# FAQ: BEGINNING SALTWATER AQUARIA

contributed by Thomas Sasala

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Introduction

So, you are wondering if a saltwater aquarium is for you. Most people believe that marine aquarium keeping is infinitely more difficult than freshwater. Not so. The simple truth is that saltwater fish and invertebrates are not necessarily more difficult to keep, they just have different requirements than freshwater fish and are a bit less forgiving when it comes to mistakes. If you have not read the beginners section, please do it now. The key to fully understanding this section is to understand the basics presented there.

FAQ: BEGINNING SALTWATER -- BEFORE BUYING YOUR FISH

The Basic Parameters

So what's different about saltwater versus freshwater? As alluded to above, saltwater fish are more sensitive to changes in their environment. The critical parameters of a saltwater tank are pH, nitrate, salinity, and temperature. During the cycling process, ammonia and nitrite can also be a problem. These elements are not different from those of a freshwater tank, but the degree to which they may stray is vastly different.

The pH of a marine tank is one of the most important parameters. Marine fish and invertebrates are especially sensitive to rapid changes in their pH, so keeping pH fluctuations within 0.2 each day is very critical. All marine creatures like a pH near 8.2, ranging from 8.0 to 8.4. The pH should never drop below 8.0.

The next critical parameter is nitrates. Saltwater fish are more tolerant of higher nitrates than invertebrates (in general), but still like nitrates lower than 20ppm, with less than 5ppm being required for most invertebrates. Reef keepers tend to quote anything higher than 0.5ppm as unacceptable, but this is an unrealistic goal for fish-only or minimal invertebrate tanks.

The next parameter of concern is salinity, or specific gravity. Loosely (very loosely), specific gravity is the amount of salt in the water. Many aquarists treat specific gravity and salinity as one and the same, but technically speaking, they are not. Specific gravity is temperature dependent and salinity is not. Most hydrometers (hydrometers measure specific gravity) are calibrated to read the correct specific gravity at 59F. Since this is a little low for most tanks, hobbyist grade hydrometers are usually temperature corrected to read the correct specific gravity at or around 77F (25C). In any case, most creatures will acclimate to almost any specific gravity (within reason), so long as it does not vary widely. The specific gravity of a saltwater tank should be around 1.022. It's worth noting that the salinity of natural sea water varies according to location (ocean, to lagoons, to estuaries), ranging anywhere from 1.020 to 1.030. So different fish might be native to different salinities, and may need some time to acclimate to a different salinity.

Finally, the temperature of a saltwater tank is basically the same as a freshwater tank. Anywhere between 75F to 80F (24C - 27C), with 77F (25C) being a good midpoint. Wild temperature variations increase fish stress and invariably lead to disease, so a good heater (or chiller) is a must. As an aside, submersible heaters tend to be preferred over hang on the back kinds. Also, they seem to be somewhat more reliable than the less expensive `clip-on' kind.

Other parameters worth keeping an eye on are alkalinity and calcium. The alkalinity of a saltwater tank is really critical for long term success. Without a decent alkalinity reading, the pH of the tank will drop over time and endanger the lives of your pets. The alkalinity of a saltwater tank should be around 2.5 to 3.5 meq/l.

Calcium is more of a reef keeper's issue than a fish-only tank. However, once you advance and wish to keep invertebrates, monitoring calcium levels becomes a must. Without calcium, and other trace elements, invertebrates can not properly form their exoskeletons and will not survive. Calcium levels should be 400 to 450 ppm Ca++. For more information about adding calcium, see the REEFKEEPERS' FAQ. *[Next Year....Editor]*

Some of the more easier to keep invertebrates, such as shrimps, also need regular supplements of iodine and other trace elements. Most foods will supply the necessary amounts of these elements. However, if you are using a protein skimmer, these elements will be stripped from the water and need to be replaced manually. Once again the reefkeeper's FAQ has more information about trace element additions.

The Basic Components

Now that we are comfortable with the basic parameters of a saltwater aquarium, let's look into what is needed to run a successful tank. The components needed to run a successful saltwater tank depends a lot on who you talk to. You should never operate solely under the advice of one person. For example, many people advocate using under gravel filters for biological filtration. This however, must be tempered with wisdom. A saltwater tank running an under gravel filter (UGF) with minimal circulation will be much more work than a system running a wet/dry filter and a couple of powerheads. Wet/Dry filters tend to require less maintenance, as UGF's tend to become clogged over time.

