

Harvesting, Hauling and Holding Live Bait for Coastal Fishing



Good Water = Good Bait



Water quality must be managed when live bait is stressed during capture and hauling. Adequate water quality will make the difference between healthy, active bait or heavy losses and few return customers.

Live Bait: Crowding = Stress

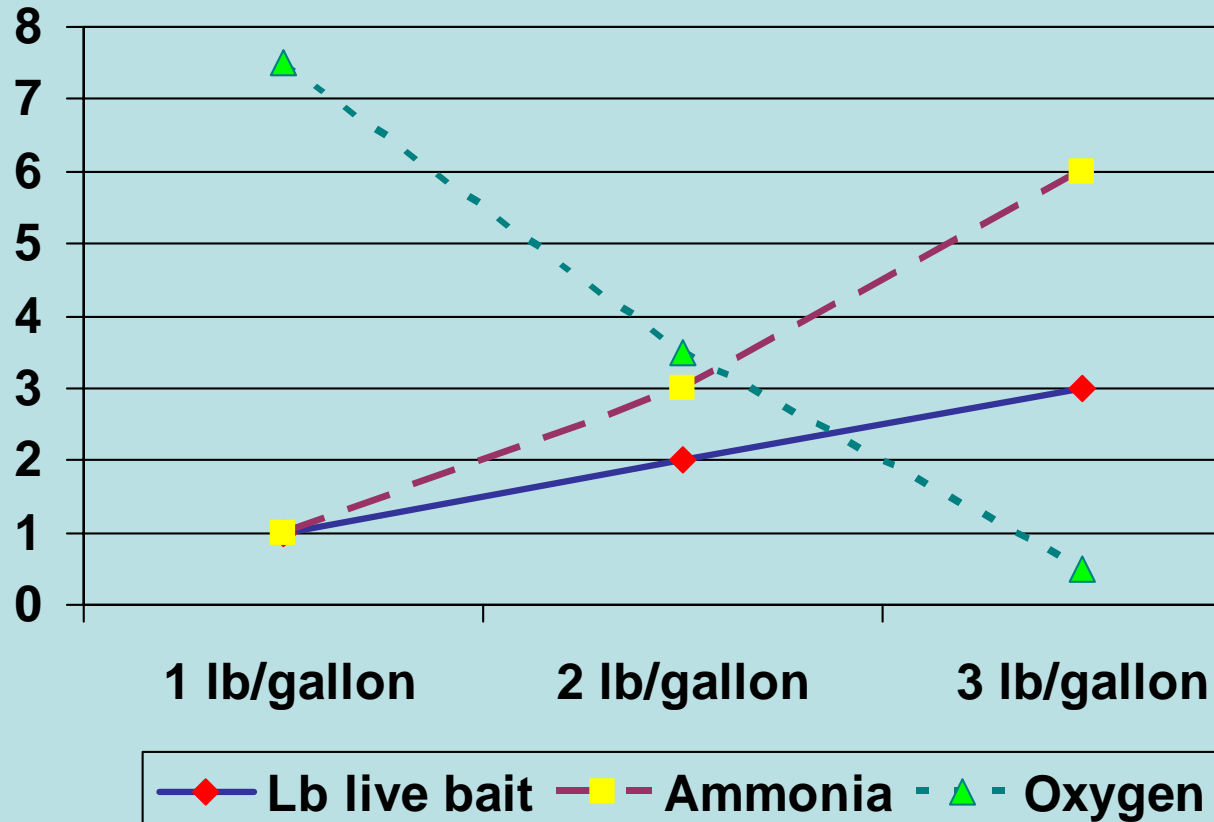


Photo: bayside-fishing.com

8 pounds of fish or shrimp will displace about 1 gallon of water.

BUT...To keep 8 pounds of live bait healthy during hauling, they will require at least 8-10 gallons of clean water.

Density↑ : Water Quality↓



As more fish or shrimp are placed in a given volume of water, the chances for keeping them alive and healthy decrease rapidly.

Live Bait: Density

- **Factors that limit loading density are oxygen levels and the buildup of waste products, primarily ammonia and carbon dioxide but also mucous and feces. These break down rapidly, consuming oxygen and producing even more ammonia.**



Live Bait: Density

- Water temperature and pH, as well as the amount of time the bait is held at high density, can affect the impact of low oxygen and high ammonia levels.

