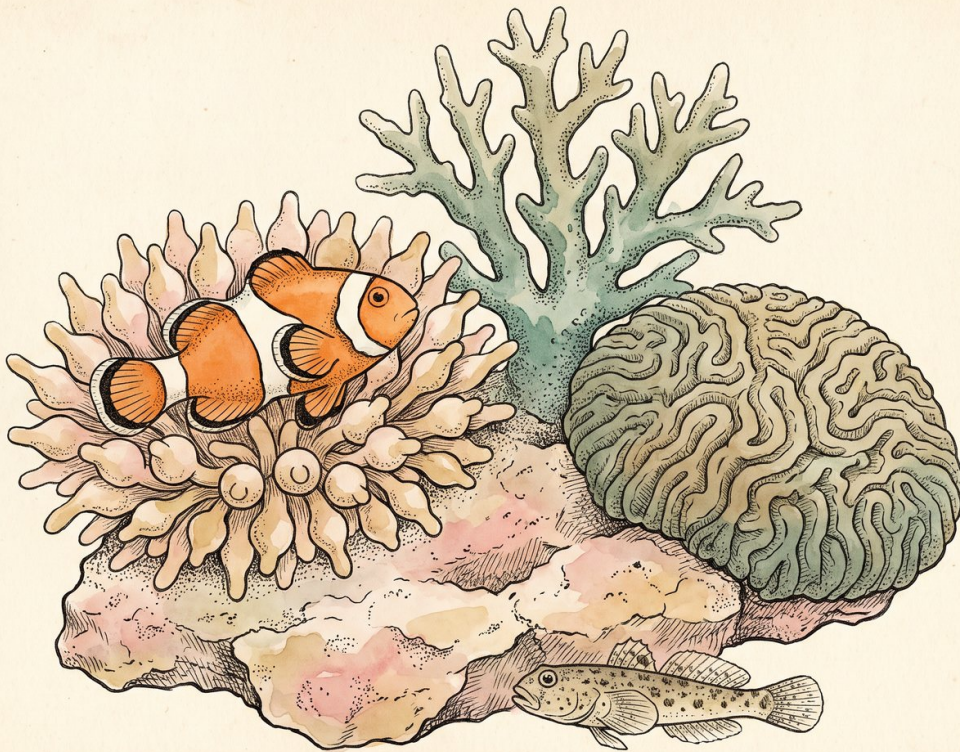


WALNUT CREEK SUPPLY

THE COMPLETE CARE GUIDE

Reef Tank

Stability first: a patient guide to your first saltwater reef



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New owner? Go straight to Section 1. It is written so you can set up a safe, correct home and get through the first 48 hours without reading anything else first.

*A healthy saltwater reef tank is one of the most beautiful things a person can build in a living room — a slow, glowing garden of corals, with a pair of clownfish bickering over the best spot and a hundred tiny things moving in the rockwork after the lights go down. It is also one of the more demanding hobbies in the pet world, and we would rather tell you that now, kindly, than have you find out in month three. A reef tank costs real money up front, takes months to mature, and rewards patience far more than it rewards spending. The good news is that the beginners who do best are not the ones with the biggest budgets or the fanciest gear. They are the ones who go slowly, test often, change one thing at a time, and let the tank settle into a steady rhythm. This guide is written for exactly that keeper. Read the Quick Start first, resist the urge to buy livestock on day two, and remember our motto for this whole hobby: **stability first**.*

SECTION 1

Quick Start: Your First 48 Hours

This sequence assumes your tank, stand, and equipment have arrived and you have a source of clean water. Do not skip the leak test; finding a leak with 40 gallons of saltwater in the room is a very different experience from finding it with tap water.

1. **Pick the spot and level the stand.** Choose a place away from direct sunlight, heating vents, and exterior doors, close to an outlet on a GFCI circuit (a ground-fault outlet that cuts power if water gets where it should not). Water weighs about **8.3 pounds per gallon**, and with rock and sand a 40-gallon system can top **500 pounds**. Use a stand rated for it, preferably on a ground floor, and check it is dead level in both directions before the tank goes on.
2. **Sort out your water source before anything else.** Reef tanks use **RO/DI water** — reverse osmosis/deionized water, which has been forced through membranes and resin to strip out nearly everything dissolved in it. Tap water carries phosphate, silicate, copper, and chloramine that feed algae and harm corals. Lancaster County folks know our tap runs hard and limestone-rich, which makes this even more important. Buy RO/DI water by the jug from a fish store, or install a small RO/DI unit, and check its output with a **TDS meter** (total dissolved solids; it should read 0).
3. **Fill the tank for a leak test and dry-run every piece of equipment.** Fill with tap water just for this step, plug in the return pump, heater (in water only), and powerheads (the small pumps that stir the water), and run everything for **at least 12 to 24 hours**. Watch every seam, fitting, and bulkhead for drips. Fix problems now, while it is only tap water.
4. **While the leak test runs, mix your saltwater.** Use a dedicated clean container (a food-grade bucket or a lidded trash can that has never held soap or chemicals), fill with RO/DI water, add a heater and a small pump for circulation, and mix in reef salt per the package directions. Let it stir for **at least 12 to 24 hours**, then check **salinity** (the amount of dissolved salt in the water) with a **refractometer**, a hand-held optical tool that reads salinity from a single drop. Aim for **1.025 to 1.026 specific gravity** (a density measure; about 35 parts per thousand, or ppt).
5. **Drain the test water, rinse your rock and sand, and build your aquascape** (the arrangement of rock that forms the reef's structure). Rinse sand in RO/DI water until it runs clear (no soap, ever). Place rock directly on the tank bottom glass or base, then add sand around it, so burrowing animals cannot undermine the structure. Leave gaps for flow behind and between the rocks.
6. **Fill the tank with your mixed saltwater.** Pour onto a plate or into a bowl placed on the sand so you do not blast a crater. Then switch on the return pump, powerheads, and heater. Set the heater to **77 to 79°F** and confirm the temperature with a second, separate thermometer, because heater thermostats can fail.
7. **Set up your auto top-off (ATO).** An ATO is a small sensor-and-pump system that automatically replaces evaporated water with fresh RO/DI from a reservoir. Fill the reservoir, test the sensor, and make sure it cannot run dry or overfill. Only pure water evaporates; the salt stays behind, so topping off with saltwater would slowly push salinity up.