Not to get too buried in details, the basic components of a saltwater tank are the tank, decorations, filtration (including protein skimming), lighting, water, and test kits. One of the most important decisions in starting a saltwater aquarium will be the size of the tank. The basic rule of thumb is the bigger the better. A larger tank will be easier to control and gives a bit more leeway for mistakes (which are inevitable). The smallest tank for beginners should be no less than 20 gallons, with 55 gallons being even better. For someone versed in fish keeping (i.e., converting from fresh to saltwater), a 10 or 15 gallon tank will work, but is not suggested. In general, fish like long, wide tanks. The more surface area a tank has, the better the gas exchange will be and the happier the fish will be.

Before finalizing on a tank size, remember that fish densities are much lower for saltwater than freshwater. That is, you can not put as many fish in a saltwater tank as you can in a freshwater tank. Putting more than 2 saltwater fish in 10 gallon tank is asking for trouble. A general rule of thumb is 4" (10cm) of small-to-medium fish per 10 gallons, or 2" (5cm) of larger/fast growing fish per 10 gallons. This is just a rough estimate of the number of fish. There is no exact number since finding the stocking density has to take into account the filtration, maintenance, feeding schedule, etc..

Beyond the number of fish you wish to keep, the tank's size will also affect your filtration and lighting choices, both in cost and design. Tanks which are 48 inches (122cm) long are usually cheaper to light because the lamps are more readily available. However, the larger the tank, the more light you will need to provide your inhabitants. Moreover, a larger tank needs efficient filtration to keep the system thriving. A good size tank is around 55 gallons.

As a note, scrutinize hoods carefully. Many of them are designed for 48" tanks, but require two 24" lamps rather than one 48" lamp. (24" lamps are usually more expensive than 48" lamps.)

Once you have decided on a tank, make sure you have a place to put it. The tank should not be in direct sunlight or in an area which is very drafty. Also, make very certain the stand will be capable of holding the weight of the tank, plus substrate, plus rocks, plus water. In total, a 55 gallon tank will probably weigh over 800 pounds.

After selecting the tank, consideration must be given to the substrate. It is best to use a calcareous substrate such as crushed coral or dolomite. These substrates will, at least initially, help buffer the water by adding ions to the buffering system. Generally the substrate should not be so tiny as to get sucked into the filter or pumps, and not so large as to make the tank unsightly. Also, some fish (e.g., Gobies) like smaller grades of substrate over larger ones. Something in the 2-5mm department seems average.

Live sand is one substrate which has recently gained a fair amount of publicity. This technology is really in its infancy and is not recommended for beginners. You can find more information in the ARCHIVE.

After you select a substrate, consider the filtration system you plan to use. Your choice in filtration may impact the amount to substrate you need. A UGF or RUGF filter should have about 2-3" (5cm) of medium grade (2-3mm) substrate covering the filter plate. You do not need substrate when you use non-UGF filters (e.g., hang-on-the-back power filters), but, most people use between a 1/2" to 1" for such tanks. It's interesting to note that too much substrate in a non-UGF system might lead to dead spots, which can kill your inhabitants (a plug for regular gravel cleaning). More detailed information about filtration can be found in the FILTER FAQ.

Next, consider the decorations, of which there are a cornucopia of choices. Dead coral, lava rock, tufa rock, live rock, and many more. Coral pieces are the most popular, but are also some of the most expensive. Lava and tufa rock are inexpensive and may also be stacked to make interesting reef looking tanks. Live rock is one of those buzz words that people like to throw around and one which gets a lot of hype. Live rock is simply rock taken from a reef system which has been populated by many different organisms.

Many aquarist dedicated to fish-only setups are beginning to discover the benefits of having live rock in their system. Live rock produces a more natural environment for the fish and also aids in nitrification and denitrification. This implies that the live rock is more that just a decoration, it is actually part of the filtration system. Although it is difficult to use live rock as the sole source of filtration in a fish-only setup, it certainly can be used effectively to reduce nitrates. The use of live rock in fish-only setups must be closely monitored though. If nutrient levels in the aquarium are high, the live rock will be the first to demonstrate this fact. Live rock in presence of high nutrient levels will grow unhealthy amounts of hair algae, and in some cases, cyanobacteria (slime algae). To avoid outbreaks of plague algaes, a few simple rules must be followed.

First, you must start will high quality live rock; live rock which is highly encrusted in coralline algae. Avoid live rock which already has hair algae growing on it. Regular additions of calcium may also be needed to keep the coralline algae thriving. Next, you need to keep nitrate levels low (~10ppm) and ensure you have nearly undetectable levels of phosphate (~0.02 ppm). Finally, feed sparingly; decomposing food is one of the main avenues for introducing phosphate/nitrate and contributing to algae problems. If you plan to add live rock to your system, remember live rock contains living organisms, so they can be killed along with any other organism in your tank. It's a good idea to wait until after the tank is set up before buying live rock. There is no good place to store live rock other than in a circulating tank. Trying to do otherwise will be disastrous and costly. Also, if you are going to put live rock into an established tank, the rock must be cured live rock (for a more detailed discussion of cured live rock, see the REEFKEEPERS' FAQ.