	<u>Percent</u> of total ammonia in <u>toxic</u> form (NH ₃)				
Temp (F)	pH 6.5	pH 7.0	pH 7.5	pH 8.0	pH 8.5
68	0.13	0.40	1.24	8.82	11.2
77	0.18	0.57	1.77	5.38	15.3
82	0.22	0.70	2.17	6.56	18.2
86	0.26	0.80	2.48	7.46	20.3

Temperature Effect



- **Cooling water with ice reduces metabolism and oxygen consumption of fish and shrimp and increases the amount of oxygen that can be dissolved in the water.**

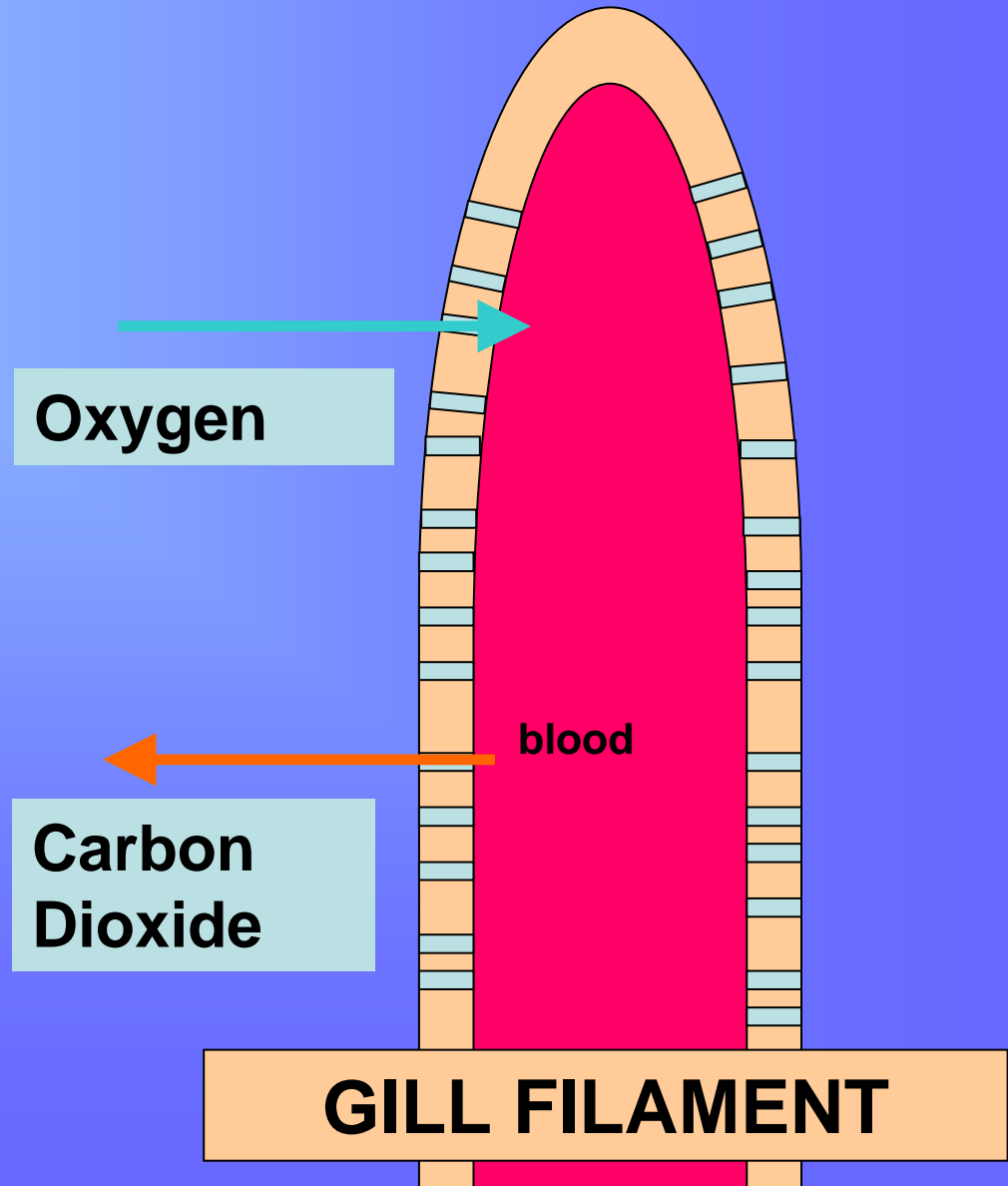
Oxygen and Carbon Dioxide



- **Maintain oxygen levels at 5 ppm or higher. Levels of 6 to 7 ppm are preferred.**