8. **Start the cycle.** The **nitrogen cycle** is the process by which beneficial bacteria colonize your rock and sand and learn to convert toxic ammonia into nitrite and then relatively harmless nitrate. Add an ammonia source (a bottled ammonia product made for aquariums, or a small pinch of fish food left to decay), and let the rock begin to colonize. **No fish, no corals, no clean-up crew yet.** The full cycling timeline is in the Cycling & Stocking Order section.
9. **Buy your test kits and start a logbook.** Write down date, temperature, salinity, and whatever else you test, every time. Your notebook becomes the single most useful diagnostic tool you own, because trends tell you things single readings never will.
10. **Make a failure plan and find your local help.** Know where the breaker for the tank is. Keep a spare heater, a spare powerhead, and a battery-powered air pump somewhere handy. Find a local fish store you trust, or a reef club, and put our number, **(717) 983-8069**, in your phone.

First-Time Starter Bundle

What needs to be in the house before you start, and what to look for in each category.

Essentials

- **A glass or acrylic tank in the 30 to 60 gallon range, with a matching level stand** — big enough to be stable and forgiving, small enough to manage. Tanks with built-in overflows or a rear chamber for equipment are easiest for beginners.
- **A sump or all-in-one equipment chamber** — a second compartment (below the tank or built into its back) that houses the heater, skimmer, and return pump so they stay out of sight and out of the way of your corals.
- **A return pump sized to the tank** — it brings water from the sump back up to the display; look for adjustable flow so you can fine-tune it.
- **A protein skimmer rated for the tank volume or higher** — a device that pulls organic waste out of the water as foam before it breaks down.
- **Two or more powerheads, or one controllable wave-maker pair** — to create random, wide water movement across the whole tank.
- **A heater with a separate temperature controller or a second thermometer** — heaters stick on and fail off; a backup reading protects your livestock.
- **A reef-capable light with a built-in timer and adjustable intensity** — LED fixtures are the standard; adjustability matters because corals must be acclimated gradually.
- **An RO/DI water source and a TDS meter** — your water quality starts here, and the TDS meter tells you when filters need replacing.
- **A dedicated saltwater mixing container with its own pump and heater** — keep it separate, clean, and lidded.
- **A refractometer and calibration solution** — floating plastic hydrometers drift and mislead; a refractometer is the correct tool.
- **An auto top-off system with a reservoir and a backup shutoff** — the single most stability-boosting piece of equipment you will own.
- **Test kits for alkalinity, calcium, magnesium, nitrate, phosphate, and ammonia and nitrite** — titration-style kits for alkalinity, calcium, and magnesium are more precise than color-card tests; choose a low-range phosphate test.
- **Reef-grade salt mix, dry rock (cured, lifeless rock), and aragonite sand** (or the bare-bottom alternative) — see the Rock, Sand & Aquascape section for how to choose.
- **A backup air pump, battery-powered** — keeps water moving through a power outage.

***Ready to set up?** Browse the essentials in our collections: Reef Supplies, Aquarium Lighting and Aquarium Filters, Pumps & Media.*

Enrichment

- **A magnetic or blade glass cleaner** — makes weekly algae removal a two-minute job.
- **A feeding station: a turkey baster, a small target-feeding pipette, and a feeding ring or clip** — for precise, low-waste feeding.
- **A small quarantine tank with its own heater, sponge filter, and powerhead** — for isolating new fish before they join the display.
- **A few ceramic frag plugs and a small frag rack** — frags are small coral cuttings, and a rack gives them a stable, bright place to grow and a place for you to practice.
- **A dedicated set of gloves, eye protection, and a bucket for livestock handling** — some corals carry toxins, and you want to be comfortable handling them safely.
- **A reef-safe epoxy or gel superglue and a few ceramic frag plugs** — for securing corals and rock work.

***Enrichment, one click away.** Shop Aquarium Decorations and Accessories.*

SECTION 2

Meet Your Reef Tank

A **reef tank** is a saltwater aquarium designed to keep living corals alongside fish and invertebrates (animals without backbones, like snails, shrimp, and crabs). Unlike a fish-only saltwater tank, where the goal is simply clean water for fish, a reef tank has to meet the needs of the coral animals themselves, which depend on stable chemistry, strong light, and gentle but constant water movement. A reef is not a decoration with fish in it. It is a small, closed ecosystem you are responsible for balancing.

Trait	Detail
Typical beginner size	30 to 60 gallons; very small tanks (under about 20 gallons) are less forgiving because mistakes change the water faster
Difficulty	Moderate to demanding; patience matters more than experience
Time to mature	Cycling takes 4 to 8 weeks; a tank looks "settled" after 6 to 12 months
Beginner setup cost	Roughly \$1,500 to \$3,500 for a quality 40-gallon system including rock, sand, lighting, and test gear
Ongoing monthly cost	Roughly \$50 to \$150 for salt, RO/DI water, test reagents, food, and electricity
Daily time	10 to 15 minutes of checking and feeding
Weekly time	30 to 60 minutes of water changes and testing
Lifespan of livestock	Clownfish: 10+ years; many soft and stony corals: decades if stable
Common beginner mistake	Adding livestock too fast and chasing numbers instead of keeping things steady
Biggest rule	Stability first

The honest cost and commitment talk

A reasonable beginner reef costs far more than a freshwater tank, and anyone telling you it is cheap and easy has something to sell you. The equipment is only part of it. The bigger investment is **time**: weeks of cycling before a single fish goes in, a year of watching the tank find its balance, and a habit of weekly maintenance that never really ends. We say this kindly, not to scare you off. Plenty of first-time keepers succeed. They do it by buying good basic gear once instead of cheap gear twice, by skipping "must-have" gadgets, and by choosing livestock that forgives mistakes.

Think of a reef like a vegetable garden: you do not rush it, you tend it. It rewards the person who is there every day, doing small things.

Beginner-friendly livestock at a glance

A quick vocabulary note before the chart: **LPS** stands for large-polyp stony corals, which build limestone skeletons topped with fleshy, rounded polyps. **SPS** means small-polyp stony corals, which grow tiny, delicate polyps on branching or plating skeletons and demand tighter stability and stronger light. SPS are a rewarding step, but not a first step.