Filtration is covered in detail in its own FAQ, with most of the information being relatively generic and applicable to marine tanks. However, there are certain caveats that should be noted. If you decide to use a UGF, reverse flow setups are better. A RUGF will keep nitrates lower by keeping the substrate cleaner and will aid water movement and circulation.

In addition to good filtration, water movement is a must in saltwater aquaria. Without circulation the system will be unstable and usually tends to grow unhealthy amounts of algae and other undesirables. The easiest way to achieve water movement is to have a powerhead in the tank for circulation. One must be careful though, a medium sized powerhead in a small tank will easily make a tornado- like environment and cause problems for small or slow moving creatures.

One of the best possible filtration systems for a fish-only marine tank is a wet/dry filter. Although commercial setups are fairly expensive, a wet/dry filter can be made very inexpensively at home with little effort. The ARCHIVE has a lot of information about constructing your own W/D filter system (as well as other fish related projects).

Many people advocate wet/dry filters for marine tanks stating they are the only acceptable solution. This is simply not true. Any one of the popular filtration systems may be used for a marine tank. The key to success is providing adequate biological filtration without trapping excess detritus. Trapping detritus produces nitrates and inevitably leads to problem algae outbreaks. Whichever filtration system you choose, be sure to rinse the mechanical filtration media <u>at least</u> once a week. Ideally you should rinse the media in old saltwater from the tank to minimize the disruption of any nitrifying bacteria growing on the media.

A part of filtration which most recently has gained wide spread acceptance is protein skimming, or foam fractionation. Protein skimmers are a must for a decently stocked saltwater tank as they strip dissolved organic particles from the water before they can be converted to nitrates.

There are simply too many models and manufacturers to discuss all of them, but the two basic designs are air-driven and venturi. Air-driven protein skimmers use a wooden or glass airstone to produce bubbles in a column of water. Venturi skimmers use a venturi valve to inject bubbles into the water column. Both air-driven and venturi have co-current and counter-current designs, with counter-current protein skimmers being far superior to co-current models.

In deciding on a protein skimmer, there are some basic things to consider. Air-driven skimmers use airstones which must be replaced on a regular basis (usually every month or so). Additionally, they usually require more maintenance than venturi skimmers to maintain proper skimming. Venturi skimmers on the other hand require very powerful pumps to achieve effective protein skimming. They are usually more expensive than air-driven skimmers as well. Also, any skimmer smaller than 24" should be avoided for heavily loaded tanks.

Whichever type of skimmer you buy, the final cost of the skimmer must not overlook the need for an external water pump and potentially an air pump. A $200 venturi protein skimmer usually doesn't include a $150 high pressure pump; a fact that most people seem to miss the first time around.

With the setup nearly complete, you need to consider your near-term and far-term lighting requirements. If you plan on having a fish-only tank forever, then you only need a single full spectrum bulb. However, if you plan to advance in your hobby and keep more sensitive animals such as anemones, you must carefully select your lighting (and filtration as well). Anemones require very strong, <u>full</u> spectrum lighting, supplemented with actinic blue. The general rule of thumb is a minimum of 3-4 watts per gallon, with the higher values for deeper tanks (greater than 18-24 inches). The standard Perfecto hood will not provide enough light to keep anemones alive (or other light-loving invertebrates for that matter).

For a beginning aquarist, fluorescent lighting is probably the best. Metal halide lighting is really for reef keeping and heavily planted freshwater tanks. In any case, if you want or will need something more than a single lamp, your choices are limited. The best thing to do is to build your own hood with custom lighting, or buy one through mail order. Fish store prices usually preclude aquarists from getting proper lighting.

If you select a custom fluorescent hood, then you will have to choose between normal output (NO), high output (HO) and very high output (VHO). Most people with fish-only tanks stay with NO lamps. Both HO and VHO lamps require special ballasts, are more expensive than NO lamps, and need to be replaced more often (more $$).

One critical item in a saltwater tank that doesn't really fit into any of the above topics is that which sets it apart - the marine salt. There are many different brands of salt on the market, all of them being basically the same. The only difference among them is whether or not they have nitrates and phosphates. Both of these are very bad for aquaria, so salts which have them must be avoided. Good salts include Instant Ocean (IO), IO Reef Crystals, and Coralife. As a note, standard rock salt can not be used as a substitute for marine salt mixes. Rock salt does not contain the important elements that marine creatures need to survive.