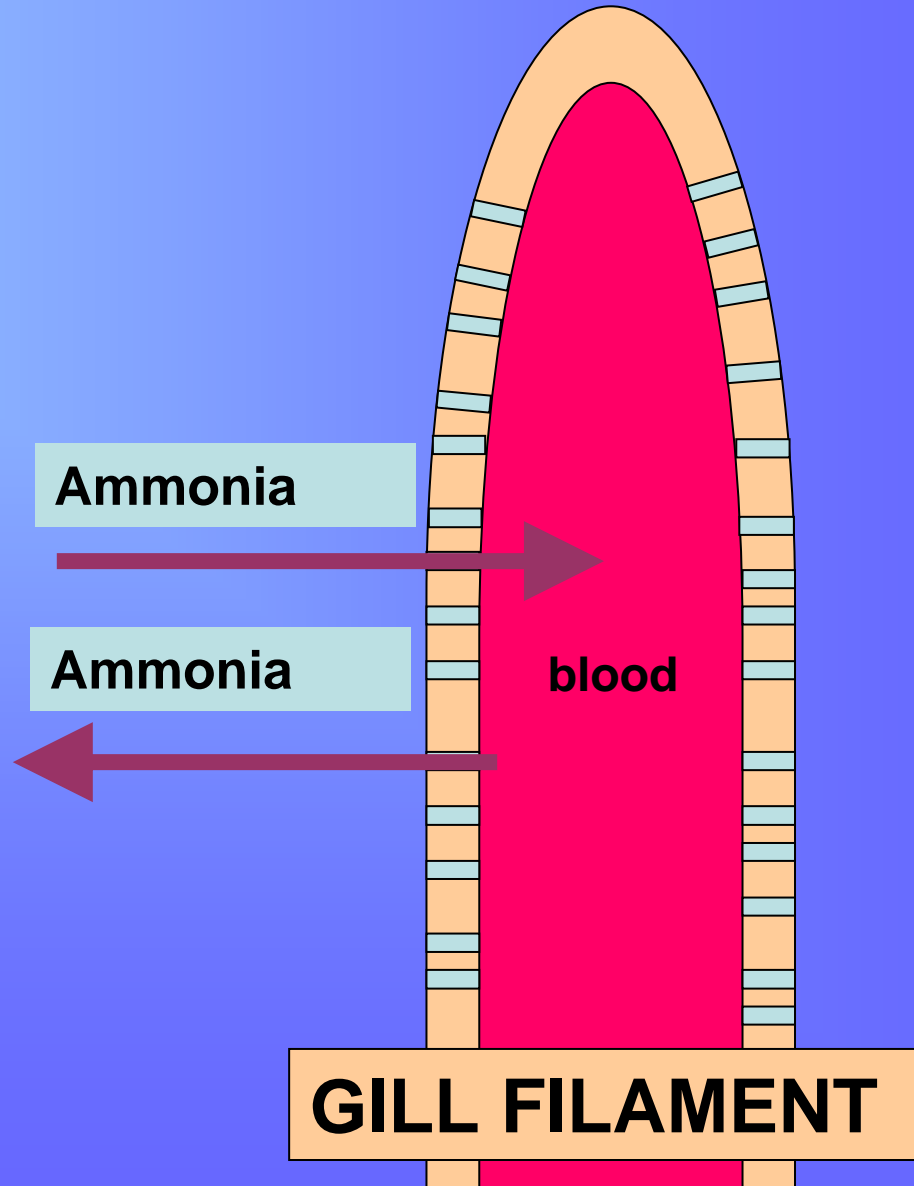
Oxygen and Carbon Dioxide

- As bait animals breathe, carbon dioxide (CO₂) will accumulate in the hauling tank. CO₂ is very soluble in water, so concentrations can become very high over several hours. Plenty of oxygen, air circulation and water agitation during hauling will all help reduce problems caused by CO₂.