Livestock	Type	Difficulty	Light	Flow	Notes
Ocellaris clownfish (captive-bred)	Fish	Easy	Any	Moderate	Hardy, peaceful with others, usually accepts frozen and pellet foods
Yellow watchman goby	Fish	Easy	Any	Low to moderate	Sifts sand; calm; needs a tight lid because many gobies jump
Royal gramma	Fish	Easy	Any	Moderate	Colorful; territorial toward other grammas; likes rock caves
Blennies (various)	Fish	Easy	Any	Moderate	Entertaining; some graze algae, so make sure there is enough to eat
Firefish	Fish	Easy	Any	Moderate	Shy, graceful; needs a lid and hiding places
Zoanthids	Soft coral	Easy	Low to moderate	Low to moderate	Spreads in mats; contain palytoxin; wear gloves and eye protection when handling
Mushroom corals	Soft coral	Easy	Low	Low	Very forgiving; spread slowly across rock
Leather corals	Soft coral	Easy to moderate	Moderate	Moderate	Release chemicals; need good water changes and filtration
Xenia	Soft coral	Easy but invasive	Moderate	Moderate	Pulsing stems are mesmerizing; can take over; place on an isolated rock
Hammer and frogspawn	LPS	Moderate	Moderate	Low to moderate	Long sweeper tentacles; keep 6+ inches from neighbors
Torch coral	LPS	Moderate	Moderate	Low to moderate	Beautiful and sticky; also stings; needs space
Acan (Acanthastrea-type)	LPS	Moderate	Low to moderate	Low	Colorful; feeds well on target feedings

Hardy fish and soft corals come first, LPS follow once the tank has proven itself, and we cover SPS briefly later as a next step.

What surprises new owners

Four things catch most first-time reef keepers off guard. The first is **how long it takes**: the "ugly stage" of brown and green algae that blooms during the first two or three months is normal, and it passes. The second is that **chasing perfect numbers makes things worse**: a steady alkalinity of 8 dKH (alkalinity is the water's buffering strength, covered in the chemistry section) is better than one that swings between 7 and 10 as you correct it. The third is **how much the quality of your water matters**: the small gap between "okay" and "good" water is what separates a struggling tank from a thriving one. The fourth is **how alive it feels**: clownfish rearranging sand and corals growing millimeters a week make it feel like a very slow, very beautiful garden.

SECTION 3

Tank, Sump & Equipment Layout

A reef tank is really two spaces joined by plumbing: the **display tank** where the corals and fish live, and a **sump** — a second tank or chamber, usually below or behind the display, that holds the equipment and adds extra water volume. More water means slower swings in temperature and chemistry, and that is the whole point. Beginner-friendly "all-in-one" tanks build the sump into a rear chamber; the principles are the same either way.

The water path, labeled

Picture a side-view diagram, left to right, with water traveling in a loop. Every label below is a point on that diagram.

Label	Component	Where it sits	What it does
A	Display tank	Center of the diagram, on the stand	Houses rock, sand, fish, and corals; the glass or acrylic box everyone sees
B	Overflow box (a weir with a toothed edge)	Back corner or rear wall of the display, at water level	Skims the top few millimeters of surface water, where oils and film collect, and sends it out of the display
C	Drain line with a gate valve	Pipe from the overflow down through the stand	Carries water by gravity to the sump; the valve lets you tune how quietly it flows
D	Mechanical filter (filter sock or mesh)	First chamber of the sump, directly under the drain	Catches larger particles before they break down; rinse or replace it every few days
E	Protein skimmer	Second chamber of the sump	A device that mixes water with fine air bubbles; organic waste sticks to the bubbles and is collected as foam in a removable cup
F	Baffles (glass dividers)	Between sump chambers	Slow the water and keep bubbles from drifting into the return
G	Heater and probes, plus an optional refugium	Calm middle chamber of the sump	The heater lives out of sight here; a refugium is an optional chamber with macroalgae under a light that absorbs nutrients
H	Return chamber, return pump, and ATO sensor	Last chamber of the sump	The water level here stays steady because the ATO tops off evaporation; the pump pulls water from this spot
I	Return line and nozzles	Pipe from sump pump up behind the tank, ending in adjustable nozzles	Pushes clean, warm water back into the display; aim nozzles to create gentle surface ripple
J	Powerheads	Inside the display, on the back or side glass	Add random, wide circulation so water reaches every coral and dead spots do not collect debris
K	ATO reservoir and top-off pump	Beside the stand, with a tube running to chamber H	Holds a few days of fresh RO/DI water and replaces evaporation automatically
L	Lid or screen cover	Over the display	Keeps jumpy fish from leaping out and reduces evaporation

The loop closes: water leaves the display at B, drops through C into D, E, F, G, and H, and rises at I back into A, continuously.

Power-off volume — the step beginners miss

When the return pump stops, water in the pipes keeps draining down for a minute or two until the siphon breaks. Your sump has to be able to hold that extra water without overflowing. Before you add any rock or sand, fill the system to its normal running level, then **switch off the return pump and watch how high the sump rises**. If it gets within an inch of the top, lower the running water level or add a siphon break (a small hole in the return line just under the surface). Doing this test once in a dry run prevents a flooded floor on the day the power flickers.

Equipment sizing guide

Equipment	Beginner target	Notes
Tank	30–60 gallons	Large enough to stay stable; small enough to fit in a weekly water change routine
Return pump	3–5 times tank volume per hour, after accounting for height	Pump ratings drop with height; check the manufacturer's flow curve
Powerheads	Together with the return, roughly 10–20 times tank volume per hour for soft and LPS reefs	Use at least two, pointed so they cross and bounce off the glass
Heater	About 3–5 watts per gallon, ideally as two smaller heaters	Two small heaters fail more gently than one large one
Temperature controller	Plugs between heater and outlet	Turns the heater off if a thermostat sticks
Protein skimmer	Rated for your tank volume or a size up	Needs 2–4 weeks to "break in" with erratic foam
ATO	Optical sensor with a second backup sensor	A failed ATO either floods your sump or lets salinity climb
Lid or screen top	Fits snugly	Many gobies, blennies, and firefish jump

Do I really need a protein skimmer?

We recommend one for nearly every beginner reef, and here is why. A skimmer removes dissolved organic waste before it breaks down into nitrate and phosphate, and it adds oxygen exchange. In a first tank, where you will inevitably overfeed once or twice, a skimmer is cheap insurance.

A skimmer is **optional** in a few cases: a very lightly stocked tank with frequent water changes, a tank running a well-managed refugium with fast-growing macroalgae, or a nano tank where a skimmer would be oversized. If you skip it, plan on more frequent water changes, rinse your filter sock twice a week, feed lightly, and watch your nitrate and phosphate closely.