To measure the specific gravity of your saltwater you will need a hydrometer. There are two basic types of hydrometers available to hobbyist, the floating kind which usually measures temperature as well, and the plastic kind with a floating arm. It's basically a toss up as to which one to get, but the plastic kind has a larger scale and is easier to read.

The final component needed to run a successful saltwater aquarium is test kits. In order of importance, they are pH, nitrate, phosphate, alkalinity, nitrite, ammonia and calcium (for reef tanks, the calcium test kit is more important than nitrite and ammonia). A good pH test kit is critical, and an electronic pH monitor is even better. Ammonia and nitrite tests are only needed occasionally after cycling. A nitrate test kit is a good overall test for water quality after the tank becomes established. You should perform a pH test once a week and a nitrate test every two weeks. The other kits are not necessary, but may be needed to solve particular problems or after you advance to more delicate creatures.

Setting Up

The following section briefly explains what you need to do to initially setup your tank.

The first thing you need to do is to place the stand in it's final position. Make sure the stand is level in all direction. Next, place a piece of Styrofoam or rubber on the top of stand where the tank will sit. This eliminates small gaps between the stand and tank reducing pressure points which might cause the tank to crack after being filled. After the stand is positioned, place the tank on the stand. Make sure the tank is level in all directions. Note, a tank that is not level has a great chance of cracking after it is filled.

Where ever you place the tank now is most likely where it will remain for its lifetime. You should never move a tank that has water in it since this is a sure way to crack it.

Once the tank is placed, install the filtration. If it is an UGF, then place the filter plate(s) on the bottom of the tank. If it is a wet/dry, then connect the prefilter and all the hoses.

Prior to adding the substrate, rinse it with plain water until the water runs clear, and then add it to the tank. On top of the substrate arrange the decorations. Now the saltwater may be added. The easiest way to add water to a tank is to place a plate on the substrate and pour the water onto the plate. When initially setting up your tank it is okay to fill the tank with dechlorinated water and then add the salt mix. However, subsequent water changes need to be premixed. Pre-mixing saltwater is done for two reasons, it gives time for the salt to thoroughly dissolve and also allows the water parameters to stabilize. Adding 10 gallons of freshwater and then an appropriate amount of salt to an established tank is a big mistake (and an excellent way to kill your inhabitants).

One note on making saltwater. The source water you use for mixing is extremely important to the overall success and health of the system. There is more to be said about this later, but for now, realize that tap water probably won't be good enough for your tank.

When all the water is in place, start up the filter system and check for any leaks (of both water and air). Let the tank sit for a day or so to clarify (with the filtration running). Now you can add fish.

How many fish you add for the cycling process depends on the size of the tank and the cycling method you choose. You can cycle a tank without any fish at all. In this case, you add ammonium chloride to simulate fish waste and an initial source of nitrifying bacteria. It is best to get a bacteria culture from an established saltwater tank. This can be in the form of some substrate, old filter media, or some macroalgae such as _Caulerpa spp._. Live rocks are also an excellent source of nitrifying bacteria.

If you choose to cycle your tank using fish, which is infinitely more interesting than a tank full of circulating water, the number of fish needed depends on the size of the tank. In any case, two fish are preferable to one. If one fish dies, you will still have one to finish the cycling. Of course the second fish may pass on too. If all the fish die, then you have to remove all the contaminants from the tank and introduce more organisms (read this as start all over).

Cycling doesn't have to be limited to fish though. Crabs and mollusks can also be used. However, since these organisms don't produce much waste, it will take longer to cycle the tank.

FAQ: BEGINNING SALTWATER -- BUYING YOUR FISH

Beginner Saltwater Fish

Contributed by Mark Rosenstein and Tom Sasala

It is easy to make mistakes when setting up your first saltwater tank. Both for the sake of the fish and your wallet, start with only a few hardy inexpensive fish. Most marine fish are collected in the wild rather than captive raised, so your mistakes impact the world's oceans!

Damsels

The best beginner fish for a marine tank are damsels. These fish are very hardy, being able to withstand worse water conditions than most other marine fish, they are not picky eaters, and they are fairly inexpensive. The down-side is that they are fairly aggressive. One or two will co-exist in a tank. There will be a lot of fighting if you put more in. Dealers get away with a lot in their tanks by keeping the tanks so crowded that none of the fish can establish a territory. This is not acceptable for long periods of time. It is best to use damsels to break in a new tank. If you are then going to add other aggressive fish, you can keep the damsels. If you want to keep shy or delicate fish, you should take the damsels back to the pet store once you and your tank are ready for more fish.

Some damsels, such as the blue damsel and yellow tailed damsels, are not as aggressive as others, such as the three striped and domino damsels. In any case, damsels are certainly the best fish to start with.

