

## Marine Aquarium Design Examples

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September 30, 2017

I converted my 2 freshwater aquarium setups to salt water (marine) about 2 years ago. I did not find any specific instructions for a configuration that would work well. I came up with the two that I am describing here by researching and some trial and error. They seem to work well – my fish are still alive.

I have a small tank (20 gallons) that I also use as a quarantine tank for new fish. Also, I have a main (medium, 125 gallons) tank. I used the same tanks, tops, cabinets and lights for the saltwater setups, but just about everything else is new. I will include some possible selections for tanks, tops, cabinets, and lights, but can't guarantee that they will be good or compatible. I will point out the areas to check out to make sure they will work. I am also listing some items that are useful, but may not be necessary.

Costs are either what I found currently or what I paid. Prices have gone up some, in general. You can often find items on sale for quite a bit less. Buying a complete used setup is probably the most cost effective, if you can find one for sale that you like. This description assumes you are putting one together yourself using all or mostly new items. You could hire a company to build a custom setup, but that would cost more. In terms of cost summary, the small tank costs about \$900 plus the fish and "nice-to-have" items. The medium tank costs about \$2900 plus the fish and main lights. The lights you use depend on what animals you keep. For fish only with live rock (FOWLR) a lower cost/intensity light can be used than for a reef aquarium with live coral. Food is not very expensive, except the shipping for frozen food. I spend about \$50-75 on food every 6-12 months. The cost of the salt to make replacement water is the largest recurring cost once everything is set up. A 200-gallon box of salt will last about 3-4 months if you do the recommended water changes and costs about \$40. The lower you can keep the nitrate levels in the tank without water changes, the less often you will need to do water changes.

Fish food does not cost as much as I was expecting, except for cost of shipping frozen food. I thought the fish might only like frozen food. However, most of my fish like the Ocean Nutrition Formula 1 pellets as well as the frozen food. I buy a lot of food at once (6 – 12-month supply) so that the shipping cost is not greater than the cost of the food. That means a freezer with room to store the frozen food must be available. I also make my own frozen food by buying live mussels (2 lbs.), removing the shells, mixing them with Selcon, and freezing in a Ziploc bag. This is the favorite food of most of my fish. The Copperband Butterflyfish loves it and will only eat it or spirulina brine shrimp. Spirulina brine shrimp is the only single frozen food all my fish will eat.

There are alternatives to the specific listed items in most cases, but the items listed are the ones I use or found that seemed reasonable (in the case of tanks, tops, cabinets, and lights). It might be difficult to find a reasonable-cost cabinet with a design that fits a large sump in it. It appears possible to build one yourself, there are several plans for cabinet designs on the internet.

1. Small Tank – This is the smallest I would recommend for most marine fish. Small is necessary and good for a quarantine tank.