Placement and electrical safety

Keep power strips and controllers above the water line and **make every cord a drip loop** — let it hang down below the outlet and curve back up, so water running along the cord drips off at the bottom instead of reaching the plug. Use GFCI protection, label your plugs, and avoid daisy-chaining power strips. Leave room behind the tank to reach everything, and mark the normal sump water level with tape so any change is obvious at a glance.

SECTION 4

Rock, Sand & Aquascape

Rock does two jobs in a reef: it is the reef's skeleton, and it is the main home of the beneficial bacteria that process waste. **Live rock** is rock that has spent time in the ocean or an established system and arrives carrying bacteria and small organisms. **Dry rock** is cured, lifeless rock (often from old reef limestone or ceramic) that you seed yourself. **Bagged bacteria** are bottled or packaged cultures of the beneficial microbes that help a new tank cycle faster.

Option	Cost	Pest risk	Cycle speed	Best for
Dry rock	Lowest	Very low; essentially none	Slowest (4–8 weeks)	Most beginners; a clean start with no surprises
Live rock (cured)	Highest	Moderate to high; hitchhikers like aiptasia, mantis shrimp, and nuisance algae may come along	Fastest, with a mini die-off to manage	Keepers who want instant biodiversity and accept pest risk
Dry rock plus bagged bacteria	Low to moderate	Very low	Moderate (3–6 weeks), but still test to confirm	Beginners who want a clean start and a small head start

Our own advice: **start with dry rock and a bottle of bacteria, then add a small piece of cured live rock or a small amount of mature-tank rubble (from a trusted source) for biodiversity** once the cycle finishes and your quarantine routine is in place. You get most of the benefit with a fraction of the pest risk.

Sand bed options

Option	Depth	Pros	Cons
Bare bottom	None	Easiest to clean; no hiding place for detritus (settled debris); great for quarantine and frag tanks	Less natural; some fish enjoy sifting sand; glass can look stark
Thin aragonite layer	About 1 inch	Natural look, easy to vacuum lightly, mild bacteria surface	Needs occasional gentle stirring to prevent debris pockets
Deeper aragonite bed	2–3 inches	More surface area for bacteria; suits sand-sifting gobies	Can trap waste and require care; old advice about deep sand beds is mixed, so keep it modest

Aragonite is a natural calcium carbonate sand that dissolves very slowly and helps buffer pH. Rinse it well before use, and do not use silica play sand, which feeds nuisance algae.

Building the aquascape

- Build on the **bottom glass or base**, with sand added afterward, so digging animals cannot undermine the structure.
- Create **arches, caves, and open channels** so water can flow through the rockwork and fish can hide. A solid wall of rock makes dead spots.
- Leave at least **2 inches** between rock and glass so you can reach in to clean.
- Place sturdier rock lower and lighter pieces higher; secure joins with reef-safe epoxy or putty, and test by gently pushing before filling.
- Plan the **frag spots** now: a few flat shelves at varying heights for corals, with rock space for each to grow without touching.

- Keep the top of the rockwork a few inches below the surface, so fish can swim over it and your lighting has room to do its job.

Pests to know about

Pest	What it is	Risk
Aiptasia	A small, fast-multiplying glass anemone (a stinging, tentacled animal) that arrives on live rock or coral	Spreads quickly; stings neighbors; hard to remove once established
Bubble algae (Valonia)	Green balls that look like shiny marbles	Pop and spread spores if broken; remove carefully
Mantis shrimp	A predatory crustacean that can hide in rock for months	Can kill fish and snails; large smasher types can crack glass
Red flatworms and others	Small, flat, fast-moving pests	Can smother corals; diagnosed by close inspection

Examine every rock, coral, and frag closely before it enters the display, and dip every new coral first.

Avoid outright

- **Wild-collected live rock from unknown sources** — pests, parasites, and a risk to wild reefs.
- **Tap water for mixing salt or rinsing** — phosphate and silicate for days to come.
- **Untreated craft rocks, shells, or "decorations" from non-aquarium stores** — they may leach metals or dissolve oddly.
- **Silica play sand** — feeds diatoms and algae.
- **Copper-based medication in the display tank** — copper kills corals and invertebrates and can linger in rock and sand for years.

SECTION 5

Water Chemistry — The Numbers

Corals are sensitive animals that live in water chemistry far more consistent than anything in a fish bowl. Getting these numbers into range matters. Keeping them **steady** matters more. A tank holding alkalinity at 9 every single day will outperform a tank that swings between 7 and 11, even though both are "in range."

Parameter	Target	How to test	What goes wrong when it's off
Temperature	77–79°F	Digital thermometer, plus a second one for cross-checking	Above 84°F: coral bleaching and fish stress; below 74°F: slowed growth and weakened immunity; daily swings over 2°F stress everything
Salinity	1.025–1.026 SG (about 35 ppt)	Calibrated refractometer	Too high: dehydrates animals, shuts down polyps; too low: stresses fish and slows coral growth; fast changes are far more harmful than a slightly "off" steady number
Alkalinity	8–9 dKH (acceptable roughly 7–11)	Titration kit	Low: slow growth and tissue recession; high: burnt tips and tissue loss in stony corals; swings of more than about 1 dKH a day are the real danger
Calcium	400–450 ppm	Titration or reliable colorimetric kit	Low: stony corals stop building skeleton; high: precipitation that clouds water and clogs equipment
Magnesium	1250–1350 ppm	Titration or reliable colorimetric kit	Low: makes it hard to hold steady alkalinity and calcium; high: rare and rarely a problem
pH	8.1–8.4	Digital pH probe or reliable kit	Normal daily swing of 0.1–0.3; persistently low pH usually points to poor gas exchange or elevated CO2 indoors
Ammonia	0	Ammonia test kit	Any reading is toxic to fish and corals; indicates a failed cycle or a dead animal
Nitrite	0	Nitrite test kit	Toxic; its presence means the cycle is incomplete or has crashed
Nitrate	Roughly 2–10 ppm (not zero)	Low-range nitrate kit	Below 1: corals pale and dinoflagellates can bloom; above 20–30: algae outbreaks and stressed corals
Phosphate	Roughly 0.03–0.1 ppm	Ultra-low-range phosphate test	Near zero: corals pale, tissue loss, dinoflagellates; above 0.2: algae, slow coral growth

A few definitions. **Alkalinity** measures the water's buffering capacity — how well it resists swings in pH — and is reported in **dKH** (degrees of carbonate hardness). Some kits use other units: 8 dKH is the same as about 2.9 milliequivalents per liter or about 143 ppm. **Specific gravity (SG)** is how dense the water is compared with pure water; 1.025 to 1.026 corresponds to roughly 35 parts per thousand (ppt) salinity. **Bioload** is the total amount of waste your animals produce, the main driver of nitrate and phosphate. **pH** measures how acidic or basic the water is.