Mollies

Some people like to break in a tank with mollies which have been acclimated to salt water. This gives you the benefit of starting with inexpensive fish and get used to maintaining salinity and pH on not-so-sensitive fish. Although safer, you don't achieve much marine experience this way. Mollies are captive raised and bred.

If you buy mollies for your saltwater tank, you can acclimate them by dripping saltwater into the bag over a period of 6-8 hours, removing some water when the bag gets too full. Slowly increasing the salinity gives the mollies time to get used to their new environment. You can keep the mollies in the tank after it cycles, but any aggressive fish will continually harass the passive mollies.

Clownfish

Clownfish are related to damsels, and are fairly hardy. However, they are more difficult to acclimate to a new tank. Clowns, in general, are very territorial, but are not otherwise aggressive except to other clowns. They will do fine without an anemone, which is good since anemones are much more difficult to keep. Anemones require very clean water and high quality lighting. Also, each species of clown likes particular species of anemones, and none of them will regularly inhabit the inexpensive and easier to maintain Caribbean anemones. Some clowns are captive raised.

Blennies/Gobies

These small fish are somewhat hardy and are unlikely to cause trouble for the other fish in your tank. Some of them show a lot of personality, though they will get lost in a large tank. Many of these fish are excellent additions to a tank to help control algae. However, some feed by sifting through the substrate and will be very hard to keep fed in a fish-only tank (e.g., the mandarin fish).

Tangs (Surgeonfish)

Tangs are fairly hardy, though they are very susceptible to marine ich. Being algae eaters, they are useful to introduce when your tank starts growing algae. They must be fed leafy greens if there is no suitable algae growing in the tank (green algae). Many different tangs are commonly seen for reasonable prices.

Triggerfish/Lionfish

If you are setting up a tank for large aggressive fish, you can start with triggers and/or lionfish, as they are hardy. However, mistakes with them can be very costly, so you may want to practice on less expensive and easier fish. Also, carnivorous fish such as triggers and lions should be fed plenty of shell fish and other marine life. Specifically, many people feed lions feeder goldfish. This is really a bad practice because goldfish are freshwater fish and do not provide the same nutrition that a saltwater fish would. Specifically, feeding saltwater fish freshwater food can cause premature liver failure and the early demise of your fish.

Angels and Butterflies

These are fish that must be ignored while in the pet store - all are both delicate and difficult fish to keep. Many butterflies have specialized diets which make them hard to maintain in captivity.

Batfish are also other fish that should be avoided.

Others

Other saltwater fish which can be attempted once you get good at controlling the fish's environment are hawkfishes, grammas, dottybacks, basslets, and wrasses. Some are more difficult to keep than others, but not nearly as difficult as angels and butterflies.

Fishes to Stay Away From

All angelfish, all butterflyfish, Pipefish, Seahorses, Long-nosed Filefish, Blue Ribbon Eels, Stonefish, and Moorish Idols. Mandarin fish should also be avoided in non-reef tanks (they are hard to feed).

Beginner Invertebrates

Many people believe that invertebrates are only for mini or micro-reef tanks. Not so. There are quite a few invertebrates that do well in non-reef tanks. However, not a lot of invertebrates should be attempted by inexperienced saltwater fish keepers. Below is a brief summary of the more hardy invertebrates available to aquarists.

Shrimps

There are many different shrimps available on the market, with most of them being perfectly suitable for a lightly loaded saltwater tank. In fact, some shrimps are more suitable for fish and invertebrate tanks than for a reef tank since they like to eat corals.

Some of the more popular shrimps are Cleaner shrimp _Lysmata amboinensis_, Blood shrimp _Lysmata debelius_, Candycane or Peppermint shrimp _Periclimenes brevcarpalis_, and Coral Banded shrimp _Stenopus hispidus_. The cleaner shrimp is denoted by a white on red stripe down the middle of its back. They are fairly inexpensive and easy to keep. They should, however, be kept in small groups (3-4), as this makes them more social and more likely to come out often. The Blood shrimp is intensely red with some white spots. It is a very striking animal, but usually commands a high price. The Coral Banded shrimp is very popular with reef keepers, but must be watched around small fish. This shrimp has been known to eat small fish without thinking twice.

Most shrimps are scavengers and don't necessarily need to be fed overtly (they usually eat food dropped by fish). If your fish consume most of the food before it makes it to the bottom of the tank, then some extra food should be given to the shrimps after the fishes have been fed, or at night (most shrimps are nocturnal). Shrimps readily accept most frozen foods and dried foods (brine shrimp, flake food, etc.).

Stay away from Harlequin shrimps _Hymenocera sp._ as starfish are their only source of food.

