



**SURF2™**

**SURF2x™**

**SURF2xx™**

**SURF4™**

**SURF4x™**

**SURF8™**

**SURF8x™**

**Saltwater Surf Scrubber®  
Floating Surface UAS®**

**Updated July 2022**

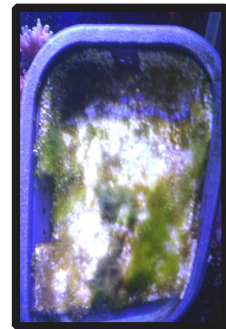
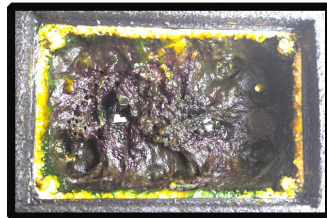
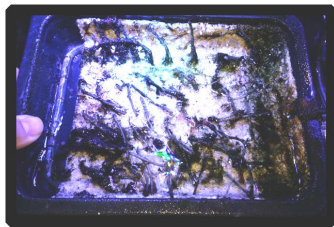
If your SURF is not show some color growth within 3 weeks, email us or ask at:  
[www.AlgaeScrubber.net](http://www.AlgaeScrubber.net) unless your tank is newer than 6 months which will take longer.

Updated instructions: [www.AlgaeScrubber.net/SURF-Instructions.pdf](http://www.AlgaeScrubber.net/SURF-Instructions.pdf)

# Slime Growth

If your scrubber starts out with dark slime like these pictures, clean it with a toothbrush in your sink with running water so that you see all the white surfaces.

Sometimes the slime will already have let go, showing the white below it. It still needs toothbrushing



**NOTE 1:** Algae must be removed from the scrubber in order for nutrients to be removed from your water. Do not go longer than 2 weeks before cleaning/harvesting, once growing.

**NOTE 2:** The SURF scrubber needs a light-reducer cloth placed over half the LED lights for the first few weeks to reduce the high-intensity light which reflects on the pure white surfaces. So be sure to use the cloth which is included, to cover about half of the lights. After growth starts and the surfaces are no longer white, the cloth can be removed. The SURF2xx and SURF4 and SURF4x and SURF8 and SURF8x also have a low-power mode to help with this.

## Part 1: Aquarium Filtration

Thank you for your purchase of the Santa Monica Filtration® SURF floating surface upflow algae scrubber® and seaweed cultivator with Green-Grabber® growth surfaces. Enclosed is either the SURF2, SURF2x, SURF2xx, SURF4, SURF4x, SURF8 or SURF8x. The first part of these instructions is for aquarium filtration, and the second part is for seaweed (sea vegetable) cultivation.

This device will do most of the filtering needed for your saltwater aquarium, and in most cases it will do all the filtering. Part of this filtering includes helping eliminate two very important things that drive most aquarium owners crazy: Algae and waterchanges. The filter works by growing algae inside the filter, which then consume all the “bad” things out of the water\*. This is how all the oceans, and all the lakes, are naturally filtered. A SURF scrubber can also be used in freshwater, but since freshwater grows mostly thin stringy algae, you will not be able to reach in and pull the algae out with your hands; you will need to brush it out in your sink instead and the strings tend to get in the way (therefore our other models without the strings are better).

**Aquarium size:** The SURF2, SURF2x and SURF2xx each has 24 square inches (150 square cm) of horizontal growth surface which can grow up to 1 inch (2.5 cm) thick, and it is designed to be the only filter on an aquarium that is fed up to 2 frozen cubes per day, or 20 pinches of flake food per day, or 20 square inches (120 sq cm) of nori seaweed per day, or 0.2 dry ounce (5.6 grams) of pellet food per day. Each 50 pounds (23 kg) of phosphate-soaked problem rock that you might have in your aquarium counts for an additional 1 cube a day. The SURF2 is suitable for water with phosphate as high as 0.2 ppm; higher than this should have the stronger light of the SURF2x, and if higher than 0.5 ppm then the strongest light of the SURF2xx is best. The number of gallons/liters of water does not matter.