Ref	Item	Qty	Cost	Total Cost	Link	Comments
1	Perfect o All Glass Aquarium	1	\$51.11	\$51.11	<a href="https://store.schoolsps">https://store.schoolsps</a>	24 x 12 x 16 inches
2	Aqueon Versa-Top Hinged Glass	1	\$28.27	\$28.27	<a href="#">Glass Top</a>	24 x 12 inches
3	NICREW LED Aquarium Light, LED	1	\$29.99	\$29.99	<a href="#">LED Lights for Aquarium</a>	White and Blue LED
4	Top Fin Aquarium Stand/Cabinet	1	\$129.99	\$129.99	<a href="#">Stand</a>	Need to check inside dimensions and opening for sump. Might need to build one.
5	<b>Filters and refugium:</b>					
6	Aqueon ProFlex Sump Model 1	1	\$189.99	\$189.99	<a href="#">Sump/Filter</a>	Drs. Foster & Smith, 19 7/8 x 9 7/8 x 17 1/4 "
7	Eshopps Overflow Box, PF-300	1	\$55.99	\$55.99		
8	Finnex FugeRay Planted Plus LED 12 inch	1	\$51.28	\$51.28	<a href="#">Refugium Light</a>	For refugium, slightly too big, but works slanted
9	Vinyl Tubing 3/4" ID, Black, 5', CBE-11818	1	\$3.99	\$3.99		
10	Directional U-Tube for 3/4-1" Tubing, CBE-25769	1	\$4.79	\$4.79		
11	Pipe Fitting for Sump Connection, 1"	1	\$4.59	\$4.59	<a href="#">Pipe Fitting</a>	
12	Silicone Sealer, 3 Oz, CD-114819	1	\$4.99	\$4.99		
13	Hose Fitting Adapter 3/4"	1	2.45	\$2.45	<a href="#">Hose Adapter</a>	Needed?
14	Check Valve, 3/4"	1	4.25	\$4.25	<a href="#">Check Valve</a>	
15	Taam Rio Plus 100 Aqua Pump, 382 GPH	1	\$33.84	\$33.84	<a href="#">Pump</a>	
16	Coralife Super Skimmer, 65 Gallon	1	\$96.34	\$96.34	<a href="#">Protein Skimmer</a>	
17						
18	Digital Aquarium Thermometer	1	\$2.59	\$4.00	<a href="#">Thermometer</a>	
19	EHEIM Jagger Heater, 150 W	2	24.99	24.99	<a href="#">Heaters</a>	
20	Sea Salt, 200 Gallon Box	1	\$39.99	\$39.99		
21	Hydrometer, CD-116658	1	\$8.99	\$8.99		
22	Aquarium Master Test Kit, Salt Water	1	\$24.99	\$24.99		
23	Carib Sea Base Rock, 40 lbs	1	\$48.25	\$48.25	<a href="#">Base Rock</a>	For inside aquarium and refugium
24	Arag-Alive Special Grade Sand 1-2 mm, 20 lb	1	\$23.10	\$23.10		
25	Air pump, hose, check valve, control valve					Needed if not shared with another tank and want
26	Fish					Fish typically cost 15-100 dollars each, but can be
27	Fish Food					Most of cost is in shipping
28	Aquarium Master Test Kit, Salt Water	1	\$24.99	\$24.99		
29			<b>Total</b>	\$891.16		
30	<b>Other Nice-to-have Items (common for multiple tanks)</b>					
31	Scrub brush					
32	Plastic containers					
33	Sink and hose with nozzle					
34	Long spoon for mixing salt water					
35	Medicine if fish get sick					
36	Live Rock			\$0.00		Optional for Coraline Algae
37	Light timers & power strips					Would need 2 if alternating refugium and main t
38	RO/DI filter					
39	Large container(s) for water (storing filtered water and changing)					
40	Fish Net					
41	Siphon Tube					
42	Midea Refrigerator/Freezer	1	\$158.01	\$158.01	<a href="#">Refrigerator</a>	
43	Calcium Hydroxide (Pickling Lime), 1 lb.	1	\$9.20	\$9.20	<a href="#">Lime</a>	
44	Feeding Clips for Algae Sheets	1	\$6.96	\$6.96	<a href="#">Feeding Clips</a>	
45						
46	<b>Recurring Costs</b>					
47	Salt					Should change about 20% of water per week (4 g
48	Fish Food					
49	Water					
50	Electricity					
51	More test kits					
52	Replace broken items					
53	Replace filter socks (last about 1 to 1.5 years)					

- The 'medium' size tank is a good size for a saltwater aquarium, in my opinion. Bigger is better, but also more expensive and more work. The amount and cost of water you must regularly change is proportional to the tank size and number/size of fish.

Some light options for the main tank are shown below. Most of these would work for a reef tank. Note that in some cases, multiple units would be needed to cover the entire 6 ft. long aquarium. I recommend using a design that allows part of the tank to be less bright to accommodate species that don't like as much light. They generally can be hung from above or mounted on special mounts (that may or may not be included). I have not upgraded yet – I have been waiting for the prices to come down more. I still use fluorescent and compact fluorescent light fixtures.