Stable nutrients, not zero nutrients

A common beginner trap is trying to scrub nitrate and phosphate to zero. Corals and the microscopic life that feeds them actually need a small, steady supply of both. When nutrients bottom out, corals turn pale and tissue recedes, and tanks can fall prey to **dinoflagellates** (microscopic algae-like organisms that form snotty brown strings and bubbles on rock and sand) — the classic

"too clean" problem. On the other end, high nutrients feed **cyanobacteria** ("cyano," the slime-forming red mats) and hair algae. Our goal is **low and steady**: nitrate near 2 to 10 ppm and phosphate near 0.03 to 0.1 ppm, with changes measured in weeks, not days.

The golden rules of adjusting

- **Change one parameter per day, at most.** Retest after 24 hours before adjusting anything again.
- **Keep alkalinity moves under about 1 dKH per day** — and less is better. Swings of more than 1 dKH a day stress corals.
- **Keep salinity changes under about 0.001–0.002 SG per day** and temperature under about 1–2°F.
- **Never "fix" several numbers in one afternoon.** Interacting changes can overshoot and are hard to untangle.
- **Test first, then dose; never dose by guesswork.** Always check the result of the last change before the next.
- **When in doubt, do a water change.** It is the safest, most forgiving correction tool you have.

RO/DI, salt, and water changes

Mix every batch of salt water in the same dedicated container, using **RO/DI water** and reef salt, and let it circulate with a heater until it matches the tank's temperature and salinity. Check it with the refractometer before it ever touches the display. Do a water change of about **10% weekly or 20% every two weeks**, using temperature- and salinity-matched saltwater. Siphon detritus (settled debris) from the sand and rock surfaces while you do. Water changes replace trace elements and dilute nutrients.

The testing routine

How often	What to test	Why
Daily	Temperature; salinity glance (ATO reservoir level); look at the tank	Early warning signs catch problems at the cheapest point
Weekly during the first three months	Alkalinity, salinity (refractometer), nitrate, phosphate, ammonia and nitrite	A new tank changes fast; weekly trends beat single readings
Weekly after the tank is stable	Alkalinity, salinity, nitrate, phosphate	Keeps drift visible
Every two weeks	Calcium and magnesium	These move slowly in a lightly stocked tank
Monthly	Full panel, calibrate refractometer with calibration solution, check kit expiry dates	Test kits expire and refractometers drift
Annually	Replace all test reagents and probes that are due	Old chemicals give wrong readings

Write every number down. A notebook full of readings tells a story, and it is the story that helps you diagnose a problem.

SECTION 6

Cycling & Stocking Order

Cycling is the slowest and most important part of the hobby, and the part newcomers most want to skip. Please do not. A cycled tank has a big enough population of beneficial bacteria to turn ammonia into nitrite and then nitrate as fast as it appears. An uncycled tank poisons whatever you put in it.

Cycling timeline

Stage	Typical timing	What you'll see	What to do
Setup	Day 1	Clear water, new rock, a faint smell of the sea	Add your ammonia source to reach about 2 ppm; start a logbook
Ammonia phase	Weeks 1–3	Ammonia reads high, then begins to fall; a brown film of diatoms (golden-brown algae) coats sand and rock	Test every few days; do not add livestock; leave the lights on a short 6–8 hour schedule
Nitrite phase	Weeks 2–5	Ammonia falls to 0, nitrite spikes then falls	Keep testing; patience
Nitrate phase	Weeks 4–7	Nitrite reaches 0 and nitrate climbs; the "ugly stage" of green and brown algae appears	Do not scrub everything; a partial water change (about 25%) can lower nitrate
Confirmation	Weeks 4–8	Re-dose ammonia to about 2 ppm; 24 hours later, ammonia and nitrite both read 0	This is the real finish line: stable ammonia-processing ability
Ready for a clean-up crew	After confirmation	Stable test results across several days	Do a water change if nitrate is high, then add the first animals

The usual window is **4 to 8 weeks**. Bottled bacteria and a bit of mature rock can shorten it, but a test that shows ammonia and nitrite at 0 is the only thing that proves you are done. If the numbers say "not yet," the answer is wait. Do not do a "fish-in cycle" by using living animals to feed the bacteria; it is unkind and unreliable.

Stocking order

Step	When	Livestock	Notes
One	After cycling is confirmed	Clean-up crew (CUC): a modest group of small snails and a few hermit crabs	Roughly one snail per two gallons is plenty; too many starve and foul the water
Two	1–2 weeks later	First one or two hardy fish: captive-bred ocellaris clownfish, firefish, yellow watchman goby, a blenny, or a royal gramma	Add one species at a time; leave two to four weeks between additions
Three	About 6–12 weeks after cycling	Soft corals: zoanthids, mushrooms, leather corals, and xenia (with care)	Start with one or two; watch alkalinity and nitrate for a month
Four	About 4–6 months in	LPS: hammer, frogspawn, torch, acan	Give each space for sweeper tentacles; target-feed lightly

Step	When	Livestock	Notes
Five	After a year or more of steady results	SPS (small-polyp stony corals)	Strong light and flow; extremely sensitive to swings; a milestone, not a starting point

Choose **captive-bred fish and aquacultured corals** whenever you can, and never buy wild-caught livestock that cannot be traced to a responsible source. **Bioload** grows with every addition. If algae flares up or nitrate climbs after you add something, pause the next addition until the tank settles.

Quarantine and dipping

A **quarantine tank** is a small, bare separate tank where new fish live for **at least 4 weeks (many keepers choose 6)** before they join the display, so that any disease shows up away from your corals. The usual culprit is marine ich (a skin parasite called *Cryptocaryon*). If you treat a sick fish with copper, do it in the quarantine tank, never the display. Dip new corals in a coral dip made for the purpose, and inspect each one with a flashlight for pests.

Always **drip-acclimate** fish and invertebrates: float the bag for temperature matching, then slowly drip tank water into the bag over 30 to 60 minutes so they adjust to your salinity. Never pour bag water into your display.

Reef-safe checks

Not every fish is reef-safe. Butterflyfish, many angelfish, triggerfish, and puffers often nip corals or clams. Some wrasses eat snails or shrimp. Corals have personalities too: many LPS and some soft corals extend **sweeper tentacles** that sting neighbors, so leave at least **6 inches** between aggressive corals and others. **Sea anemones** (like the bubble-tip anemone in our cover art) are an advanced step, best attempted after a year of stability. Captive-bred clownfish do not need one to be happy.

