

Multi Level Reef Zone System

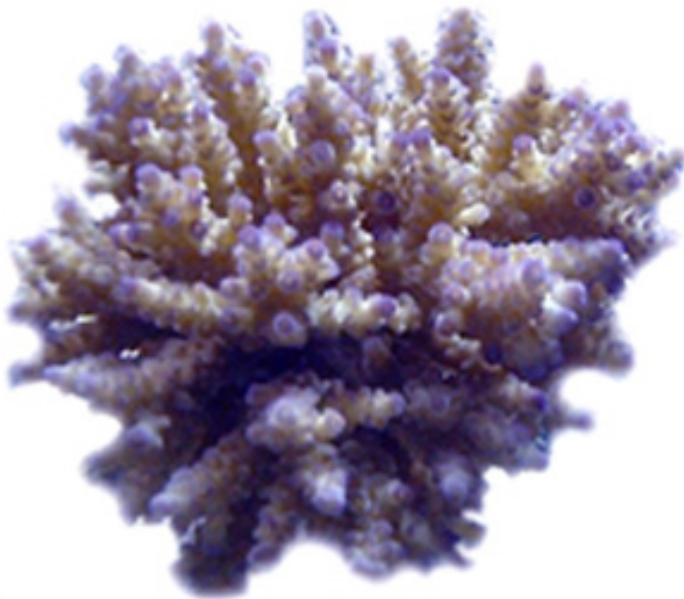
By Blane Perun from Farms-of-TheSea.Com

Background After three years in the reef-keeping hobby and a recent move from an apartment to a home, I wanted to create something breathtaking. My past two years had been dedicated to a long 40 gallon reef, with about 35 fish and 40 or so pieces of coral ranging from small colonies to propagations. In such a heavy populated tank I was able to learn some behavioral lesson through observations. I set out like many hobbyist do to create a scaled down version of a living reef, as time went on the more I learned about actual reefs, the more I tried to emulate nature. For example: simple placement of the corals aquascaping, and a selection of fish and invertebrates that mimicked the reef community. Well I soon learned the hard way, that I could not really imitate the vastness



of a reef in merely 18 inches of depth and 48 inches of length. Many territorial wars between encroaching corals, and small fish usually resulted in death or near destruction of these tank mates. I would not settle for a glimpse of nature, I wanted to create a micro eco-system and I had my work cut out for me.

Mission Nearly two months had passed and my research and planning were finished. My objective was to create a Multi Level System, but not just any system one that actually had dedicated reef zonation. After everything I had read and witnessed up to this point had convinced me the only way to have some of these species or coral and fish thrive and reproduce would be to engineer conditions similar to their natural habitat rather than attempting to have an amalgam of reefs zones all in one tank.



Living Reefs Much unlike our typical display tanks, the living reefs are made up of specific zones and have many creatures indigenous to them that sometimes spend their lives there. The concept of zonation is fairly well accepted within the research community. Most corals (but no all) are more abundant and more successful in specific areas of the reef, and these zones are pretty consistent through most of the world. The most in-depth description I had come across at the time split the reef into 11 distinct zones. The lower slope, upper slope, reef front, inner flat, outer reef flat, outer slope, back reef margins, back reef slope, inner tidal mudflat, outer intertidal mudflat, and the lagoon. I'm sure the distinction between these zones, and their definitions are somewhat

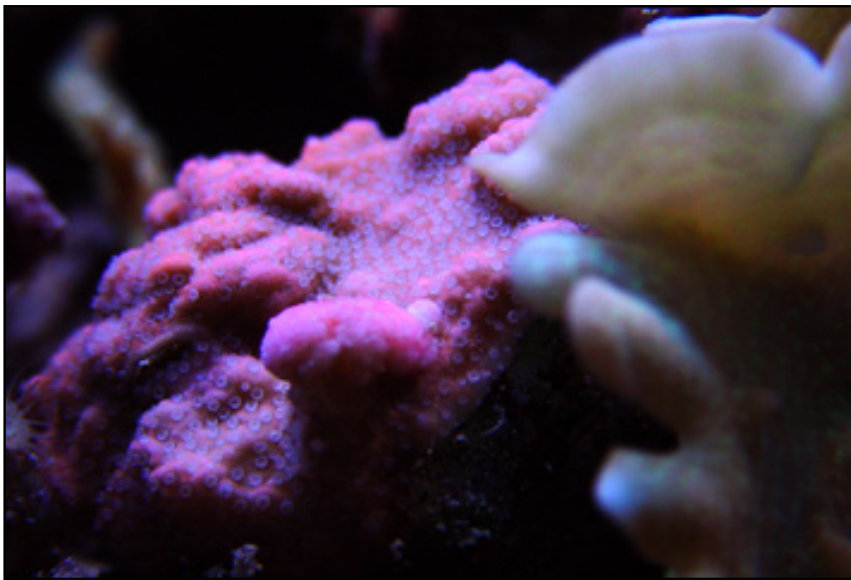
debatable, however there certainly are some unique areas within the reef. **Zone Selection** I chose 5 zones to emulate in my mine marine eco system; the reef front (crest), upper and lower slopes a back reef margin and the lagoon. My selection was based on getting the most biodiversity for the buck, in addition some of these zones are not that hospitable. The outer reef flat for example is usually hammered by waves and not many creatures call it home, especially in comparison to other sections. **Construction** I knew right from the start, the tanks would have to be