### LED Light Fixture Options

Item	Model	Price for 1	# LEDs	Power (W)	Comments
EcoTech Reeflink Controller for SmartPhone		\$99.00			
EcoTech Marine Radion	XR30W G4	\$649.00	34	150	11.8x7x1.5"
EcoTech Marine Radion	XR30W G4 Pro	\$800.00	46	190	\$725 on Amazon
EcoTech Marine Radion	XR15W G4 Pro	\$399.00	23	95	Covers 18" diameter
Kessil Aquarium Tuna Blue	Tuna Blue	\$239.00		40	Covers 24" Diameter
Kessil AP700	AP700	\$895.00		185	Need 2
Aqua Illumination AI Hydra 52 LED	Hydra 52	\$599.00	52	135	Need 2
Current Marine Reef Lighting, 72"	Regular	\$270.86	144	63	
Current Marine Pro LED Lighting	Pro 72"	\$526.47	176	100	3.3x1"
Current Marine Pro LED Lighting	Pro 72" Dual	\$935.97	352	200	Dual is for > 18" Width
GHL Mitras LX7	7206 Saltwater	\$749.90	72	?	Built in WiFi, hanging kit not included

## Medium Tank Components

Ref	Item	Qty	Cost	Total Cost	Link	Comments
1	125 Gallon Aquarium, Perfecto 72 x 18 x 22 Inch	1	\$780.39	\$780.39		
2	R&J Enerprises Stand/Cabinet, 72 x 24 x 30" High	1	\$724.99	\$724.99		Need to check stand size and opening for fit with sump. Would rather not need to remove aquarium to get sump out.
3	Aquarium Top, Aqueon Versa 36 x 18"	2	\$28.99	\$57.98		Could get 1 x 72" for 49.99; Need to check if these fit the Perfecto aquarium
4	Aquarium Lights	1		\$0.00		Kessil, Radion, and AI high end, Finnex, Current (see separate sheet for some options)
5	<b>Filters and refugium:</b>					
6	Aqueon Proflex Sump, Model 4 (filters and refugium)	1	\$319.99	\$319.99	<a href="#">Sump</a>	Dr. Foster & Smith (36 x 12 3/4 x 18 7/8 ")
7	Eshopps Overflow Box, PF-1200	1	\$86.54	\$86.54	<a href="#">Overflow Box</a>	
8	Eshopps 1" ID Flex Hose, 3 ft, CD-32903	2	\$14.99	\$29.98		
9	Finnex FugeRay Planted Plus LED, 12 inch	1	\$51.28	\$51.28	<a href="#">Refugium Light</a>	For refugium
10	Schedule 40 PVC Union Fittings w/ O-Ring, 1" slipx1"slip	2	\$4.39	\$8.78		For removable sump input
11	Directional U-Tube, For 3/4" Tubing	1	\$5.99	\$5.99		For filter return into tank
12	FPT x FPT Swing Check Valve (Clear), for water	1	\$25.99	\$25.99		
13	Hose Fitting Adapter 3/4"	1	\$2.45	\$2.45	<a href="#">Hose Adapter</a>	For swing check valve output to 3/4" ID hose
14	Supreme Classic Mag Drive Pump, 1200 (MD12, Mfg#027)	1	\$154.99	\$154.99		Max. 1200 gallons/hr, 110W, love these pumps, could probably up to 1800, \$184.95
15	Vinyl Tubing 3/4 ID, Black, 10'	1	\$9.99	\$9.99		
16	Super Skimmer Needle Wheel Protein Skimmer, 125 Gallo	1	\$159.99	\$159.99		
17	Ball Valve, CD-821065, Barbed-end 3/4"	1	\$5.99	\$5.99		Optional, control flow rate into tank (I always have open all the way)
18	Silicone Sealer, 3 Oz, CD-114819	1	\$4.99	\$4.99		
19						
20	EHEIM Jagger Heater, 200W	2	\$24.74	\$49.48		
21	Carib Sea Base Rock, 40 lbs	2	\$48.25	\$96.50	<a href="#">Base Rock</a>	Minimum amount, both inside aquarium and refugium
22	Florida Crushed Coral, 40 lbs, CD-967078	3	\$29.83	\$89.49		Could use all special grade sand 1-2 mm for a finer bottom
23	Arag-Alive Special Grade Sand 1-2 mm, 20 lb	1	\$23.10	\$23.10		
24	Hydrometer, CD-116658	1	\$8.99	\$8.99		