Ammonia

- Like CO₂, ammonia also increases in hauling situations but it is not removed by agitation. Starving fish or shrimp before transport, using clean water and lowering the water temperature all help reduce ammonia build-up.

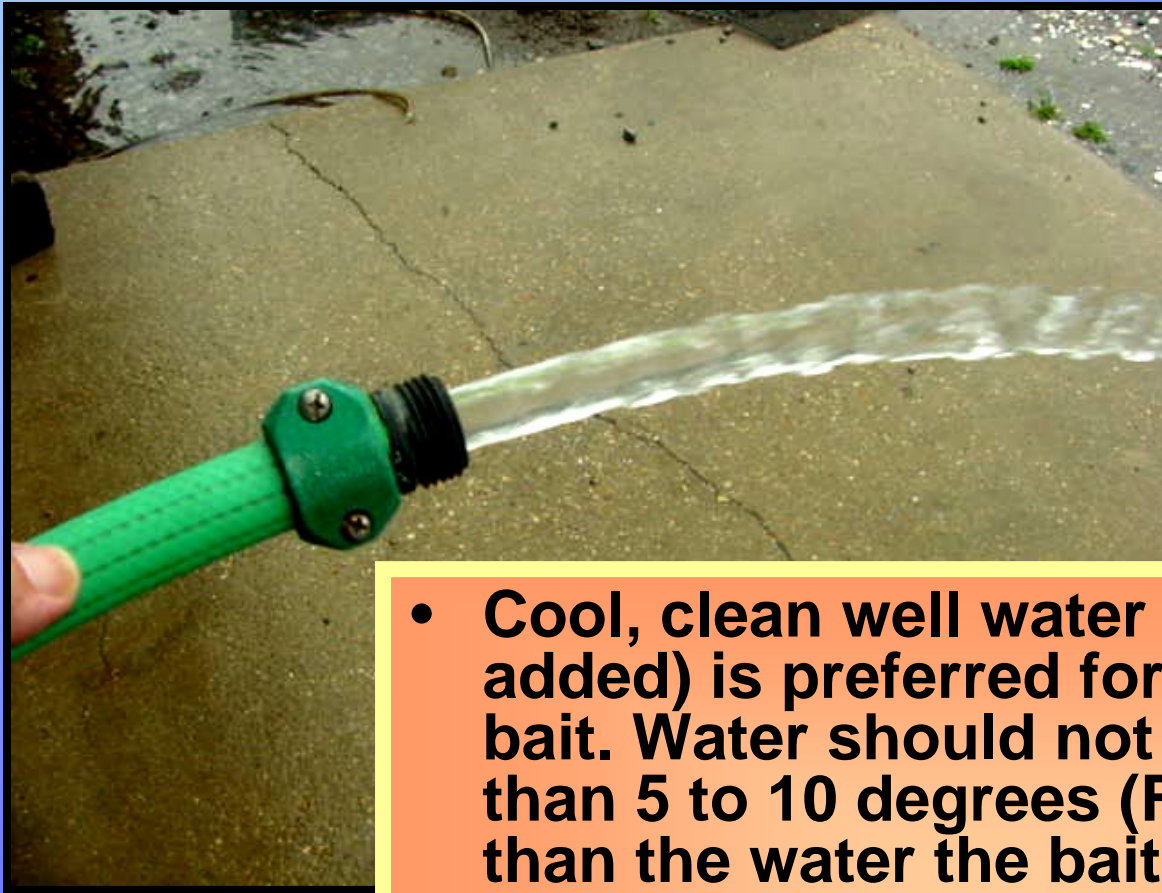


Water Sources



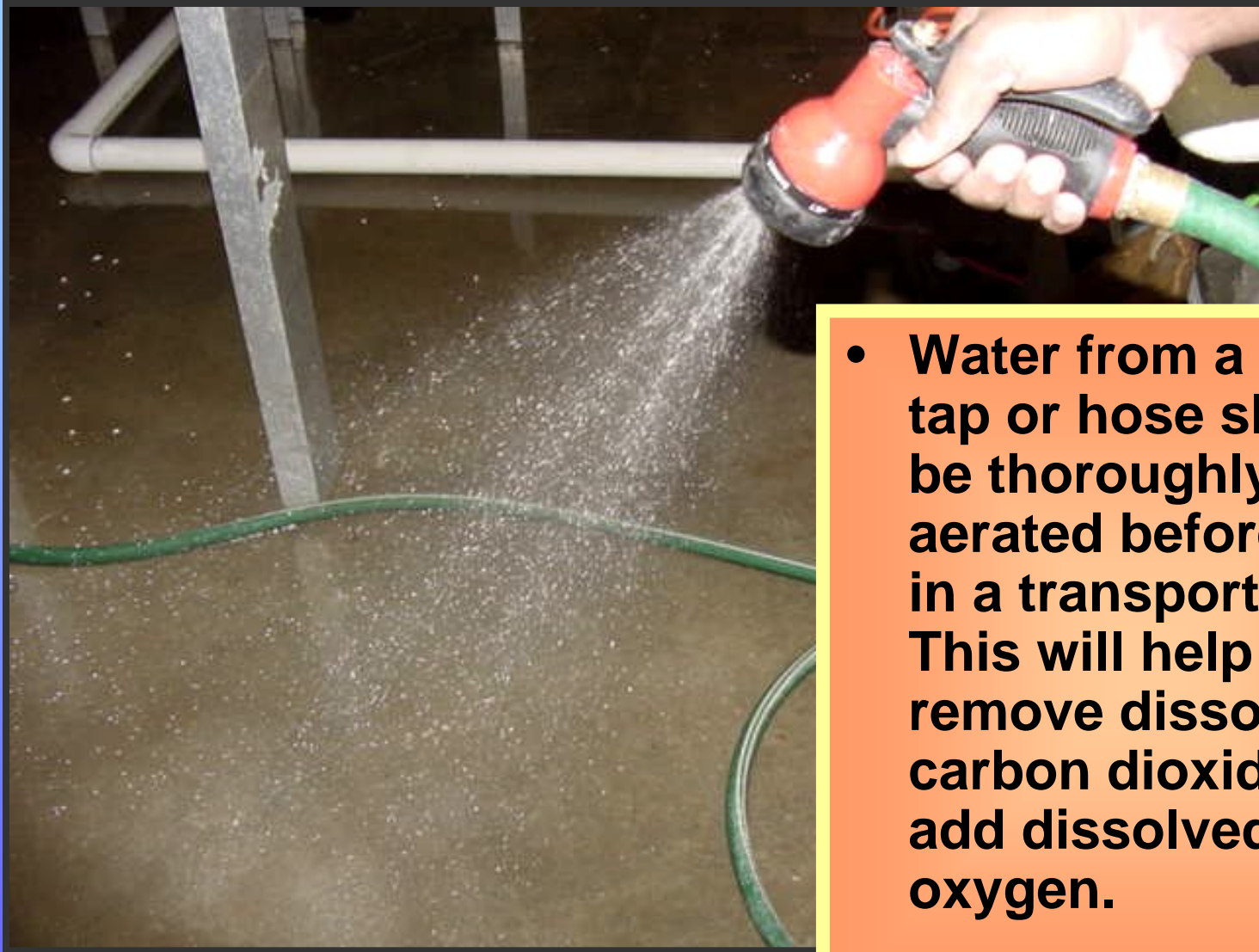
- A suitable water supply is needed for short-term holding and hauling. If well or tap water is used, salt must be added to match the salinity of the water the live bait will be collected from.

Hauling Water



- **Cool, clean well water (with salt added) is preferred for hauling live bait. Water should not be more than 5 to 10 degrees (F) cooler than the water the bait is collected from. Hauling tanks should be insulated so water will tend to remain cool for at least several hours.**

Pre-Treating Water



- Water from a well, tap or hose should be thoroughly aerated before use in a transport tank. This will help remove dissolved carbon dioxide and add dissolved oxygen.