custom made along with the stands. I began gutting a room in my basement and running some dedicated circuits. A friend Tony Calfo put me in touch with a custom tank builder and the project was off. Aside from the electrical I did have to pour cement to level a small section of my basement floor which was concave for run off. I came up with a staggered design for overall impact of viewing. There were five main tanks and one sump to be built, overall the system would be about 500 gallons. The lower reef slope and upper reef slope dropped about 6 inches each from the reef crest, the back reef and lagoon followed suite. By dropping each and staggering the front three it gave the appearance of a wall of reef spanning some 4.5 feet high and 6 plus feet long. The Lagoon returned on to make an "L" shape combined with the back reef off the reef crest.

Equipment Aside from lighting the basic setup was not all that complicated, however I did add gear as time progresses. Each tanks was drilled and had a small triangular overflow constructed in the corner. The sump had two drilled holes in which I mounted to each and external pump (1200gph) The main pump ran the front three tanks, and the secondary pump ran the back reef and lagoon. Each of the two separate lines returned to the sump and passed through biological and mechanical filtration. In the sump I had constructed a wet dry filter with bio balls in an area about three feet wide 18 inches deep and 18 inches high. (The bio balls were removed after 6 months). One of each of the lines ran into a temperature controlling device, the secondary sump a 1000 watt inline heater and the primary pump a 1/3 hp chiller. In addition a canister filter was run inline prior to the heater. Two submersible pumps were in the sump one supplying a skimmer the other a hyperbarix reactor and two mechanical modules filled with carbon. The reactor was connected to an ozone unit. Lastly I had a doser which replenished the tank 24/7 with DI water spike with calcium hydroxide. The parameters of the system such as temperature and lighting cycle were run by a controller, in conjunction with the monitoring of PH, and Redox. Circulation was run by the controller and provided by many submersed powerheads. I matched the in tank flow rate to emulate the tidal conditions over that section of reef. One example was two small powerheads would come on for nearly an hour 4 times a day, aside from that the only other circulation in that zone was provided by the main pump.

Lighting Lighting this multi tier system was perhaps the most time consuming, the most



fun, and the most rewarding from the standpoint of knowledge. My 40 gallon system was illuminated by 6 110w VHO bulbs. Prior to this endeavor I did not have the opportunity to experiment with different lighting combinations, so I figured this was my chance. I wanted to try to match the Kelvin temperature over each section of the reef so I set out to illuminate them all differently. Starting with the lagoon, I ran two 5500k 175w Metal Halide bulbs, the back reef was one 10k 175w MH, the lower reef a 20k 175w Mh, the upper reef a 14k 175w MH, and the reef crest 2 175w 6500k MH, As time progresses I modified the lighting setup, however I ran this for about 2 straight years.

Stocking After the system had been running with salt water for 4 weeks, I went ahead to begin stocking. For my first step I added aragonite sand, about 4 inches in each tank and 10 inches in the sump, there were over 800 pounds in that tanks alone. It took about another two weeks for the water to become clear, at that point I inoculated each tank with some live sand and began looking for rock. In addition to the local fish store haunts, I was able to get me a good variety. My list of acquisitions included Brazil, Haiti, Tonga, Indo (Bali and Jakarta) Samoa, Gulf, Solomon, and the Atlantic. In the end I was not exactly sure how it got to the states or If I could be certain of the countries or origins but at any rate I had about a half ton of almost fully cured rock set up in my tanks. After about 6 more weeks I began populating the tanks slowly with fish and coral. The process was a joy and lasted about 14 months. Aside from the local fish stores, and private collectors I had made a few road trips for some really unique specimens. My collection ranged from the commonly accessible to the rare and more uncommon species. With a goal in mind of biodiversity nothing was too common. On my reef front you would often find such contrast as a common brown Motipora Digitata along the side of a baby blue polyped on light blue Acropora Abrolhosensis. Down the upper reef slope you could find a brilliant red and teal green centered Blastomussa Wellsi in proximity of a brown Galaxea Fascicularis.

Aquascaping Aside from creating interesting structures with rock, the next most impressive attribute of the tank is positioning of the specimens, which is second to their requirements of lighting and current. Before I put any coral in with marine epoxy I first experimented with the species attempting to locate a position in the tanks where it could flourish. The process may take months understanding the current needs and the potential for color under a multitude of light intensities and temperature. Since the tanks in my system were all in close proximity I would have an overflow of light from one tank to the next. After identifying the needs for each coral, you will still have many



choices throughout your tank. I have seen countless tanks with an incredible collection of coral and rock that had tremendous unrealized potential by lack of design. With an interest in horticulture and landscape design I brought many fundamentals of design to my captive system.