An advanced next step: frag tanks and fragging

Once your tank has been stable for a year, you may want to try **fragging** — cutting a healthy coral into smaller pieces ("frags") and attaching each to a plug. Frags are how reefers share corals, swap with local clubs, and keep wild reefs intact. Use sharp bone cutters or a sterile blade, wear gloves and eye protection, never frag stressed corals, and keep a coral dip ready. A **frag tank** is a small, shallow, separate system with its own light, flow, and heater where frags can grow out before being shared or placed in the display. It also doubles as a second holding tank. Buying frags from a local reef club or a reputable aquaculture source is the most sustainable way to expand a collection.

SECTION 7

Diet & Nutrition



Feed fish lightly and consistently. Stable, modest nutrients beat both over-feeding and an over-scrubbed, nutrient-starved tank.

Reef feeding is a balancing act, and the number-one rule is to **feed the fish, not the tank**. Everything you put in the water either becomes animal, or becomes waste that fuels algae. Our approach matches how we stock our own shelves: **Clean Fuel, No Junk**. Choose simple, high-quality foods, avoid fillers, and use less than you think.

Feeding your fish

Feed most community reef fish **once or twice daily**, only as much as they finish in **one to two minutes**. Rotate several foods: thawed frozen **mysis shrimp** (small shrimp-like animals, a staple), high-quality small pellets with simple ingredient lists, and **nori** (dried seaweed) clipped to the glass a few times a week for herbivores like blennies. Thaw frozen cubes in a cup of tank water and pour the food through a fine strainer or soak and drain, so the packing juice never goes in your display. Skip one day a week to keep the system tidy.

Coral feeding and the tiny natural food web

Healthy corals get most of their energy from light via symbiotic algae inside their tissue, plus particles and plankton they catch from the water. Soft corals and most beginner reef tanks do not need extra feeding at all. LPS can be **target-fed** (feeding a coral directly with a pipette) once or twice a week with a tiny amount of meaty food, as long as the extra food does not raise nitrate or

phosphate. A pod population — **copepods** and **amphipods** (tiny crustaceans that graze on algae and detritus) — appears naturally in a mature tank and is an excellent live food source.

Nutrient balance

Think of your tank as a bank account. Food and fish waste are deposits; water changes, the skimmer, and algae and coral growth are withdrawals. Deposits outpacing withdrawals means algae; starving the account means the "too clean" problem. **Aim for stable, modest feeding** that keeps nitrate near 2 to 10 ppm and phosphate near 0.03 to 0.1 ppm.

The never-feed list

Food	Verdict	Why
Freshwater feeder fish or live goldfish	Never	Can carry parasites and fatty acids that harm marine fish
Bread, human leftovers, or cooked foods	Never	Fouls water; nothing a marine fish needs
Fatty meats like beef heart or cooked chicken	Avoid	Mammal and poultry fats are poorly digested by marine fish and spike nutrients
Heavily filled flake or cheap pellets	Avoid	Low-quality fillers become waste; clouds water
Anything fed in large amounts at once	Never	The most common cause of nutrient crashes and algae
Wild-collected live food from ponds or beaches	Never	Brings disease, parasites, and freshwater
Expired or freezer-burned food	Avoid	Loses nutrition; adds waste
Food rinsed or thawed in tap water	Never	Tap water carries chloramine, copper, and phosphate

Shop the food and supplies: Browse Food for Aquatics.

SECTION 8

Lighting & Flow

Light intensity (PAR) by coral type

PAR (photosynthetically active radiation) measures how much usable light reaches a coral, and is reported in micromoles per square meter per second. Corals from different reef zones need very different amounts. The table gives rough working ranges. Always check the specific coral's care notes.

Coral type	Rough PAR range	Placement
Soft corals (mushrooms, leathers, zoanthids, xenia)	About 25–75	Lower or shaded rock, sides, mid-tank
LPS (hammer, frogspawn, torch, acan)	About 50–150	Mid-tank, on rock or sand away from strong flow
SPS	About 200–400	Upper rockwork under bright, steady light

A light that is too bright bleaches corals (pale or white); a light that is too dim leaves them dark brown and stretched. Run lights on a **timer for 8 to 10 hours**, with a gradual sunrise and sunset ramp if your fixture supports it.

Acclimating corals to new lighting

Every new coral should be **acclimated gradually**. Place it low in the tank (or turn the light down to about half) for the first week, then raise it or increase intensity slowly over several weeks. Move corals up only if they look healthy and open. Never move a coral from a dim store tank straight under full-strength light.

Flow: random, wide, and gentle

Good flow carries food to corals, carries waste away, keeps detritus from settling, and brings oxygen to the surface. Think of a gentle breeze rather than a laser. **Random, wide-spread flow beats a single powerful stream.** Place powerheads so they cross, or use a wave-making controller; point them at the glass or open water, never straight at a coral. Soft and LPS corals prefer lower flow; SPS like more. If a coral's polyps are blown flat, flow is too strong; if debris settles on rocks, it is too weak. A pinch of fine food shows you where the water travels.

SECTION 9

Common Challenges & Solutions

Almost every reef problem has the same first answer: test, then **slow down**. Never "nuke" a tank with chemical cure-alls; they tend to crash the bacteria you spent two months growing.

Cyanobacteria (red slime)

What you see: dark red, maroon, or green slimy mats on sand and rock that peel off in sheets and smell musty. **Why:** cyanobacteria (cyano, a bacteria that behaves like algae) thrives on excess nutrients, especially phosphate, plus low flow in dead spots. **What to do:** siphon it out during water changes, increase flow to the affected area, trim feeding, and confirm your RO/DI water is clean. **When to ask for help:** if it keeps returning after two weeks of corrections, or coats corals.

Dinoflagellates (the "too clean" problem)

What you see: brown, snotty strings or bubbly film on sand, rock, and corals, often worst in the morning. **Why:** often triggered when nitrate and phosphate bottom out, or after sudden changes. **What to do:** stop trying to strip nutrients; stabilize them at low-but-measurable levels, keep up with water changes, siphon the strands, and avoid chemical treatments without guidance. **When to ask for help:** right away; dinos are stubborn, and an experienced reefer or our team can help you pick a safe path.

