

Going Brackish

Cultivate your fascination in the transition zone.

By Stephen G. Noble

Brackish waters occur primarily in estuaries, backwater areas and rivers. Tidal shifts, rainy seasons, winter thaws and drought dramatically affect the salinity and dissolved oxygen levels of these dynamic aquatic habitats. Nutrient-rich brackish waters act as both home and transit lines for an eclectic array of very resilient flora and fauna. Brackish areas are essentially transitional zones where freshwater and saltwater meet. For comparison, brackish water has a specific gravity extending from 1.001 to 1.019, while most of our marine aquariums are in the range of 1.020 to 1.024 specific gravity.

Undiscovered Hobbies

Brackish water environments are probably the least replicated, yet arguably the most fascinating aquarium biotopes. Unfortunately, brackish water aquariums are on the fringe of our hobby and seem to be both misunderstood and rarely attempted. They are, however, a fantastic way to learn about and enjoy the many species of fish found in estuaries and backwaters. Some brackish aquarium species include the figure-8 puffer (*Tetraodon biocellatus*), archerfish (*Toxotes jaculatrix*), bumblebee goby (*Brachygobius doriae*) and others (see sidebar). They also allow for a smooth transition for freshwater hobbyists desiring to enter into the exciting world of saltwater.

A major challenge for those interested in going brackish is finding reliable information and expert assistance. Those lucky enough to live near a public aquarium are really fortunate. I have visited many public aquariums and coastal nature centers and found some spectacular brackish water exhibits, be they tidal pools, replica estuaries or backwater displays.

Without exception, public aquarium or nature center personnel have always enthusiastically shared their expertise. Remember that they are extremely busy, so visit during off-peak hours or make an appointment. Prepare a list of questions prior to your visit, and don't forget to ask for the names of individuals and organizations in your hometown that keep brackish tanks.

Another excellent source of information and assistance is a good locally owned pet or fish shop that keeps brackish water fish. Look on the Internet for some of the large mail-order firms that offer superb assistance. Check in this issue of FAMA for advertisers that sell live fish, plants and aquarium equipment.

I can't overstate the importance of seeking help from individuals with a positive attitude. Avoid those who try to dissuade you from attempting a "dreary" brackish water aquarium. Yes, in nature brackish areas are perhaps turbid, but so are most of the rivers and streams from which many of our favorite tropical fish originate.

Preparatory Planning

Virtually any glass or acrylic aquarium will work for a brackish water tank. The thing you want to entirely avoid is metal. Steer clear of antique metal-framed tanks, hoods, lighting and thermometers. If you haven't purchased a tank, consider a 20-gallon or larger saltwater-ready aquarium. The initial cost may be somewhat higher, but the long-term benefits of maximum flexibility are quite substantial, especially if you intend to later transition to saltwater.

Analyze the cost prior to purchase, and make sure you are willing and financially able to outfit the aquarium you desire. Calculate the cost of the substrate, sea salt, water-testing supplies, conditioners and fundamental equipment, such as filters, heaters and lighting. Add a reasonable percentage for livestock, decorations and incidentals.

Carefully plan the installation of your tank. Ensure your electrical connections are protected by a ground fault circuit interrupter (GFCI). If you choose a large tank, make sure your home (especially the floor) is structurally sound enough to withstand the extreme weight. Because the salt spray and flaking associated with an aquarium containing salt can get on walls, rugs and the floor, you may want to discuss tank placement with your family prior to set up.

Absolutely be sure to secure large tanks to the wall to preclude small children from toppling them. When my kids were little, I secured a 55-gallon aquarium to the wall studs using a coated cable. During the chaos of a birthday party, one guest tried to climb the tank and was saved by my foresight.

Make sure that all the fish you select for your brackish water setup are actually compatible with a brackish environment.

One of the beauties of brackish water is the variation of the salinity level. Brackish fish are unique in that they are able to adjust to subtle changes in specific gravity. You might even desire to experiment with this. Most interestingly, some brackish water species move temporarily to fresher water, or vice versa, in order to breed. You can't estimate the specific gravity of water, so a dependable hydrometer or refractometer for measuring specific gravity is an essential tool. Obtain a device capable of registering in the low end of specific gravity (1.002) if you intend to keep species requiring minimal salinity.

Any quality device will work as long as it has the specific gravity ranges you desire and is used properly within its design limits. Some enthusiasts will argue that a refractometer, in which a water sample is viewed through an eyepiece for its refractive index, is best. Others swear by a swing arm hydrometer, in which a plastic arm simply floats upward in the saline solution until it meets equilibrium.

Another type of hydrometer is the floating device. These are supposed to be quite accurate but I haven't located one capable of registering at the lower levels. Finally, the electronic conductivity meter, which is expensive, provides accurate readings and is virtually effortless.

It Needs Salt

Once you have your aquarium chosen and supplies ready, it's time to mix the brackish water. Use marine aquarium sea salt available at pet or fish stores. Don't use freshwater aquarium salt or cooking/table salt. Mix your sea salt in a plastic bucket by adding the water first, making sure to leave sufficient space for salt and "slosh" room. Condition the water for chlorine. Then place an inexpensive powerhead for circulation into the mixing container, along with a submersible heater to raise the water temperature to the same temperature as the freshwater tank you want to transition to brackish. I recommend the Visi-Therm Stealth heater for this task. Use a digital thermometer to verify the mixture temperature.