Crabs

There are many different type of crabs, but the most commonly seen varieties are anemone crabs _Neopetrolisthes ohshimia_, arrow crabs _Stenorhynchus seticornis_, and hermit crabs _Dardanus megistos_. Anemone crabs live in anemones, as do clownfish (e.g., Sebae), and vary greatly in color and shape. They are usually acquired indirectly by buying an anemone, but are some times sold separately. These crabs should have a host anemone to feel comfortable. Arrow crabs are very interesting animals which should be kept one to a tank, as they will continually fight. Also, Arrow crabs should not be kept with Coral Banded Shrimps as they will fight as well. Hermit crabs are also interesting, and vary in color and size. Most are passive, but some will eat corals and other invertebrates.

Crabs are generally omnivorous and readily accept the same foods as your fish. Like shrimp, crabs can only eat food which has made it to the bottom of the tank. Thus, ensure some food is in reach of your crabs.

Sea Urchins and Starfishes

Most sea urchins and Starfishes are suitable for beginners who have a few months experience. Once again they vary greatly in size, shape, and color. Beware, some sea urchins are poisonous. Most sea urchins and starfish feed on detritus and algae, and small particles of food that have fallen within their reach.

Anemones

Simply put, amemones should not be kept by beginners (sorry folks). They all require very strong lighting and excellent water conditions. Do not believe a fish store guy that tells you otherwise. Unless you are willing to invest a lot of money in proper lighting, do not try to keep an anemone.

Some Notes on Invertebrates

Invertebrates are very sensitive to water quality. Signs of stress due to poor water quality will usually be exhibited first by invertebrates. Therefore, shrimps, anemones and other invertebrates should never be used to cycle a tank. Moreover, you should never add an invertebrate to a diseased tank or a

tank which does not have stable water quality parameters (e.g., pH, temperature, etc.).

Other points to note. Shrimps need iodine to properly molt, as well as calcium. If you do not change water regularly (which you should), or if you do not feed live or frozen food frequently, then you may need to supplement your water with iodine. Without proper levels of iodine, shrimps will not molt properly and will most likely die. Also, copper kills invertebrates at much lower concentrations than fish. If you have ever used copper in your tank, DO NOT put invertebrates into the tank. You will never be able to adequately remove all the copper such that you can keep invertebrates alive and happy. Finally, crabs usually outgrow their shell sooner or later. Therefore, you will need to provide a new larger shell (they usually try a few out before sticking with one, so you will probably need at least a couple).

Invertebrates to Stay Away From

Tridacna clams (they need strong lighting), Flame scallops (they are nearly impossible to feed in an aquarium as they are filter feeders), Octopi (they have very short life spans), Nudibranchs (they are difficult/impossible to feed), any hard or soft coral (they need very strong lighting), and sea squirts (they can release poisonous toxins into the water).

Selecting a Saltwater Fish

Since saltwater fish are usually more expensive than freshwater fish, you have a great stake in getting them home alive and keeping them alive for the long term. You must realize that most fish you see in stores were swimming around the vast ocean a mere week ago. As such, the stress of capture and transportation can wreak havoc with the biological processes of the animal.

The most important thing when buying a fish is to not be overcome by the buying impulse. Before buying any animal, you should ask `Can I keep it happy'. Merely keeping the fish or invertebrate alive doesn't mean it is happy. Fifty goldfish may live in a 10 gallon tank, but they certainly won't be happy or healthy. Buying a fish you know nothing about and then asking if you can keep this fish happy is a very bad practice. Also, as hard as it is to say this, don't feel like you are doing a sick fish any favors by taking it home. If you have the room and time to nurture the sick fish, then I suggest you help out the environment and care for the sick fish rather than letting it die. However, if you are just going to place the fish into your main tank because you don't have the time or inclination to set a up a quarantine tank, then don't bother. It will only result in the death of the fish and the lightening of your wallet.

Once you decide on a particular fish, don't be afraid to ask the store to hold it for you. A good store will always hold a fish for you (don't patronize stores that won't!). Also, ask to see the fish eat. If the fish is healthy and eating, then it most likely is a good specimen. Finally, check the fish closely for spots, irregular patches, missing scales, and wounds. Torn fins will usually heal and are not much of a problem.

Bringing the Fish Home

Once you get the fish home you should set the bag in the destination tank, thus allowing the temperature to equalize. After about a half hour or so, add a 1/4 cup of tank water to the bag. Repeat this process once every 15 minutes for an hour, removing any water if the bag gets too full. Any water you remove from the bag should be disposed of. It will most likely contain parasites and other bad things.

After you have the fish acclimated to your tank's water chemistry, there are a couple of things you can do. You can place the fish directly into the main tank and hope for the best, you can give the fish a freshwater dip and then place it into the tank, or you could place the fish into a quarantine tank.