The SURF4 and SURF4x each has 48 square inches (300 square cm) of horizontal growth surface which can grow up to 1 inch (2.5 cm) thick, and it is designed to be the only filter on an aquarium that is fed up to 4 frozen cubes per day, or 40 pinches of flake food per day, or 40 square inches (240 sq cm) of nori seaweed per day, or 0.4 dry ounce

(11 grams) of pellet food per day. Each 50 pounds (23 kg) of phosphate-soaked problem rock that you might have in your aquarium counts for an additional 1 cube a day. The SURF4 is suitable for water with phosphate as high as 0.2 ppm; higher than this should have the stronger light of the SURF4x. The number of gallons/liters of water does not matter.

The SURF8 and SURF8x each have 96 square inches (600 square cm) of horizontal growth surface which can grow up to 1 inch (2.5 cm) thick, and it is designed to be the only filter on an aquarium that is fed up to 8 frozen cubes per day, or 80 pinches of flake food per day, or 80 square inches (480 sq cm) of nori seaweed per day, or 0.8 dry ounce (22 grams) of pellet food per day. Each 50 pounds (23 kg) of phosphate-soaked problem rock that you might have in your aquarium counts for an additional 1 cube a day. The number of gallons/liters of water does not matter.

If you have rocks which are soaked with phosphate from having been in a problem saltwater aquarium, each 50 pounds (23 kg) of problem rock will add 1 cube a day to your feeding amounts; so be sure to account for this when choosing a scrubber size. For example if you feed 1 cube a day, but have 100 pounds of live rock that came from a tank with nuisance algae problems, this rock will add 2 cubes a day to your feeding, meaning that you would need a scrubber for 3 cubes a day. This applies even if the rock was dried out and bleached, because this does not remove any nutrients from the rock. It will take several months for the phosphate to come out of the rocks; after this time, your feeding amounts will be the same as the amount you feed per day.

The amount of water in the aquarium, or the dimensions of the aquarium, are not important. If you have other filters, or do waterchanges, then a single SURF scrubber can handle more feeding. If you feed more than the above amounts but have no other filters or waterchanges, you can use additional SURF filters to add up to the amount that you are feeding and then clean one filter at a time on a rotating schedule (one per week, etc). If you feed much less than the above amounts, and the aquarium is very small, then it will still work but you just need to find a place where the filter will fit, or consider getting a smaller HOG, DROP, or SLIP, or maybe a RAIN waterfall version to go above the water.

**Filter Position:** This SURF filter is to be floated on the surface of your aquarium or sump water. It does not matter where it goes, because it will filter the same. Some red light does come out of the holes on the bottom, so you may have to account for this when deciding where to put it. This red light will decrease as growth increases. The lid has a rim which blocks all light from coming out of the top. If you have powerheads or an overflow or other strong flow near the SURF2, SURF2x or SURF2xx, position the filter so that the flow does not hit the bottom of the filter; this will allow all the filter's air bubbles to go inside the compartment without being blown sideways (the SURF4, SURF4x, SURF8 and SURF8x has bubble rings which block sideways bubble flow).

**Light Timer:** The lights (LEDs) in the filter should be put on a timer so that they stay on for part of the day, and off for the rest of the day. The LEDs light should generally not stay on for 24 hours or the filter may not function well because it probably will not grow

the algae it needs to grow in the filter (although you can try 24 hours if you want, especially when new, to see how it goes). A good starting point is 18 hours per day for your first weeks. Once the rock and string surfaces inside the unit are no longer white, increase the hours to 20 per day the next week. If the growth continues to grow good, you can try up to 22 hours per day for the week after that. However if the growth starts showing bright yellow or clear areas beneath the LEDs, then decrease the hours by 2 per day. By adjusting the hours per day you can control the growth: Bright yellow or clear growth (like a sunny day) means you need less hours of light; black growth (like a dark night) means you can add more hours of light. Eventually you will find the overall best number of hours for your aquarium, based on how much you feed, and how old the rocks are. If you need to turn the lights off longer because the aquarium is in a bedroom, you can, but the filtering might be reduced.

The SURF2xx, SURF4, SURF4x, SURF8 and SURF8x each has two separate power cords on each light, with each power cord powering half of the red LEDs for each light. When brand new, plug only one of the power cords in, and run it this way until some type of colored growth starts to develop on the rocky walls, or strings, or both, which usually takes a week or two, or longer on a new tank. After colored growth (any color) has started to develop thick on the rock textures or strings, plug the other power supply in so that both power supplies turn on at the same time.

