

# COCAHOE WATER QUALITY

A number of factors must be managed properly to ensure good survival and health of live bait for salt-water fishing. When holding live minnows or shrimp, important factors to monitor and control include dissolved oxygen levels and water quality variables such as alkalinity, pH, salinity, ammonia, and temperature. Mortality due to toxic substances is also an important concern.

**Dissolved Oxygen:** Dissolved Oxygen (D.O.) is the most important factor that must be managed to successfully maintain live bait. D.O. is measured in parts per million (ppm), and the ideal range for holding live bait is 6 to 10 ppm of oxygen. At no time should oxygen be allowed to fall below 4 ppm. Cold water can hold more oxygen than warm water and slows metabolism.

D.O. problems can be chronic or acute. The most common chronic D.O. problems are caused by (1) overloading holding systems with too many fish and (2) warmer water temperatures. Acute problems are due to some unforeseen problem with the system. Also, feeding, especially overfeeding can cause on-going 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.

D.O. problems can usually be corrected by reducing the amount 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 holding facilities use electric agitators to maintain sufficient levels of oxygen, but here 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 holding tanks. An alternative in some situations is to use a very low flow of compressed oxygen through an air stone.



An electric agitator

**Chlorine:** Chlorine or chloramine is added by water companies to tap water to remove bacteria, etc. Even very low concentrations of chlorine or chloramine can cause damage to the gills of bait fish. 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.

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

**Alkalinity:** Ideally, holding systems that rely on biological filters should have water with alkalinity ranging from 100 to 150 ppm. In most instances, higher alkalinity will not cause problems, but lower levels

## Summary of Water Quality

Water Parameter	Safe Range
DO	6-10 ppm
Chlorine	0
Alkalinity	≥ 100 ppm
pH	7.0-8.5
Salinity	5-15 ppt
Temperature	60-80° F
Total Ammonia Nitrogen	< 1.00 mg/l

may reduce the ability of biofilters to break down ammonia. 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.

**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.

**Salinity:** The ideal salinity range for cocahoe minnows is from 5 to 15 part per thousand (ppt). Two pounds of salt in 50 gallons of water is about 5 ppt. Water softener salt or rock salt can usually be used to increase salinity levels as long as no harmful chemicals have been added to prevent caking. Iodized table salt should not be used. If surface water is used to flush holding systems or provide make-up water after backwashing filters, keep in mind that salinity levels may fluctuate greatly due to heavy rains, tidal patterns, or prolonged periods of hot, sunny weather.

**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 highly toxic nitrite. Further breakdown results in the less toxic stable form of nitrate. Nitrite and ammonia need to be monitored to prevent mortality. The safe range of TAN is dependent on pH and temperature, but should be less than 1.00 mg/l. Additionally, aeration will not remove nitrogen products.



**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 from time to time in holding systems can be toxic to live bait as well. Holding tanks made of concrete or block can release alkalis into the water for some time unless treated. The easiest approach is to fill the 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 directly toxic. Galvanized tanks should be coated with water-proof epoxy paint or other non-toxic 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.



**Alkalinity adjustment per 100 gallons**  
1 tsp baking soda = 10 ppm increase  
6 tsp calcium chloride = 50 ppm hardness

Contributors:

Dr. Greg Lutz [GLutz@agcenter.lsu.edu](mailto:GLutz@agcenter.lsu.edu)



All photos by Greg Lutz