Pre-Treating Water



- If water comes from a chlorinated supply, chlorine must be neutralized before adding live bait. Many commercial compounds are available for this use. Make sure your chlorine remover will also neutralize chloramine, which is often used in rural water supplies since it breaks down more slowly than chlorine.

Surface Water

- “Natural” water from bayous or marshes where bait is collected will already be at the salinity that the bait is accustomed to, but this water source often has dissolved organic material, a heavy algae bloom, or natural microorganisms that can remove oxygen from the water and produce ammonia.



Surface Water



- **Raw, untreated surface waters are also more likely to have bacteria and parasites that can cause disease losses in holding tanks.**

Healthy Bait



- **Live bait must be healthy and in good condition for successful handling and transport. After prolonged crowding in traps with low oxygen and high stress bait animals will be vulnerable to any disease organisms they come in contact with.**

Stress + Water Quality = Disease



- **If live bait has already been stressed, water quality in hauling tanks becomes even more important.**
- **The hauling period can provide an opportunity for recovery, or it can compound the physiological stress the animals are already contending with.**

Quality Control



- After harvest, remove debris and dead animals and provide a recovery period of several hours before they are handled again. If holding vats are available, bait can be graded, cleaned, sorted and acclimated to the expected transport water temperature.

“Hardening” Live Bait

- If you hold fish or shrimp in tanks or cages prior to delivering, do not feed them for at least 1 to 2 days before transport during warmer months and for 3 days or longer during colder weather.**



Hauling Compounds



- Salt or commercially available anesthetics or antibacterial compounds in hauling water can minimize stress for minnows, but these chemicals may not always be suitable for live shrimp.

Aerating Hauling Tanks



- Two common methods involve the use of mechanical agitators or compressed oxygen. Because fish or shrimp are densely crowded and excited, the aeration system must be able to provide dissolved oxygen (DO) faster than it is consumed by the bait.

Measuring Oxygen Levels



- **Oxygen levels and water temperature can be monitored using an oxygen meter. A low-cost alternative is to use test kits with glass ampules that change color depending on the oxygen content of the water. An oxygen meter or test kit is essential.**

Oxygen: How? And How Much?

- **Oxygen concentrations should be maintained above 5 parts per million (ppm) at all times. An oxygen cylinder with tubing and airstones is a practical approach, especially for smaller fish and shrimp. Excessive agitation can be harmful to delicate scaled fish.**



Maintaining Oxygen in Hauling Water



- **Standard oxygen cylinder: 280 cubic feet of oxygen and 150 pounds. Smaller cylinders are available.**
- **Pressure regulators are needed for each oxygen tank. Flow meters can be installed**
- **Airstones or porous tubing are available commercially.**
- **Usually 3/8-inch ID flexible plastic tubing from regulators to flow meters and drop lines to diffusers.**
- **Some aeration lines and diffusers are made of PVC pipe.**

Using Agitators Effectively



- Agitators can be used either alone or in combination with pure oxygen.
- A combination of agitators with oxygen diffusers works extremely well for fish hauling, especially long hauls when carbon dioxide can accumulate. This can support 1 pound per gallon during cooler months and 0.7 pounds per gallon in the summer.

Using Agitators Effectively



- **Agitators alone do not have good mixing characteristics. They may reduce the build-up of carbon dioxide in the hauling tank, but low DO can still be a problem in crowded corners of the tank.**
- **If relying on agitators, alternators should be heavy-duty, and the vehicle's engine should be kept running during stops to keep the battery charged.**