**Air Pump:** The SURF2, SURF2x and SURF2xx require an air pump that can provide at least 5 total liters per minute (300 lph, or 0.2 cfm) of air to make the air bubbles and water flow into the growth compartment via the 2 air bubble holes at the bottom, and twice this much is not a problem; this is a larger air pump, and most single-outlet pumps will not be enough. We recommend a 2-outlet air pump such as the Danner AP-4 with a control knob; this will match up with the 2 air inlets on the SURF2. Other tested pumps which work well are the Whisper 300 from Tetra (it has even more air, and is more silent, but is more expensive and is not adjustable), and the Tetra Whisper 150 will also work but you will need two of them. Generally if a pump only has 1 outlet, you will need two of them; one for each air inlet on the SURF2, SURF2x and SURF2xx.

The SURF4 and SURF4x require an air pump that can provide 10 total liters per minute (600 lph, or 0.4 cfm) of air to make the air bubbles and water flow into the growth compartment via the 4 air bubble holes at the bottom; this is a large air pump, and single-outlet pumps will not be enough. The Danner AP-8 air pump work well and has a control knob. Other tested pumps which work well are two Whisper 300 pumps, or one Hailea ACO-9720. The Hailea has an 8-outlet manifold, so you will need to cap off (or melt closed, if plastic) 4 of them to match the 4 air tubing inlets on the SURF4 and SURF4x.

The bubble rings which circle the four air inlets on the SURF4 and SURF4x allow large quantities of air to be pumped in without the bubbles spilling sideways; the rings allow 10 lpm (600 lph) per inlet, which is 40 lpm (2400 lph) total, to be pumped in, which is four times the “normal” bubble amount and really creates a bubbling soup of algae.

The SURF8 and SURF8x require an air pump that can provide at least 20 total liters per minute (1200 lph, or 0.8 cfm) of air, and preferably up to 80 lpm (4800 lph, or 3.2 cfm). There are many air pumps which will work well, and they tend to be sold for hydroponics, aquaponics, aquaculture, koi ponds, septic tanks and other uses. They are usually much larger and heavier so that they will absorb the sound. One such pump is the HAILEA air pump in the smaller model ACO-9720 mentioned above, which is 25 watts and 30 liters per minute, or the larger model ACO-9730 which is 50 watts and 60 liters per minute. These pumps are completely waterproof for outdoor use, and are solid metal and fairly quiet so that you will mostly only hear the scrubber working, not the pump. However these pumps are large (the size of a soccer ball), and heavy (8 or 12 pounds; 4 or 6 kg), and they use lots of thick rubber inside which gives a "new tires" smell for a few weeks. The 25 watt ACO-9720 can run one SURF8 or SURF8x, or two SURF4 or SURF4x units, and the larger 50 watt ACO-9730 can run two or three SURF8 or SURF8x units, or many SURF4 or SURF4x units. These HAILEA pumps are available in either 120 volt or 240 volt versions, and are easily found online by searching for "9720 air pump"; the 120 volt USA version is available here:

<https://pentairaes.com/outdoor-air-pumps.html>

It is the air bubbles which move water into the growth compartment and up the growth surfaces, and also supply carbon dioxide (CO<sub>2</sub> in the air) to the water after CO<sub>2</sub> in the water is used up, which allow algae to grow fast in the filter. The more bubbles there are, the thicker the algae can grow. Large bubbles even create openings in the algae for light to reach further down into the growth; thus reducing dark areas. The air pump should run 24 hours a day, however you can turn it off or reduce the flow for a few hours when you turn the LED lights off, but make sure the LEDs are indeed off so you do not burn the algae. Lower air flow, however, will probably reduce filtering. Make sure to place the air pump above the aquarium so water does not drain out if the power goes off. If you don't have a large enough air pump for the SURF, just use what you have (or two, three or four of them) until you can get a bigger one. Interestingly, if you use high amounts of air and you have livestock in the water below the SURF, you may find that the animals are eating the algae as it get pushed out the bottom drain holes!

**Filter Cleaning:** The filter box and the light must be cleaned when the algae growth gets thick, which is usually every 7 to 10 days. Do not let the algae stay longer than 14 days. If the growth is not thick by 10 days, let it go to 14 days before cleaning (you can clean the LED light more often if you want, so it stays bright). Newer tanks usually have to run for more days before thick algae grows. Just check it every few days to make sure the bubbles are still flowing properly, and that the light is on for 18 hours per day, and that the light really turns off when you think it does (watch it). Also, if you are using the SURF on a brand new tank that you have not started feeding yet (for example, if it is still cycling), then there will be very little growth at all until you start feeding.