Hair algae

What you see: green strands growing on rock like a lawn. **Why:** excess nitrate or phosphate, too much light, or an overgrown "ugly stage." **What to do:** hand-pull, trim feeding, tune the photoperiod, and keep up the water changes; algae-eating snails help but are not the solution alone. **When to ask for help:** if it overruns corals or persists for months.

Bubble algae

What you see: shiny green balls on rock, from pea-sized up. **Why:** it arrives on live rock or coral and thrives on nutrients. **What to do:** remove whole bubbles without popping them (use a small bowl of tank water and tweezers), then keep nutrients steady. **When to ask for help:** when it spreads faster than you can remove it.

Aiptasia

What you see: small, translucent, brownish anemones sprouting from rock crevices, multiplying quickly. **Why:** hitchhikers on rock or frags. **What to do:** use an aiptasia-specific product or a gentle injection method, or add a specialist predator (check with us first); do not scrape, because it can spread bits. **When to ask for help:** if they have reached corals or you cannot keep up.

Brown jelly

What you see: a brown, jelly-like slime covering a dying coral, usually quickly spreading. **Why:** bacteria feeding on decaying tissue, often triggered by stress or a damaged coral. **What to do:** remove the affected coral immediately in a bag, place it in a separate bucket, and do a water change. **When to ask for help:** if more than one coral is affected.

Closed-up polyps and coral recession

What you see: a coral that normally extends its polyps stays closed, shrinks, or shows bare skeleton. **Why:** a sudden parameter change, a new coral stinging a neighbor, too much light or flow, or a pest. **What to do:** test everything, check for neighbors and pests, and keep conditions steady. Corals often close for a day after being moved. **When to ask for help:** if it stays closed for more than a few days.

Tissue necrosis (RTN and STN)

What you see: tissue peeling off the skeleton, either rapidly (rapid tissue necrosis, RTN) or slowly from the base (slow tissue necrosis, STN). **Why:** unstable alkalinity, temperature stress, or pest infection. **What to do:** frag healthy tissue away from the dying edge if possible, quarantine it, and correct the underlying parameter. **When to ask for help:** immediately, because RTN can claim a coral in a day.

Marine ich (Cryptocaryon)

What you see: tiny white dots like salt grains on fish, scratching, rapid breathing, hiding. **Why:** a parasite that arrives on new fish and strikes during stress. **What to do:** move affected fish to a quarantine tank for treatment; never medicate the display with copper. **When to ask for help:** at the first sign; fish can decline within days.

Parameter swings

What you see: alkalinity or salinity numbers that bounce around, corals that look dull. **Why:** inconsistent water changes, a faulty ATO, or evaporation that is not being replaced evenly. **What to do:** identify the cause before correcting; then move slowly, one parameter at a time. **When to ask for help:** if the swing exceeds 1 dKH a day.

Power failure and heat events

What you see: dead silence, falling temperature, or water temperature above 82°F in summer. **Why:** an outage, a failed heater or controller, or a heat wave. **What to do:** run a battery air pump, cover the tank to hold heat in a winter outage, or use fans, remove the lid, and lower lights in a heat event. **When to ask for help:** as soon as temperature stays above 84°F or below 72°F.

Pump failure and loss of flow

What you see: a quiet pump, a stagnant tank, or a sump that rises or empties. **Why:** a clogged impeller, blocked overflow, or failed pump. **What to do:** unplug, clear, and clean it; swap in your spare. **When to ask for help:** if flow does not return within an hour.

Overfeeding

What you see: cloudy water, algae blooms, rising nitrate and phosphate, uneaten food. **Why:** too much, too often. **What to do:** cut portions in half, siphon leftovers, and do a water change. **When to ask for help:** if fish seem sluggish or nitrate stays high.

Hitchhiker pests

What you see: unfamiliar worms, flatworms, crabs, or a shrimp hiding in rock; clicking or snapping sounds at night. **Why:** they arrive on rock or corals. **What to do:** dip every coral, quarantine fish, and inspect at night with a red flashlight. **When to ask for help:** if animals vanish unexpectedly, you may have a mantis shrimp.

Quick reference

What you see	Likely cause	First move	Urgency
Dark red slime on sand	Cyanobacteria	Siphon, add flow	Within a week
Brown strings and bubbles	Dinoflagellates	Stabilize nutrients; ask for help	Within days
Green lawn on rock	Hair algae	Hand-pull; trim feeding	Within a week
Brown slime over a coral	Brown jelly	Bag and remove coral	Same day
Coral shrinking or peeling	Recession or necrosis	Test; check neighbors	Same day
White dots on fish	Marine ich	Quarantine and treat	Same day
Tank silent, temperature moving	Power or heater failure	Battery pump; fix heat	Immediately

SECTION 10

Routine Care Calendar

How often	What to do
Daily	Check temperature, flow, and that every pump, the skimmer, and the light are running
Daily	Watch every fish at feeding time: eating, breathing normally, no spots or scratching
Daily	Feed fish lightly; look at corals for open polyps and normal color
Daily	Check the ATO reservoir and sump water level
Weekly	Water change of about 10% (or 20% every two weeks) with matched RO/DI saltwater; siphon detritus
Weekly	Test alkalinity, salinity, nitrate, and phosphate; write results in the log
Weekly	Clean the glass, empty the skimmer cup, and rinse or replace the filter sock
Weekly	Inspect powerheads and nozzles for debris
Every two weeks	Test calcium and magnesium; top off salt supplies
Monthly	Calibrate the refractometer; clean the skimmer body and pump; check heater and controller function
Monthly	Refresh RO/DI filters per your TDS reading; check test-kit expiry dates
Quarterly	Deep-clean pumps, clean the ATO sensors, and replace any worn tubing
Annually	Replace test reagents, review your emergency kit, and consider replacing aging heaters and pumps

SECTION 11

When to Ask for Help

Reef animals hide trouble until it is serious. **If you are not sure, ask.** A quick call costs nothing, and your local reef club or fish store will usually help too.