Other Water Quality Characteristics



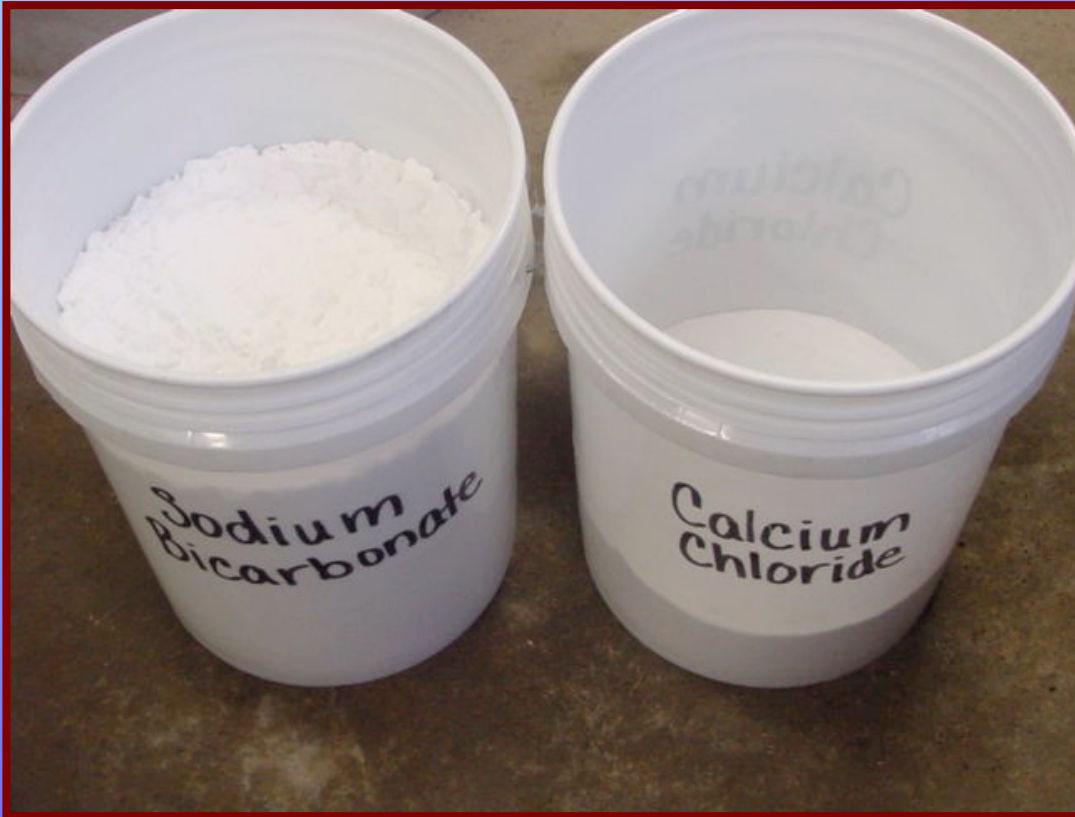
- Salinity, hardness, alkalinity and pH test kits should be used to check transport and receiving waters.
- If you deliver fish to sites where chlorinated water is used, a chlorine test kit is also helpful.
- Chlorine and chloramine neutralizers will usually be needed to dechlorinate water.

Other Water Quality Characteristics



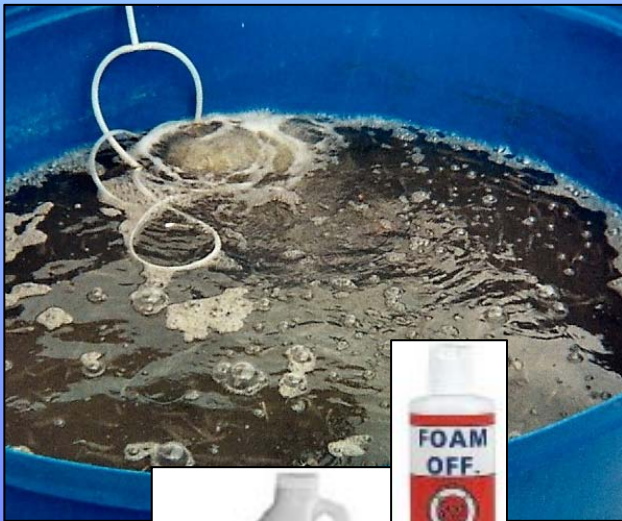
- Chronic losses or weak fish are associated with handling and transport in soft water, or transferring fish from saltwater to freshwater.
- A 12-volt submersible pump or small gasoline-engine pump is useful for adding water in emergencies and for pumping water into or out of the hauling tank to avoid any shocks from changes in salinity, temperature or water quality.

Hardness and Alkalinity



- Hardness and alkalinity levels from 50 to 100 ppm are preferable. 1 teaspoonful of baking soda per 100 gallons of water increases alkalinity by 10 ppm. About 6 teaspoonfuls of calcium chloride per 100 gallons increases hardness by 50 ppm.