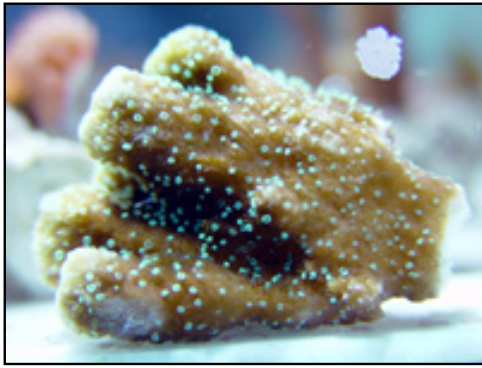
Sort by color Nothing stands out more with specimens that a dramatic contrast in color. Placing a mauve or brown pigmented coral behind a yellow or pink makes the coral really stand out.



Sort by texture On the same contrast point attempt to mix textures, for example a small polyped tight branched species next to something with long branches and great polyp extension.

Sort by shape. Don't lump all of your encrusting specimens together. In this system, I actually did but that was a dedicated section of called a back reef. Even still I attempted to break them up by shape, and you can do this in a single system much easier.

Spread color. Try and spread out a color so it appears unique against the close company. For example if you have 3 or 4 pink corals chose places on the reef where they will do well but not all lumped together. A bright green Montipora looks great against a Pink Stylophora, but does not appear too striking against a brown Montipora.



Placement In my system I tried to group the majority of the branching sps along the reef crest (reef front) the sps transitioned over to lps along my upper reef slope, and had a transition to encrusting and plating sps within the back reef. The lower reef consisted of Leathers, Gorgonian, Palythoa, and Zoanthus. Many of those species entered the upper reef section as well. The lagoon consisted of grasses and such along with some mangrove trees. For all intensive purposes my lower reef was technically the near bottom of the upper reef slope as far as inhabitants went. The back reef was a collection of many of the thrashed zones. On some occasions I did have a species out of place all together and that

was in the circumstance that I did have a species out of place all together and that was in the circumstance that I had witnessed some favor in coloration under a specific combination of lighting in a between zone or a tank other than the starting tank.

Findings Over the years the system had been in operation I had gained some insight on a variety of subjects. **Live sand** for one; I had acquired most of my sand prior to the availability of South Down Play Sand. I spent a significant amount on the substrate which is Aragonite from Caribe Sea. Looking back I would have made much deeper beds in each tank, the aragonite dissolves each year and anything less than 3 inches is really not a functional DSB, but rather a nutrient trap. I built my rock formations on the from the glass up, so tearing down was necessary. In addition to deeper beds, I should have acquired smaller amounts of live sand from many different sources rather than a large amount from one source.

Rock Placement. and rock itself were two areas which I now would make other decisions. For starters I paid a handsome amount to have such a variety of source rock. In addition I have some rather large pieces that were overpriced. In conjunction with the theme of the live sand I would now prefer to purchase a variety however supplement the structure with Tufa (base) rock a less expensive alternative that yields the same look over time. Placement of the rock was a second error in retrospect. I ad felt the structure were fairly large and airy on the contrary I could have pushed more. One thing I learned in graphic design is about full space and empty space. When designing a logo empty space accounts for just as much as the design. I think I could have put something together much more open and enjoyable for the marine life that diagonal walls with some openings. Keeping a specific density of poundage to gallonage could always be made up in the sump on a shelf. Another big lesson was **Unnecessary Hardware** I as well as many other enthusiast became a hardware junkie early on. I was more obsessed with the hardware and readings of probes than signs of health or lack there of from the corals. Many of the pieces of hardware are functional and add value for specific circumstances, events or conditions. My trend in the last few years has been more towards simplicity, pumps, skimmer, and a reactor. The hardware was a learning experience from the standpoint of both the action of the engineering and the reaction from the inhabitants. **Water Quality** in particularly the makeup water is key to success. I had begun my system with D.I water as a stand alone. After investing in a Microsiemens meter and doing testing for three months I learned our tap water is not consistent in quality. The reading of tap water was about 500microsiemens, the D.I. water was in the neighborhood of 45. When the dionizers approached exhaustion the reading would climb over 125. I then moved to an Reverse Osmosis system producing water at about 25 microsiemens, which worked very well but I had the occasional outbreak of nuisance algae once or twice every 6 months. Lastly I added a DI cartridge on the end of the RO unit and I have eliminated the headaches of outbreaks of debresia, aptasia, valonia, and cynobacteria all together. The output of the combined unit is about 6-9 microsiemens. **The Internet** is proving to be a tremendous resource for me with regards to chatting with people first hand from around the globe about their experiences, not to mention the potential for trading for corals you have been looking for. I have dedicated a better part of the last two years building an online educational resource for hobbyist like myself entitled www.thesea.org

Next Step After numerous request to share my stock with people I was meeting in the Domestic United States I decided to eventually convert my lagoon to a grow out tank. My main concentration was sps but one of my long time passions has been collecting color morphs of Zoanthus. I believe I'm up to about 34 color morphs which are mostly covered on my site. A pinnacle moment in this hobby was when J. Sprung included one of the photos he took visiting my home of a colony of bright pink Zoanthus which he included in his book. "Invertebrates". I've since been so motivated by this passion I have begun an addition on my home to house approximately 800 gallons in grow tanks so I can return my display tank to its original state.