Act today:

- Ammonia or nitrite above 0 in an established tank
- Fish gasping at the surface, breathing hard, or covered in white dots
- A coral losing tissue quickly, or a slimy brown film spreading on one
- Temperature above 84°F or below 72°F that you cannot fix in an hour
- Salinity that has moved more than 0.002 in a day
- Any leak, or sump water within an inch of the top
- A fish stuck against a pump intake, or one that cannot swim upright

Ask within a few days:

- A fish that stays off food for three or more days
- Persistent algae outbreaks that do not respond to adjustments
- A coral that stays closed for several days
- Nitrate above 30 ppm or phosphate above 0.2 ppm
- Repeated parameter swings of more than 1 dKH a day

Equipment-failure checklist

- **Power outage:** run the battery air pump, keep lids shut in winter, avoid feeding, and do not open the tank unnecessarily.
- **Heater stuck on:** unplug it, check the second thermometer, float a bag of ice or add chilled RO/DI water in small amounts, and replace the heater and controller.
- **Heater failed off:** add a spare heater, insulate the tank, and raise the temperature slowly.
- **Return pump stopped:** check for clogs, restart or swap in the spare, and watch the sump level.
- **Skimmer overflow:** switch it off, empty the cup, and clean the neck; let it settle before restarting.
- **ATO stuck:** unplug it, remove any excess water, recheck salinity, and replace faulty sensors.
- **Powerhead stopped:** clean the impeller and replace if needed; flow loss in hours can stress sensitive corals.
- **Lights stuck on or off:** reset the timer; sudden changes in intensity can stress corals.

Call us at **(717) 983-8069** or visit your local fish store. For sick fish, an **aquatic veterinarian** is worth finding before you need one, though they can be hard to locate.

SECTION 12

FAQ

How much does a reef tank cost?

A solid beginner reef in the 30 to 60 gallon range typically costs about **\$1,500 to \$3,500** to set up, including the tank, stand, rock, sand, lighting, flow, skimmer, ATO, test kits, and a first round of livestock, with ongoing costs of roughly \$50 to \$150 a month for salt, RO/DI water, reagents, food, and electricity. Costs climb with larger tanks, premium lighting, and lots of corals. The most reliable way to spend wisely is to buy dependable basic gear first and add livestock slowly.

How long does it take to cycle a reef tank?

Most reef tanks take **4 to 8 weeks** to cycle. Dry rock plus bottled bacteria usually finishes in about 3 to 6 weeks, and live rock can be faster but brings a die-off to manage. You are done when you can add an ammonia source, wait 24 hours, and find ammonia and nitrite both at 0, and when nitrate has settled. Resist rushing; fish added too early are the most common beginner heartbreak.

What salinity should a reef tank be?

Aim for **1.025 to 1.026 specific gravity**, which is about **35 parts per thousand (ppt)**, measured with a calibrated refractometer rather than a floating hydrometer. The exact number matters less than keeping it steady. Fast changes harm corals and fish far more than a slightly high or low steady reading. Use a good ATO so evaporation is replaced with fresh RO/DI water, and recalibrate the refractometer monthly.

Do I need RO/DI water for a reef tank?

Yes, in practice it is effectively mandatory. Tap water carries phosphate, silicate, copper, and chloramines that fuel algae and harm corals, and tap water in many parts of Pennsylvania is also quite hard, which makes that even more true (your own supply may differ, so have it tested). RO/DI water starts as a clean slate so that you control exactly what goes into the tank. Buy it by the jug or install a small RO/DI unit, test with a TDS meter (aim for 0), and use it for salt mixing and top-off.

What are the best beginner corals?

The easiest corals are **soft corals**: mushrooms, zoanthids (handle with gloves and eye protection because they contain palytoxin), leather corals, and xenia (isolate it on its own rock, as it spreads). After a few months of stability, add **LPS** such as hammer, frogspawn, torch, and acan, giving each space to extend sweeper tentacles. Leave SPS and anemones for later. Buy aquacultured corals and frags from local reefers whenever you can.

What are the best fish for a beginner reef tank?

Start with captive-bred **ocellaris clownfish**, then consider firefish, a **yellow watchman goby**, blennies, or a **royal gramma**. Add one or two at a time, quarantine each, and avoid fish that nip corals or outgrow a small tank, such as tangs in 30 to 60 gallons. Prefer captive-bred or traceable sources, since wild-caught fish that cannot be traced are a real sustainability problem.

How often should I do water changes in a reef tank?

A good rhythm is about **10% weekly or 20% every two weeks**, using temperature- and salinity-matched RO/DI saltwater. Siphon detritus off the sand and rock while you drain. Water changes replace trace elements, dilute nutrients, and keep chemistry predictable. Pick whichever schedule you will actually keep. If something feels off, do a smaller extra change rather than adding chemicals.

What temperature should a reef tank be?

Keep it between **77 and 79°F**, with as little daily swing as possible (under 2°F). Use a heater with a separate controller and a backup thermometer. In summer, watch for heat events: sustained readings above 84°F can bleach corals. In winter, watch for failed heaters. Stable temperature matters more than a perfect number, so avoid placing the tank near windows or vents.

Do reef tanks need a protein skimmer?

Most beginner reefs benefit from one. A skimmer pulls dissolved organic waste out of the water before it turns into nitrate and phosphate, and it forgives the occasional overfeeding. It is optional in lightly stocked tanks with frequent water changes or a well-run refugium, but if you skip it, expect to do more maintenance and watch nutrients closely. Choose a skimmer rated for your tank volume or higher.

Why are my corals closing up?

Corals close for many reasons, so the first move is to test your water: look for changes in alkalinity, salinity, temperature, and nutrients. Then check for a neighbor stinging, a new light, too much flow, or a pest. A coral that was just moved or fragged may stay closed for a day. If several corals close at once, suspect water quality, and do a water change. If a single coral stays closed for more than a few days, ask for help.

***Ready to shop?** Start with Aquatics. 10% of every purchase supports no-kill animal shelters.*

SECTION 13

Every Purchase Gives Back

Before we earn a dime, **10% of every purchase at Walnut Creek Supply goes to no-kill animal shelters across the country.** Not at checkout. Not as an option. Off the top of every order, every day, because we believe responsible pet ownership and community care are the same commitment made in two directions.

That matters for reef keepers too. Every captive-bred clownfish, every aquacultured frag, and every patient week of cycling is a small vote for a healthier hobby and healthier oceans. If you ever find yourself with a thriving tank and a few spare frags, share them with a local club, the way the best reefers always have.

We are a family business in Christiana, Lancaster County, Pennsylvania. We grow our own food, keep our own animals, and stock the goods we would put in front of our own families, with **no mystery ingredients** and no shortcuts. If you have a question about your cycle, your water numbers, or a coral that just does not look right, call us at **(717) 983-8069**. We would rather talk it through with you.

Welcome to the reef. Go slowly, test often, and enjoy the garden.

*From our family to yours, **Walnut Creek Supply** — Christiana, Lancaster County, Pennsylvania walnutcreeksupply.com*