Cocahoe Hauling, Holding, & Handling

Water quality is the most important factor to manage while hauling minnows. Maintaining good water quality can make the difference between healthy, active bait or unhealthy bait and few return customers.

Density

To keep minnows healthy during hauling, 1 pound of fish will require at least 1 gallon of water. When fish are crowded, stressed and excited, water quality will deteriorate rapidly. The major factors that limit loading density are adequate oxygen levels and the buildup of toxic waste products from the fish themselves.

Temperature

Temperature influences other water quality variables, and it directly influences the metabolism of fish. While moving fish from one system to another, acclimate very slowly for temperature differences or else fish will become stressed and/or die. Slowly add the new temperature water into the old system to acclimate the fish until the water temperatures are less than five to seven degrees difference (F). In addition, going from cooler water to warmer water is more stressful than going from warmer to cooler. Adding about ½ pound of ice per gallon of water will generally lower the water temperature by about 10 °F. Ice made from chlorinated drinking water can cause problems as it dissolves; keep it sealed in plastic containers. Lowering the temperature during transport quiets fish, lowers their metabolism, and increases the oxygen level. For short trips (less than one hour), the hauling temperature should be similar to that of the water at the destination.

Water Sources

A suitable water supply is needed for short-term holding and hauling. If well or tap water is used, salt must be added to match the salinity of the water from which the bait will be collected. Cool, uncontaminated well water is usually preferred for hauling fish, but water should not be more than five to ten degrees (F) cooler than the water from which the fish are collected. Ideally, hauling tanks should be insulated so cooler water will tend to remain cool for at least several hours. If water from a tap or hose comes from a chlorinated supply, the chlorine must be neutralized before adding fish. Many commercial compounds are available for this use, and some neutralize ammonia. Make sure your chlorine remover will also neutralize chloramine, which is often used in rural water supplies since it breaks down much more slowly than chlorine.

Natural water from bayous or marshes where fish are collected will already have the correct salinity that the bait is accustomed to, but this water source often has dissolved organic material, a heavy algal bloom, or other organisms that can remove oxygen from the water and produce ammonia. Raw, untreated surface waters are also more likely to have harmful fish pathogens such as bacteria and parasites.

Physical Condition

One critical factor to the successful handling and transport of fish is to make sure they are healthy and in good condition before they are hauled. If fish have already been crowded with low oxygen and high stress for some period, they will already be in poor condition and more susceptible to any disease organisms they contact.

Aeration and Oxygen

Two common methods of aerating water during holding or hauling involve the use of mechanical agitators or compressed oxygen. Because fish are densely crowded and excited, it is essential to have an aeration system that can provide dissolved oxygen (DO) faster than it is consumed by the bait.

An oxygen meter or test kit is important for measuring oxygen concentrations in transport and receiving waters. Oxygen levels and water temperature can be monitored easily by using an oxygen meter; however most meters are relatively expensive. A low-cost alternative is to use test kits based on glass ampules with contents that change color depending on the oxygen content of the water - for a cost of roughly $1 per test.

Figure 1. Oxygen cylinders and hauling tank on trailer ready for transport. Photo: Greg Lutz

Oxygen concentrations in tanks should be maintained above five parts per million (ppm) at all times. However, these levels may be difficult or impossible to attain when only using agitators – an oxygen cylinder with tubing and air stones is a more practical, efficient approach for maintaining adequate dissolved oxygen in tanks. Additionally, excessive agitation can be harmful to delicate scaled fish. For all of these reasons, diffused oxygen is the preferred aeration method for holding and hauling small fish.

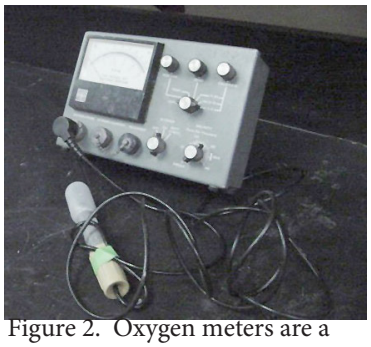

Figure 2. Oxygen meters are a critical part of many aquaculture operations. Photo: Greg Lutz

Oxygen cylinders are available from some industrial gas or welding suppliers. Pressure regulators are needed for each oxygen tank, and flow meters can be installed to adjust oxygen flow rates. Various diffusers such as air stones or porous tubing are available commercially for dispersing oxygen in the hauling tank.