For cleaning, the SURF offers you the advantage of livestock-feeding, and also in-place harvesting if the growth is thick green hair algae. If your filter has started growing green hair algae, you can feed some of it to your animals at any time by just lifting the LED lid up and pulling some algae out (you do not need to turn the air or lights off; however you

can clean the light at this time). Usually smaller amounts of feeding at a time are better. By feeding your animals from your SURF scrubber, your animals get very fresh live growth and no additional nutrients are added to your water. This SURF feeding process simply takes nutrients from your aquarium water and converts (grows) them into food so that they can be put back into your animals. It's very much like growing your own food in a garden. Generally, the more you can feed your animals from your SURF instead of from packages, the "cleaner" your aquarium will be because the nitrate, phosphate etc. that was accumulating in your water are now helping your animals to grow.

To clean or "harvest" the filter, just remove more growth from the compartment than you would for feeding. Also clean the light at this time. The removed green or brown growth can be thrown away, but it also makes great garden fertilizer, pet food, and beauty (seaweed) wraps and baths. In saltwater, a bright green very-thin growth is usually Angel Hair seaweed (*Cladophora* species), but if it's thicker like Easter basket filler it is Sea Lettuce (*Ulva fasciata*), and sometimes you'll actually get the large-leaf Sea Lettuce variety (*Ulva lactuca*). If it's brown, then it is a mixture of others.

If after two weeks the SURF compartment is only covered with slime (of any color), then you'll want to clean out the entire compartment so that green hair algae can attach (slime is a great filter, but is slippery and will prevent green hair algae from attaching). Do this by disconnecting the air supply tubing and taking the growth compartment to your sink or outside, and using an old toothbrush to remove all slime from all rock surfaces, and scrape the strings with your fingers while running water over it. You'll also want to clean it this way if you discover lots of saltwater pods (tiny animals) in the compartment, because these pods will eat some of the algae and will reduce the filtering; the freshwater from your sink will remove these pod animals. Of course if you are wanting to feed your livestock, nothing is better than lots of live pods draining out of the SURF drain holes; so in this case you would not want to use freshwater for cleaning, and you may not even want to clean it at all; just let the fish eat what flows out. Do still clean the light though; strong light is important when the growth gets thick in any color (green, brown, black). And if you never do a freshwater cleaning in your sink, it's a good idea to do one every few months, to reduce the number of pods or worms that might be living in the scrubber.

The LED lid will usually have a coating of growth on it, on its bottom side. The growth may not cover the actual LED spots because the LEDs are strong enough to "burn" the algae away, but the other areas of the lid can get thick. For best filtering results, wipe or scrape (maybe with an old credit card) this algae off of the lid, taking care not to scratch the plastic with anything metal. You can clean the light as often as you wish, which will increase light levels for more growth and better filtering.

**Other Filters:** Although a SURF scrubber can be the only filter on your aquarium (which is how you would operate it to be the lowest cost and easiest way), it can also be operated with most other aquarium filters and additives. One exception might be additives that kill algae, or medications that contain copper, depending on how much you use. Carbon dosing, such as pellets or Zeo if used heavily, can also reduce scrubber growth. And chaeto reactors and macroalgae refugiums, while they won't reduce scrubber growth, will

usually die when your scrubber gets fully functional because your scrubber will treat them as nuisance algae.

**Bulb Replacement:** The individual red LED lights are not replaceable.

\* **Water Changes:** If you have been doing water changes to reduce nitrate, phosphate, or nuisance algae, then an algae scrubber will greatly reduce the need for them and may possibly eliminate them. When algae grow in the filter, they consume nitrate, nitrite, phosphate, ammonia/ammonium, metals, CO<sub>2</sub>, and some toxins; so it's just a matter of growing enough algae inside the filter to do the filtering you need, compared to how many nutrients you are putting into the tank with the food you feed (that is why the SURF filter is sized for a certain amount of feeding per day). However, this filter (and algae in general) do not supply calcium, alkalinity, magnesium or strontium to the water. So if you wish to reduce or eliminate water changes, you will need to supplement any calcium, alkalinity, magnesium or strontium that you were using water changes for. Freshwater aquariums, which may only need alkalinity (hardness) to be maintained, may get enough alkalinity from just doing evaporation top-offs with tap water.