The best scenario is to give the fish a freshwater dip and place it into a quarantine tank. Keep the fish in the quarantine tank for 2 weeks and watch for signs of disease. If the fish gets sick, you can medicate the quarantine tank without affecting the chemistry of the main tank. If you are going to quarantine the fish, you should acclimate the fish to the quarantine tank's chemistry, not the main tank.

If you don't use a quarantine tank, then it is a very good idea to give the fish a freshwater bath before placing it into your main tank. The freshwater bath will cause any parasites attached onto the fish to let go and remain in the freshwater (to die a lonely death). Otherwise, parasites left to their own will reproduce very rapidly in captivity and usually infect all the fish in the tank.

To give a marine fish a freshwater dip, prepare a container of dechlorinated freshwater with a similar chemistry of the destination tank. That is, make sure the pH and temperature are as close as possible to the destination tank (this is critical!) . Remove the fish from the bag and place the fish into the container for 3 to 5 minutes. Watch the fish closely for signs of stress. If the fish stops moving or begins to float, remove it immediately and place it in the destination tank (either the main or quarantine tank).

In placing the fish into the freshwater bath, never pour the fish into the container. Use a tupperware container or a net to capture the fish and place it into the dip. The store water should never be introduced to the freshwater bath, or any of your tanks. This water usually contains all sorts of nasty diseases and organisms.

If you put the fish into the main tank and it comes down with an illness, it should be removed to a quarantine tank immediately. Do not risk spreading the illness to the other fish in the tank (although it may already be too late).

Some more information on setting up a quarantine tank can be found in the Archive.

FAQ: BEGINNING SALTWATER -- LONG-TERM SUCCESS

Saltwater Maintenance

The cycling process will undoubtedly be the most tense time for you and your new tank. So below is a guide to the first few days and months of your tank.

Over the course of the first 4 to 6 weeks your tank will demonstrate the typical cycling process (which is described in detail the BEGINNER FAQ). During this critical time, you should carefully watch the ammonia and nitrites in the tank. If the fish look stressed (darting around the tank, gasping for air, or not moving at all), a partial water change might be in order. If the fish look really bad, they may have to be moved to another tank or storage location until the toxicity of the tank is reduced. You should always keep salt mix and dechlorinated water on hand for impromptu water changes.

Along with monitoring ammonia and nitrites, you should keep a careful eye on the pH (you should always watch the pH, not just during the cycling process). The pH will tend to fall over time and needs to raised. The easiest way to raise the pH is through additions of sodium bicarbonate (i.e., baking soda). Mix a tablespoon or so of baking soda in a cup of dechlorinated water and slowly add it to the tank. Slowly means over the course of an hour or two. Baking soda will cause a short term drop in the pH, but will bring the pH to 8.2 over time.

As time marches on, water will evaporate from the tank and need to be replenished. The water that evaporates is freshwater and needs to be replaced with freshwater. You should never use saltwater for makeup water (unless you want to increase the salinity of the tank).

As the tank matures, algae will start to grow (usually around week 2 or 3). Typically brown algae, otherwise known as diatoms, will be the first algae that shows up in the tank. Brown algae will usually cover everything in the tank and need to be cleaned every week or so. With time green algae should overtake the diatoms and the brown algae will disappear all together. If it doesn't, there might not be enough light for the green algae to out-compete the diatoms.

After the tank completes cycling, it will be time for your first major water change. Although the amount of water you change is really up to you, it should be a significant portion of the water. Something like 40 to 50%, with 100% of the water not being uncommon. When changing the water, the gravel should also be cleaned. There are many commercially available gravel cleaners on the market.

The chemistry of the change water should be as close to the tank's water as possible. The pH should be within 0.2 and the temperature should be within 1-2 degrees. It is better to have the change water warmer than cooler (imagine the shock of a cold shower and you will know how your fish will react to cooler change water).

After the first water change you should establish a regular maintenance schedule. Something like monthly water changes, weekly algae scrapings, and bi-weekly feedings are normal.

A note on nutrition. Saltwater fish need varied diets. Constantly feeding your fish flake food may provide it with all the necessary vitamins and minerals, but this may ultimately cause a nutrition deficiency of sorts. Alternating between cut up shrimp and clam, flake food and frozen/live brine shrimp makes a good combination. Herbivorous fish, like Yellow Tangs, also like romaine lettuce or Nori (an algae regularly sold at oriental markets) on a regular basis.

Converting to Saltwater

One of the most frequently asked questions in the news groups is how to convert from freshwater to saltwater. What equipment needs to replaced, what needs to purchased, etc..