25	Sea Salt, 200 Gallon Box	1	\$39.99	\$39.99		
26	MarineLand Maxi-Jet Powerhead, 1200 PRO, CD-74854	1	\$24.99	\$24.99		
27						
28	<b>Below for air injection (water flow and adding oxygen)</b>					
29	20' Flexible Air Tubing	1	\$4.49	\$4.49		Don't recommend vinyl tubing, use flexible silicon, usually blue, rated for O2
30	AirLine Check Valve	1	\$1.25	\$1.25		
31	Whisper Air Pump, Model 100 (or Deep water 150/300 se	1	\$21.99	\$21.99		I like my Tetratrac Deep air pump, but don't see that for sale any more. Now it is Whisper deepwater, 150 is \$37.99, 2 outlet 300 is \$59.99.
32	Airstone, 6"	1	\$2.49	\$2.49		
33	Aquarium Gang Valve, 4 way, CD-35665	1	\$2.99	\$2.99		
34						
35	Fish					Fish typically cost 15-100 dollars each, but can be more for rare fish
36	Fish Food					Most of cost is in shipping
37	Aquarium Master Test Kit, Salt Water	1	\$24.99	\$24.99		
38	Calcium Hydroxide (Pickling Lime), 1 lb. (to adjust pH and	1	\$9.20	\$9.20	<a href="#">Lime</a>	
39	Digital Aquarium Thermometer	1	\$2.59	\$4.00	<a href="#">Thermometer</a>	
40			<b>Total</b>	\$2,834.25		
41	<b>Other Nice-to-have Items</b>					
42	Crabs and snails to eat algae and left over food					
43	Scrub brush					
44	Plastic containers					
45	Sink and hose with nozzle					
46	Long spoon for mixing salt water					Could use another power head
47	Medicine if fish get sick					Copper is the only thing that works well for the most common infections
48	Live rock			\$0.00		Optional for Coralline Algae
49	Light timers & power strips					Would need 2 if alternating refugium and main tank lights
50	RO/DI filter					
51	Large container(s) for water (storing filtered water and changing)					
52	Fish net					
53	Siphon tube					Needed to do water changes
54	Midea refrigerator/freezer	1	\$158.01	\$158.01	<a href="#">Refrigerator</a>	For frozen fish food, if using (Many others, cost is for Midea)
55	Additional test kits (calcium, phosphate, copper, others as needed)					
56	Feeding Clips for Algae Sheets	1	\$6.96	\$6.96	<a href="#">Feeding Clips</a>	



there is no chance of removing the sump any way but through the top of the cabinet (by removing the aquarium). Fortunately, it is not that hard to move the 20-gallon tank (removing most water first). Ideally, you should rarely have to remove the sump. Note that for the small setup, the sump lists the protein skimmer I use as not compatible (too big). This is not completely true. The water pump and skimmer in the above list just fit together in the 3<sup>rd</sup> compartment. It is a little tricky getting the skimmer cup back on and getting the pump out to clean it. The skimmer in the medium setup is the same brand (Coralife) and basic design, but bigger; however, the smaller version is much harder to adjust properly. I thought it was broken at first. It has an additional adjustment on the water flow rate that the larger model does not have. Once it is set properly, I recommend not changing either of the adjustments when you take the cup off for cleaning. It does not matter if the bubbles overflow while you have the cup off.