Foam in Hauling Tanks



- **Foam buildup, primarily from mucous and proteins shed from the fish, can interfere with observing fish and may inhibit some gas exchange. Commercially-available anti-foaming agents can be used to combat the formation of scum or foam on the water surface.**

Hauling Tank Design and Construction



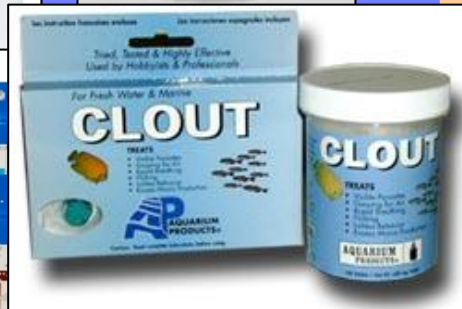
- Insulated tanks require less ice to maintain cool temperatures on long trips.
- Urethane foam, plastic foam and corkboard can be used with home-made tanks, glued to the outer surface.
- Tanks should be equipped with an overflow drain to allow agitators to function at the proper operating depth.
- Electrical outlet boxes should be available for easy hookup of agitators.
- Another useful feature is an air vent or scoop to permit air circulation

Disease Management

- Prophylactic treatment with approved chemicals can reduce pathogenic organisms that cause problems during or after transport. Formalin maybe used in holding vats for 15- minute to 1-hour baths, but appropriate safety measures such as gloves, safety glasses, etc. should be taken when using this compound.



Disease Management



- Many treatments against parasites and bacteria are commercially available for ornamental fish, but some may be cost-prohibitive. 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.

Disinfection / Hygiene



- **Hauling tanks and equipment should be dried and/or disinfected between loads. This reduces the possibility of spreading disease from one group of fish to another. Tanks and equipment can be thoroughly air-dried or treated with chlorine solution (1 teaspoon of bleach per 5 gallons of water) for 1 hour. Rinse tanks, nets and other equipment thoroughly after chlorine treatment.**

Nets, Netting, and Handling



- **Select the proper mesh and material for harvest seines and dip nets to avoid injuring bait. Use soft 3/16- inch knotless nylon mesh nets for delicate minnows. Do not overload dip nets or baskets - fish or shrimp at the bottom can suffer damage from the weight of the animals on top of them. Delicate species should be kept in water whenever possible. When netting and transferring fish or shrimp, avoid warm times of day and direct, bright sunlight.**

Transferring Live Bait



- **Partial drying of the skin or gills can occur while moving small minnows, increasingly the chance of bacterial and parasitic infections. Minimize the time out of water on windy days when the drying effect is greatest. Avoid physical injuries, which will also provide sites for opportunistic infections. Always avoid temperature shock. A sudden temperature difference of more than 10° F can harm or even kill small fish or shrimp. Cold winter air and wind chill factors can also cause temperature shock when fish are moved in nets.**

More About Temperature

- **Temperature influences other water quality variables, and directly influences the metabolic rate (breathing, heartbeat, digestive activity, etc.) of aquatic animals. Inadequate acclimation (tempering) for temperature differences during loading or unloading will stress or kill fish, either immediately or within a period of hours. Temper fish at least 20 minutes for each 10 degrees Fahrenheit difference in water temperature. Some species are very sensitive to temperature shock while others are quite hardy, but in general smaller fish are more sensitive than larger ones.**

Even More About Temperature



- Adding 1/2 pound (1 pint) of ice per gallon of water will usually lower the water temperature by about 10° F. **CAUTION:** ice made from chlorinated drinking water can cause problems as it dissolves, because some bait species are extremely sensitive to chlorine.
- Lowering the temperature during transport quiets fish and shrimp, lowers their rate of metabolism and increases the the amount of oxygen that can be dissolved into the water.
- Exception: For short trips (less than one hour), the hauling temperature should be similar to that of the water at the destination.

QUESTIONS & DISCUSSION



- This presentation includes illustrations of various equipment and supplies relating to holding, harvesting and transport of live bait. Neither Louisiana Sea Grant nor the LSU AgCenter specifically endorse these products, nor is there any intention to exclude other, similar products.