Most equipment used in freshwater can be used in a saltwater system, with a few exceptions. You should start by replacing your gravel with some sort of calcerous material. Examples include crushed coral, dolomite and argonite. Using these types of substrate tend to help buffer the water and produce a more stable environment. Next, you need to check all your equipment for anything metal. Saltwater will rust anything except the highest grade stainless steel. There are stainless steels on the market which will rust when exposed to saltwater. Needless to say, you need to replace or get rid of anything made of metal.

The filtration system used in your freshwater system will usually be adequate for a saltwater system. However, you can use this opportunity to upgrade or change filtration mechanisms. Also, which ever type of filtration system you are using, you should add some sort of extra water circulation to the tank. Saltwater has a lower dissolved oxygen content than freshwater, so you need to keep the water in the tank moving. Actually, it needs to do more than move. You need to disrupt the surface of the water to maximize oxygen transfer with the atmosphere.

The lighting you used for you freshwater system should also work for a fish-only saltwater tank. However, if you want to keep invertebrates, you will need to upgrade (more that just your lighting).

One part of a freshwater system that needs to be replaced is the food. Marine fish need varied diets. You need to supply your fish with a combination of fresh, frozen and live food. Flake food, although adequate, should not be the major portion of your fish's diet.

Finally, when you are ready to make the switch to saltwater, you really should replace all the water in your system. It is best to start with nitrate free water to minimize the potential for algae problems. Also, many people think that adding salt to a cycled freshwater tank will yield a cycled saltwater tank. Experience have shown this is not true. Saltwater nitrifying bacteria are different than freshwater nitrifying bacteria, so they must be cultured from scratch. As a note, nitrifying bacteria seem to be pH and temperature sensitive. So moving some gravel from a warm saltwater tank (~85F/24C) to a temperate saltwater tank (72F/21C) will shock the bacteria enough to nullify any advantage from using the gravel (e.g., to shorten the cycle time).

General Notes

Keeping a quarantine tank is especially important for saltwater tanks. It can be very difficult to treat a sick fish when it is continually being harassed by healthier fish. Also, some medications, namely copper, will kill invertebrates. You should NEVER put copper into your main tank. Contrary to popular belief, you will never be able to get all of the copper out of the tank. Also, using copper in a tank which contains live rock will decimate the life forms populating the rock, as most of them are invertebrates.

Source water for saltwater tanks is also very important. Although the water authority says that tap water is fit for human consumption, it may not be fit for your fish. Tap water typically contains chlorine and chloramine, which will kill your fish. Although these will have an immediate effect on your fish, there are usually other contaminates in tap water which need time to affect the tank. In particular, phosphates will cause massive growths of hair algae and potentially cyanobacteria outbreaks (red slime algae). Without good quality source water, your tank will not be the continuous joy you hoped it would be.

The best water purifiers on the market are reverse osmosis units. These, coupled with de-ionizing resins, produce water which is 98% pure. If the price of a RO/DI combination is too much, then you can always use distilled water (not spring water). However, distilled water may have been stored in copper containers which will kill invertebrates.

Before you start your saltwater tank, find a good store near you. Good stores will have knowledgeable staff and exhibit a general concern about the care of the animals. If the store has few saltwater tanks, with a lot of sick or dying fish, don't buy any fish there, even if they look healthy.

The last point about keeping saltwater fish is to read, read, read. The FAQ is no substitution for reading a good book. Some of the best are _The Marine Aquarium Handbook_ by Martin Moe, _The Book of the Marine Aquarium_ distributed by Tetra Press, and _The Marine Aquarium Reference_ also by Martin Moe. Also, don't be afraid to post to *.aquaria. Just don't forget to include all the importance specifications (e.g., ammonia, nitrite, nitrate, pH, temperature, how old the tank is, how big the tank is, and what the inhabitants are). Happy fish keeping.

A Successful Saltwater Tank: *[US Prices...Editor]*

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| 30 gallon tank | $30 |
| Custom Hood | $20 |
| Custom Stand | $30 |
| 1 Phillips Ultralume | $11 |
| 1 Coralife Actinic Blue | $15 |
| Wizard Electronic Ballast | $28 (now $49 including the endcaps) |
| DIY w/d filter | $30 |
| Amiracle Prefilter | $50 |
| Eheim 1250 | $69 |
| DIY 30" Air-driven skimmer | $50 |
| Hagen 801 powerhead | $22 |
| Tetra Luft G Airpump | $20 |
| Hagen 301 (circulation) | $15 |
| Ebo Jaeger 100W heater | $16 |
| 20 lbs dolomite | $8 |
| Misc. Rocks | $15 |
| 2 Domino Damsels | $10 |
| Total | $439.00 |