a buffer against acidification of water due to CO<sub>2</sub> buildup (really carbonic acid in equilibrium)

**Alkalinity adjustments per 100 gallons**

1 tsp baking soda = 10 ppm increase  
6 tsp calcium chloride = 50 ppm hardness



**pH**

pH is a measure of the acidity of water. Normal levels are in the range of 7.5 to 9 pH units. pH can usually be maintained at acceptable levels as long as alkalinity is above 100 ppm. Moving live bait from a system where pH has already reached low levels into fresh water with a higher pH can cause stress and occasionally result in death.

**Ammonia**

Total Ammonia Nitrogen (TAN) is given off as a waste product by the minnows, and therefore, can build up from overfeeding or overcrowding. As it builds up, it can become toxic to the fish. Bacteria break down ammonia to less toxic nitrite. Further breakdown results in the less toxic stable form of nitrate. Ammonia needs to be monitored to prevent mortality. The safe range of TAN decreases with higher pH and temperature, but generally should be less than 1.00 ppm.

**Nitrites**

Nitrites are the less toxic product of broken down ammonia. While nitrites are considered relatively toxic in freshwater systems, they have a much less detrimental effect in saline water. As long as cocahoes are raised in their optimal salinity, between 5-15 ppt, nitrites should have a minimal effect on fish health unless the system has a severe nitrite problem. For best results nitrite levels should try to be kept below 10 ppm.

Water Parameter	Safe Range
DO	6-10 ppm
Chlorine	0
Alkalinity	≥ 100 ppm
pH	7.0-8.5
Salinity	5-15 ppt
Temperature	60 °F -80 °F
Total Ammonia Nitrogen	< 1mg/l

**Toxic Substances**

A number of commonly used household products can be toxic to live bait. These include insecticides, insect repellents, and common cleaning solutions used on windows, floors or other surfaces. Additionally, certain paints and metal fixtures used in holding systems can be toxic to live bait as well. Plumbing in fish holding systems should be done with PVC and not copper. Holding tanks made of concrete or block can release alkalis into the water for some time unless treated. The easiest approach is to fill a new concrete tank with water and add 1 pint of vinegar for every 50 gallons of water. Leave this solution in the tank for 4 or 5 days, drain, and repeat. Similarly, galvanized tanks can release zinc, which is toxic. Galvanized tanks should be coated with waterproof epoxy paint or other nontoxic coatings. Care should be taken whenever applying coatings to allow for sufficient curing time and flushing of any unwanted residues prior to putting holding tanks into use.

**Salinity**

See Salinity Fact Sheet.

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Updated June 2012