### **Troubleshooting:**

*Lights have stopped working:* If the little light on the power supply box is on, all of the red lights should be on with the same brightness. Sometimes people will drop the black power supply box on a hard floor and this will bend some of the components inside it, causing the red lights to go out. This can sometimes be fixed by tapping the power supply on a hard wood surface such as a desk, on all the sides of the power supply. Try harder each time, on different sides, until the red lights come back on. Also, sometimes water gets inside the power supply box from drips, sprays, or condensation. This can be solved by setting the power supply in warm sunlight for several hours, or on top of a warm surface (like your aquarium lights) for several days. If none of the above works, or if only a few of the red lights are operating, contact us for a solution.

*Reduced Bubbles:* Sometimes a white lime carbonate buildup (looks like salt) will occur inside the ends of the air tubing where the bubbles come out under the filter, and this will slow down the airflow. To fix this (or prevent it from happening), push a paper clip into the ends of the tubing (or use pliers to slightly squeeze the tubing) to break the hard material up into small pieces, and then it can be blown out with air, or with water using the included syringe. Alternately, some vinegar could be put into the tubing by using the included syringe, and it will slowly dissolve the buildup; however to do this the filter needs to be kept out of the water for an hour or two so the vinegar can soak, and the algae in the filter needs to be kept wet so it does not dry out. If the tubing does not seem clogged, but the bubbles are still low, then the air filter on your air pump may need cleaning. Many air pumps have a tiny round filter on the bottom of the pump, and larger pumps have it under the top cover; pull it out and wash it and put it back.

*Completely Black Growth:* Some aquariums, even if you are not feeding much, have huge accumulations of nutrients (usually phosphate) in the live rock and sand/gravel after years



or even decades of use without any phosphate removal. These situations will cause a black “oil” or “tar” to grow in the filter because phosphate is now being removed from your aquarium for the first time by the scrubber. These large concentrations of nutrients, like phosphate, will cause phosphate-loaded black growth. Not to fear: Since the black growth contains LOTS of nutrients, you can be assured that the filter is indeed working and is removing these nutrients from your aquarium. However if the white textures or strings are completely covered in black growth and there is no more white to be seen (only black everywhere), then this would be a case for needing to take the filter to your sink or outside and use a toothbrush to remove all of the black growth from the rock textures, and from the strings with your fingers, under running water. Clean the light also. After another short period of just 3 to 5 days you may need to clean it in the sink again, and you can clean the light as often as you wish. At some point, enough nutrients will be removed from your aquarium that green growth will probably start growing in the filter, and you may then be able to start doing reach-in cleaning/harvesting which does not require taking it to the sink. How many weeks or months this takes depends on how much rock and sand you have, how many SURF filters you are using, and how many other phosphate filters (including water changes) are helping with the phosphate removal. Note: skimmers, canisters, sponges, floss, socks, and bio media do not remove phosphate. In all cases of black growth, run the lights as much as possible, up to 24 hours per day, and clean the light as often as practical so it stays bright.

*Black and White Spots:* Black “oil” or “tar” growth contains lots of nutrients from the water, but does not attach well to the white rocky surface. So if you are getting the high-nutrient black growth described above, but the air bubbles are blowing the growth away, then you will see patches of white where the black growth lets go. To get through this phase, reduce the air bubbles a little bit (you can tie a knot in the air tubing), so that the black growth can stay attached, and brush the growth clean in your sink very often, such as every 3 days. And in all cases of black growth, run the lights as much as possible, up to 24 hours per day. Black and white surfaces can also be caused by pods (tiny saltwater animals) living and eating in the scrubber. If you see any little animals moving around, then use freshwater in your sink to get rid of them. But if you are brushing clean in your sink every 3 days, you should never see them. After the growth starts growing brown or green, you can clean less often.