Agitators can be used either alone or in combination with pure oxygen. Agitators also provide back-up aeration for emergencies when oxygen supplies run out. Cooling water with ice reduces metabolism rates of fish and increases the solubility of oxygen in the water. As fish breathe, over time carbon dioxide (CO_2) will accumulate in the tank. High oxygen levels, air circulation and water agitation during hauling will all help to reduce any adverse effects from accumulated CO_2. Adding baking soda could also help to neutralize the carbonic acid that comes from CO_2 in water.

Other Water Quality Characteristics

Salinity, water hardness, alkalinity and pH test kits should be used to check transport and waters the fish will be held in. If you deliver fish to sites where chlorinated water is used, a chlorine test kit is also helpful to be sure chlorine in waters has been neutralized. If not, chlorine and chloramine neutralizers will be needed to dechlorinate water. Ammonia can also increase in hauling situations and is not removed by agitation. Fasting fish before transport, using clean water, and lowering the water temperature all help reduce ammonia. Ideally, the pH of hauling water should be 7 to 7.5; higher pH increases the toxicity of ammonia to aquatic animals.

Figure 3. A refractometer is a relatively inexpensive instrument for checking salinity. Digital salinity meters are more costly but can be more precise. Different models can also measure other water quality characteristics. Photo: Jill Christoferson

Chronic fish losses or weak fish problems are often associated with handling and transporting fish in soft water or transferring fish from saltwater to freshwater. Hardness and alkalinity levels from 50 to 100 ppm are preferable. Sodium bicarbonate and calcium chloride will increase alkalinity and hardness and are safe to use. Add approximately 1 teaspoon of baking soda per 100 gallons of water to increase the alkalinity by 10 ppm. Add about 6 teaspoons full of calcium chloride per 100 gallons to increase the hardness by 50 ppm.

Hauling Tank Design and Construction

Most commercially manufactured hauling tanks are insulated. Urethane foam, plastic foam and corkboard are common insulating materials, but they can also be used with homemade tanks, glued to the outer surface. Tanks should be equipped with an overflow drain to maintain water level and allow agitators to function at the proper operating depth. Another feature is an air vent or scoop to permit air circulation in the space between the water surface and top of the tank.

Disease Management

Prophylactic treatment with approved chemicals can reduce pathogenic organisms that could cause problems during or after transport. Formalin may be used in holding vats for 15-minute to one-hour baths, but appropriate safety measures such as gloves, safety glasses, etc. should be taken when using this compound. Avoid over-treating with excessive doses or combinations of chemicals, and be prepared to flush any treatment with clean water (with the same salinity, hardness, alkalinity, etc.) if fish show any signs of stress.

Hauling tanks and equipment, such as dip nets, should be dried and/or disinfected between loads of fish. This practice reduces the possibility of spreading disease pathogens from one group of fish to another. Tanks and equipment can be thoroughly air-dried or treated with chlorine in approximately 1 teaspoon of bleach per 5 gallons of water solution for an hour. Flush tanks thoroughly after chlorine treatment. A 5 percent solution of formalin can also be used to disinfect and will not damage nets and seines as chlorine does over time.

Figure 4. Cocahoe minnows in a knotless net. Photo: Jill Christoferson

Nets, Netting, and Handling

Select the proper mesh size and net material for harvest seines and dip nets to avoid injuring fish. Use soft 3/16 inch knotless nylon mesh nets for delicate minnows, and do not overload dip nets or loading baskets since the fish at the bottom can suffer serious damage from the weight of the animals on top of them. Bait should be handled rapidly and delicate scaled species should be kept in water whenever possible. During netting and transferring of fish, avoid the warmest times of the day and direct sunlight.

Partial drying of the skin surface or gills can occur while moving small minnows. This in turn can allow bacterial and parasitic infections to occur, so minimize the time out of water on windy days when the drying effect is greatest. Cold winter air and wind chill factors can also cause temperature shock when fish are moved in nets.

Contributor:

Greg Lutz

Jill Christoferson

Christopher Green

Julie Anderson

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