Slowly add sea salt to the water. I dissolve it in a cup containing a small amount of water before slowly pouring the salt solution into the mixing container. Let the powerhead swirl it around for a couple of minutes, then test the specific gravity. Repeat this process until you reach your desired salinity level. When you are ready to add this water to the aquarium, remove 25 percent of the tank's water volume and make a 25-percent water change, which is close to the standard water change most aquarists make.

Rinse your testing equipment in fresh water after each use, and store your measuring cup and spoons somewhere other than inside the salt container. Otherwise, the salt will become rock hard because of moisture contact.

The Importance of Testing

As with any aquarium, regular water testing is essential when maintaining a brackish setup. Because brackish is in the transition zone between freshwater and saltwater, be sure to purchase a water test kit capable of testing both conditions. In addition to measuring specific gravity, they also measure pH, ammonia, nitrite, nitrate, carbonate, general hardness and alkalinity.

A few words about test kits, learned in the Stephen G. Noble School of Hard Knocks: I recently tested the water in one of my indoor ponds and got a very high ammonia reading. Nothing had changed in the environment as far as bioload and routine maintenance. Thinking perhaps a child might have accidentally dumped food in the water, I proceeded to take countermeasures in a very logical, time-proven manner. It was after tremendous effort and much anguish that I realized the test kit I purchased was out of date and had provided false readings. Always remember to check the expiration date on any kit before you purchase it. Some manufacturers are cryptic with their expiration dates, and you might have to contact them to crack the secret code. Avoid their products if they are unresponsive.

An Example

I set up a 30-gallon aquarium to replicate a meandering stream emptying into a lagoon where freshwater and saltwater intermingle.

I began the project with a well-cycled aquarium planted with Java fern (*Microsorium pteropus*). The substrate is tidal sand about 3-inches thick. Filtration consists of two bio-wheel filters and one biological filter created from an Eheim Pre-Filter Module connected to an AquaClear powerhead. A 150-watt submersible heater maintains the temperature at 79 degrees Fahrenheit.

I enjoy open-top aquariums and initially began this venture without a hood, but around day 10, I reluctantly covered the tank to reduce salt spray, evaporation and minor temperature variations.

The tank was transitioned from fresh to moderately brackish water over a 30-day period by doing small water changes

(about 25 percent) and methodically adding what averaged out to be about 112 tablespoons of sea salt per day.

Changing Over

The specific gravity and water parameters were tested twice daily during the transition period, and I carefully observed the brackish water species that I had selected for this setup for signs of stress, as a transition that is too fast can cause problems.

Proceed slowly when transitioning a freshwater tank to brackish water. The sudden introduction of high salt levels could seriously disrupt your biological filter and injure your fish. Again, be sure your fish are compatible with a brackish water environment. You might be advised to mix your sea salt based upon static measurements such as 5 teaspoons of salt per gallon, but such a method could violate the delicate transition from freshwater to brackish water.

This method assumes we all have the same water source with identical mineral content and other parameters, which is absurd. Additionally, it devalues the need to test specific gravity, which is essential. Another pitfall of using static measurements involves evaporation between water changes. If you hastily add 5 teaspoons of sea salt per gallon of replacement water, your salinity level may dangerously skyrocket because salt and minerals don't evaporate with the water.

So, be sure to test the specific gravity daily and keep your tank water levels topped off. Salt flakes on the glass and other surfaces should be scraped back into the tank prior to water testing. Do a 25-percent water change and vacuum the substrate every week for scheduled maintenance.

It is really important to predetermine the specific gravity you wish to attain, and a little time spent developing an implementation plan will save you much grief.

Be sure to check that all of the species you intend to keep are both compatible with other tankmates and are able to thrive at the level of brackishness you are aiming for. For example, guppies, swordtails and mollies all seem to do best at the lower specific gravity range of 1.001 to 1.010. Bumblebee gobies enjoy more mid-level brackishness in the 1.010 to 1.015 range.

Finding Livestock

I highly recommend you locate a reliable source for acquiring your stock. One suggestion is to contact a local fish club and see if anyone is willing to trade or sell some of the brackish species you desire over an extended period of time. Make sure the fish you select will be compatible with your existing species and are acclimated to the salinity level of your tank prior to introduction.

Proceed very slowly with the introduction process, keeping the bioload low and adding your stock gradually. Remember, most newly acquired species will probably be in the juvenile stage so consider their adult size when calculating your bioload.

I obtained two juvenile bumblebee gobies (*Brachygobius doriae*) and three adolescent mollies (*Poecilia sphenops*), along with three newborn mollies for my 30-gallon project. The mollies transitioned from freshwater to brackish water and the bumblebee gobies transitioned from extremely brackish to moderately brackish water without incident. The use of a small quarantine tank assisted in the acclimation process of both fish.

Feeding the gobies is somewhat challenging. They like to pursue their food and the downward current provided by the bio-wheel filters caused bloodworms and brine shrimp to become quickly lodged in the sand. That problem was resolved with the introduction of the Eheim pre-filter and AquaClear powerhead combination that provides a strong crosscurrent and keeps food in suspension long enough for those little guys to gorge. Brackish water tanks are a real conversation piece because they are so unusual. I guarantee a brackish water tank will stimulate more interest and discussion than either freshwater or saltwater tanks, especially with the children. Creating a brackish aquarium is a great family project. I hope you enjoyed this expose about transitioning from freshwater to moderately brackish water. Until we talk again, have fun in the transition zone!