*Completely White Surfaces:* If your tank is new, or if your tank has low nutrients because lots of nuisance algae on your rocks is absorbing the nutrients, or because you are running a low-nutrient system, your SURF scrubber compartment may stay “paper white” with absolutely no sign of growth for weeks because the scrubber light is reflecting on the white surfaces and is too much light compared to how many nutrients are in the water. This is why the scrubber comes with a black cloth to place halfway (or more) over the lights, and why the SURF4, SURF4x, SURF8 and SURF8x have low-power modes using only one of the power plugs. You can also place your own shading material such as a stocking, black T-shirt, or some other material over half or more of the lights until some growth of any color occurs. After growth (of any color) covers the white textures and strings in the growth compartment, the light will not reflect as much and you can remove

the shading material partly or completely, and/or go to full-power mode with the SURF4, SURF4x, SURF8 or SURF8x . Algae just cannot grow when the light is too strong.

*Algae On Rocks Increases:* This baffles many people. If after running your SURF scrubber (or any scrubber) for several months you start seeing more (not less) algae growth on the rocks in your aquarium, what probably is happening is that phosphate is coming out of the live rock. This is good! This is usually the case when the phosphate in the water measures “zero”, and the algae that is starting to grow on the rocks is green, long, and concentrated in certain spots; usually near the top and on sharp rock edges and points. Another indicator will be that there will be no algae growing on clean plastic or glass, even if these parts are up near your lights, because plastic and glass do not store phosphate. The rock algae will increase for a while, and when the phosphate in the rock is used up, the rock algae will start turning yellow and letting go, sometimes in large chunks which get caught in pumps. The time for all this to happen can be from two to four months, depending on how much phosphate was in the rock, how many SURF scrubbers you have, and how many other filters you have, including water changes.

*Bubbles Not Going Up Through Holes:* If air bubbles do not come up through the air inlet holes in the bottom of the filter of the SURF2, SURF2x or SURF2xx, and instead go sideways around the bottom of the box and into the water, then there is a powerhead or other strong water flow that is pushing the bubbles sideways underneath the unit. Remove or re-route the strong water flow, and the bubbles will come up through the holes properly. Also a very weak air pump can cause bubbles to not get to the holes. The SURF4, SURF4x, SURF8 and SURF8x include circular bubble rings around the holes to prevent this. These bubble rings can be purchased separately for the SURF2 or SURF2x, if you must keep rapid water flowing beneath the unit.

If a SURF4, SURF4x, SURF8 or SURF8x has recently started having bubbles go sideways instead of up through the holes, and otherwise has been growing good for a long time, then check the drain holes in the corners. Growth may have filled-in the drain holes, especially after a reach-in harvest where pieces of growth get stuck in the drain holes. If the drain holes are blocked, then upflowing water will fill up the compartment more than normal, and this extra water inside makes it harder for bubbles to come up.

## **Part 2: Seaweed (sea vegetable) Cultivation**

Note: Seaweed cultivation is separate from aquarium filtration; do not add fertilizer to you aquarium.

Seaweed which grows naturally in the ocean does so using sunlight for photosynthesis, rocks for attachment, nutrients for metabolism, and water flow to deliver these nutrients to the photosynthetic parts of the seaweed. The SURF cultivator simulates this environment by providing strong red LED light (red is the part of sunlight that seaweed uses most), rock-hard attachment surfaces (and flexible strings too), fertilized water for

nutrients, and upflowing air bubbles to deliver these nutrients and CO<sub>2</sub> to the seaweed and to stir up the growth.

**Reservoir size and type:** The SURF cultivator needs to be floated on a container of saltwater; the number of gallons or liters of this reservoir is not critical, however the larger it, the less often you will need to add fertilizer to it. It is estimated that at least a 5 gallon (20 liter) reservoir should be used for each SURF you operate. However the reservoir could be 10, 20, 55 gallons or larger. A dark-colored opaque reservoir material such as black plastic works well; do not let any metal parts touch the water.

**Position:** The SURF filter is to be floated on the surface of the reservoir water. It does not matter where it goes there, because it will grow the same. Some red light does come out of the holes on the bottom, so you may have to account for this when deciding where to put it. This red light will decrease as growth increases. The entire reservoir and cultivator area can be enclosed if desired, which will block all light and most sound.

**Light Timer:** The timer requirements for seaweed cultivation are the same as filtration, described above in Section 1.

**Air Pump:** The air pump requirements for seaweed cultivation are the same as filtration, described above in Section 1.