**Temperature.** The pumps add heat to the water so the tank temperature without additional heating stays about 4 degrees F above room temperature. That means, assuming a nominal aquarium temperature range of 72 – 78 degrees, the room temperature can be between 68 and 74 degrees without additional heating or cooling. My aquariums are in a place where they need some additional heat in the winter and some cooling in the summer. The tank heaters are to keep the water warm enough in winter; and I use room air conditioning to cool the room below 74 degrees in the summer. You could add a chiller to each tank, but that is somewhat expensive and complicated.

The details are in a separate spreadsheet that are pasted as pictures above. For the links, I can provide the Excel spreadsheet.

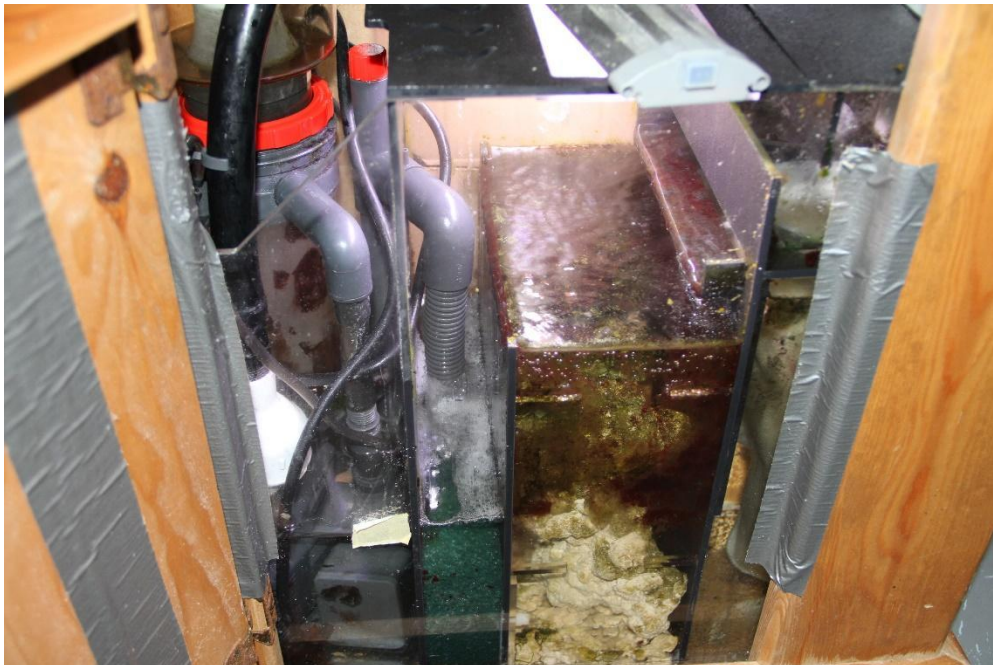
**Light.** See above for some good options. The LED lights in the refugium are for 2 reasons: 1) promote algae growth to lower nitrates, 2) Keep pH more constant by having light on in refugium when is off in the main tank.

Note that the input to the inside overflow box should be covered up with filter material (I secure with a rubber band) if there are small fish that might jump or get sucked into the filter. Also, the top of the tank should be completely covered so no fish can jump out. Some fish can jump through a crack that is smaller than it would seem physically possible. Don't ask me how I know.

Hope this helps someone. I would be happy to try to answer any questions.

Here are a few photos of the tank setups:

Small 20-gallon Tank:



2<sup>nd</sup> and 3<sup>rd</sup> sump compartments under the small tank hold protein skimmer, refugium, return pump/hose, and LED light (1<sup>st</sup> sump compartment (on right), not visible, holds 2 filter socks)

Medium 125-gallon Tank:



3<sup>rd</sup> Sump compartment contains the protein skimmer and return pump



1<sup>st</sup> sump compartment holds 3 filter socks



Back of medium tank and side/back of small tank. Overflow box is shown (I modified to make it quieter).



Center (2<sup>nd</sup>) refugium compartment from the back



Right side of medium tank showing pump return and power head (water flow pump)