**Salt:** After filling your reservoir with tap water, let it sit overnight so any chlorine will evaporate. The next day add a salt mix from an aquarium store, or natural sea salt from a health food supply. You will need quite a bit of salt mix the first time, so it will probably be cheaper to get it from an aquarium store. The exact amount of salt is not critical; just follow the instructions. If you are trying to duplicate the amount of salt in the ocean, you would use a hydrometer tester (also from an aquarium store) and set the salinity to approximately 0.026 the first time. Thereafter, as you harvest more and more seaweed (which removes some saltwater, and thus salt), you'll need to check the salinity periodically and replenish it as needed. A reservoir that is twice as large will operate twice as long before needing more salt.

**Fertilizer:** After adding the salt, then add a fertilizer mix from a garden store. This part of the operation of your SURF cultivator is still experimental, because seaweed cultivators have never been available before. Therefore the directions on the fertilizer package will not be of any use. There are two techniques you can start with:

**GUESSING:** This is easy; just add some fertilizer to the water, and see how the growth develops. To look at the growth, remove the red LED lid and use a regular white light or flashlight. If after 7 to 10 days the growth is extremely light green or yellow, or very light brown, and the LED was on for about 18 hours a day, then double the amount of fertilizer for the next 7 to 10 days. If however the growth is very dark brown or black, then discard half of the saltwater and re-fill with tap water and half the amount of salt you used the first time. This will bring the salinity back to the proper level, but it will reduce the

fertilizer nutrients to half. Let it grow another 7 to 10 days and see how it looks. Basically, more fertilizer nutrients will grow darker growth.

**MEASURED NUTRIENT LEVELS:** This technique uses aquarium test kits for ammonia, nitrite, nitrate, and phosphate. Low cost test kits are fine. Put enough fertilizer in the saltwater so that ammonia/ammonium measures 0.1 to 1.0 ppm. You can measure the other nutrients too if you like, so you will have a record of them. Now let it grow 7 to 10 days and look at the growth with a white light: Very light green, yellow, or light brown growth needs more fertilizer; very dark brown or black growth needs less fertilizer.

When you find the ammonia/ammonium levels (and other nutrient levels) that give you the best growth, you can then add fertilizer each time to bring the nutrients up to that level. The amount of fertilizer you need to add will be larger if you have a larger reservoir, however the nutrients won't be used up as fast by the growth and therefore will go longer without needing replenishment again. Also, the number of hours the LED light is on will also affect the color of the growth; more hours of light will make the growth lighter; less hours of light will make the growth darker. By adjusting the amount of fertilizer and LED light, you can come up with the proper amount for your amount of harvesting. Lastly, adding a little bit of fertilizer each day is better than adding large amounts once a week.

**Seeding:** If you like, you can take some water from a saltwater aquarium, and/or some green hair algae too (from a lake, etc, and blend it first), and put it into your water reservoir. This is called seeding. It will help speed up the growth, but is not necessary for growth to develop because algae cells will still find their way into the reservoir eventually.

**Harvesting:** The cultivator must be harvested when the seaweed growth gets thick, which is usually every 5 to 10 days once it's been growing a while, or even sooner if it's filling up fast. The light should be cleaned too, preferably more often. If the growth is not thick by 10 days, let it go to 14 days before harvesting, however you can clean the light as often as you like. Newer cultivators usually have to run for more days than older ones do before thick growth occurs. Just check it every few days to make sure the bubbles are still flowing properly, and that the light is on for 12 to 22 hours per day (watch it to make sure it turns off).

The SURF cultivator offers you the advantage of in-place harvesting. After the cultivator has grown thick, you can harvest at any time by just lifting the LED lid up and pulling some seaweed out (you do not need to turn the air or lights off, or take the unit to the sink; however you should clean the light at this time).

The LED lid will usually have a coating of growth on it, on its bottom side. The growth may not cover the actual LED spots because they are strong enough to "burn" the algae away, but the other areas of the lid can get thick. For best cultivation, wipe or scrape this

growth off of the lid, taking care not to scratch the plastic. This will allow more light to reach the algae, thus you can clean the lights as much as practical.

**Black Growth:** If a reservoir has a high concentration of nutrients from too much fertilizer, this will cause a black thick slime or tar to grow, because a large amount of nutrients are being removed from the saltwater and concentrated into the seaweed. If the white textures or strings are completely covered in black growth, and there is no more white to be seen (only black everywhere), then take the cultivator to your sink or outside and use a toothbrush to remove most of the black growth from the textures and strings under running water (unless, of course, you want nutrient-rich black growth for some purpose, such as garden fertilizer). Clean the light also. When putting the cultivator back into the reservoir after cleaning, you can remove some of the saltwater and replace it with tap water and more salt; this will bring the nutrients down in the water, allowing for green growth sooner. An alternate way of reducing nutrients is to just let it cultivate another 5 to 10 days, then clean again. At some point, enough nutrients will be removed from the water by the seaweed that green growth will indeed start growing, and you won't reduce your salt concentration too much this way because you didn't discard any saltwater.

**Bulb Replacement:** Same as filtration, described above in Section 1.

## Miscellaneous

**Power Supply: Do not put the power supply box in the water, or get any water on it.** The power supply box is the black box on the power cord. Also do not let salt spray accumulate on the power supply box. The power supply box is best placed away from the aquarium, reservoir, sump, stand or cabinet, so that if water is spilled, the power supply box will not get wet. It is also best to not put the power supply inside a sump compartment, because of the higher humidity there.

The SURF2 uses 7 watts of power for the LEDs; the SURF2x uses 9 watts; the SURF2xx uses 14 watts; the SURF4 uses 14 watts; the SURF4x uses 21 watts; the SURF8 uses 28 watts; and the SURF8x uses 42 watts. These LEDs use a low voltage that is perfectly safe. The LEDs are sealed in a triple waterproofed enclosure; this sealed enclosure prevents corrosion from saltwater. The UL and CE approved power supply works on both 120 or 220 volts, it converts the 120 or 220 volts to a safe low voltage which is isolated from the SURF, meaning that even if the LEDs were not sealed at all you could drop the LEDs into the water and they would continue to work and nothing would happen. The power plug is for North America, so if you need to plug into a different type of outlet you'll need to get a plug-adaptor (available at any hardware, electronics, home improvement store, or online) or just cut the plug off and attach your own 2-prong plug from a hardware store. The power supply box does get warm, so place it where it can get air (don't put things on top of it). Also, it is recommended that you use a GFCI safely plug, available at any aquarium, hardware, electrical or home improvement store, or online.

**Dimensions:** The SURF2, SURF2x and SURF2xx are 6" wide x 8" long x 3" thick (15 cm wide x 20 cm long x 7.5 cm thick). It requires at least 3" (7.5 cm) of water to operate in. The power cord is 10' (3 m) from the plug to the filter. The air tubing is 3' (.9m). The shipping box is 7.5" wide x 11" long x 5" thick (18.75 cm x 27.5 cm x 12.5 cm).

The SURF4 and SURF4x are 8" wide x 10" long x 4" thick (20 cm wide x 25 cm long x 10 cm thick). It requires at least 4" (10 cm) of water to operate in. The two power cords are each 10' (3 m) from the plug to the filter. The air tubing is 6' (1.8m). The shipping box is 9" wide x 12" long x 6" thick (23 cm x 30 cm x 15 cm).

The SURF8 and SURF8x are 17" wide x 11.5" long x 4.5" thick (43 cm wide x 28 cm long x 11 cm thick). It requires at least 4" (10 cm) of water to operate in. The four power cords are each 10' (3 m) from the plug to the filter. The air tubing is 10 feet (3m). The shipping box is 30" long x 12" wide x 12" thick (75 cm x 30 cm x 30 cm).

**Warranty:** This SURF scrubber comes with a 12 month warranty. Warranty is for replacement or repair only; not a refund. Costs for shipping back to us are not covered; you will need to ship the entire filter back to us before we can ship a replacement.

**Warranty is limited to repair or replacement, and does not cover fish loss, personal injury, property loss, or direct, incidental or consequential damage arising from the use of it. The warranty and remedies set forth above are exclusive and in lieu of all others, whether oral or written, express or implied. We specifically disclaim any and all implied warranties, including but not limited to lost profits, downtime, goodwill, damage to or replacement of other equipment and property, and any costs of recovering animals, plants, tanks or other aquarium related items and/or equipment. We are not responsible for special, incidental, or consequential damages resulting from any breach of warranty, or replacement of equipment or property, or any costs of recovering or reproducing any equipment, animals or plants used or grown with this product.**

**Happy Algae Growing!!**