The
Raleigh Aquarium
Society
P.O. Box 31564, Raleigh, North Carolina 27612-1564
http://www.raleighaquariumsociety.org
raleighaquariumsociety@yahoo.com

July 6th, 2010

Next Meeting: Thursday @7:30pm August 5th, 2010

Meetings are held on the first Thursday of each month at the North Carolina State University College of Veterinary Medicine located at 4700 Hillsborough Street in Raleigh. Visitors are welcome! Snacks and light refreshments are provided. A raffle of fish and fish related items follow the meeting.

BUSINESS MEETING THURSDAY, JULY 15TH. WE WILL BE HOLDING AN ELECTION FOR WORKSHOP CHAIRMAN. IF YOU ARE INTERESTED IN THE POSITION THEN COME TO THE MEETING.

Meeting Agenda

TBA

ITS PICNIC TIME!

THE RAS ANNUAL PICNIC WILL BE ON JULY 18TH AT THE ENO RIVER STATE PARK IN THE COLE MILL CAMP AREA. FOR MORE INFORMATION ABOUT THE PARK, PLEASE GO TO www.ncparks.gov. FOLLOW UP EMAIL WILL CONTAIN THE COLLECTING TRIP INFORMATION.

Monthly Feature

ARTICLE INFORMATION: **Author:** Dr. Adrian Lawler	**ARTICLE USE:** ***Internet publication (club or non-profit web site):***

Title: Value of Ponds to a Community
Summary: In these times of environmental concerns, Dr.Lawler outlines the many benefits provided by ponds - for animals and humans.
Contact for editing purposes:
theo@aquarticles.com
Author email: alawler@hotmail.com
Date first published: October, 2007
Publication: Original to Aquarticles
Reprinted from Aquarticles:

Value of Ponds to a Community

by Dr. Adrian Lawler
(retired) Aquarium Supervisor (l984-l998) J. L. Scott Aquarium Biloxi, Ms 39530

Original to Aquarticles

A pond, if properly stocked with mosquitofish (*Gambusia affinis*) or maintained so larval mosquitoes are otherwise controlled, is a great asset to a community. Besides the obvious benefits of being pleasing to view, a recreational/fishing area for people, and a water reservoir for possible use in fire control, there are other reasons a pond has high value to a community.

Reproduction site for mosquito control animals + for garden insect control animals

The greatest value a pond has, in my opinion, is as a breeding/reproduction site for several species of animals that help control mosquitoes and other insects. Toads, tree frogs, bull frogs, leopard frogs, bronze frogs, etc. (in my area) use ponds for mating and places to lay their eggs. Insect predators as dragonflies (mosquito hawks) and damselflies also reproduce in ponds. The aquatic nymphs (also called naiads) of dragonflies and damselflies prey on larval mosquitoes and other small organisms; adult dragonflies and adult damselflies prey on adult mosquitoes and other insects.

The control of mosquitoes to lessen the infections of humans by various diseases (as: malaria, yellow fever, West Nile virus, encephalitis, Dengue fever, etc.) is a major endeavor throughout many parts of the world. Estimates range from about 1.5 to 2.7 million people that are killed by malaria alone each year; thus, mosquitoes can be considered the greatest human killer in world. It is not nice to be a victim of a mosquito-borne disease (author got West Nile virus in 2003 in Mississippi and still realizes some effects of it).

Some of the same animals that reproduce in a pond also are helpful in the control of garden and lawn insect pests. In my area they are toads, tree frogs, bull frogs, bronze frogs, and adult dragonflies and damselflies. Large numbers of dragonflies have also been observed feeding on swarming fire ants and swarming termites by the author. Dragonflies were observed catching

swarming winged fire ants shortly after they took flight off stalks of grass, and other places higher than their nest.

Watering site for mosquito predators and other wildlife

Another value a pond has is as a watering place for other mosquito predators like bats, various swallows (including purple martins), swifts, lizards, etc.

To attract wildlife for food

In my area various predatory birds get various animals from ponds for food. Red foxes may catch frogs, ducks, geese, mice, etc. around ponds. Nutria frequent ponds for aquatic plants to eat. Raccoons get fish, tadpoles, frogs, crayfish, etc. from ponds. Turtles get tadpoles, snails, plants, etc. out of ponds. Snakes catch frogs, toads, tadpoles, fish, etc. from ponds. Ponds provide foods for many animals.

As watery compost pits

Organic material washed or falling into a pond decays under bacteria and fungal action. This organic pond muck can be used to enrich garden plots and other land.

To offset errors made by humans

Ponds combat poor engineering/construction by contractors, homeowners, and city work crews throughout the world when they make/clean drainage ditches LOWER than the drainage pipes under driveways, or install drainage pipes under driveways HIGHER than associated ditches, or install flexible drainage pipes with the downhill end turned up, etc., thus causing standing water upstream (Figures 1, 2, 3) of various pipes and causing the too deep ditches to breed mosquitoes.

FIGURE 1. STANDING WATER IN A DITCH THAT WAS DUG OUT TOO DEEP. NOTE GRASS AND OTHER PLANTS GROWING IN WATER, WHICH MEANS THIS AREA HAS HAD STANDING WATER FOR A LONG TIME. A PRIME MOSQUITO-BREEDING SITE AND HEALTH THREAT TO HUMANS.

FIGURE 2. SIDE VIEW SHOWING PIPE WITH AN UPTURNED END, CAUSING WATER TO BE RETAINED IN PIPE, LEADING TO MOSQUITO-BREEDING SITE INSIDE PIPE.

FIGURE 3. CLOSE-UP OF INSIDE PIPE OF FIGURE 2. STANDING WATER INSIDE A "DRAINAGE" PIPE. UPTURNED END OF PIPE EITHER DUE TO IMPROPER INSTALLATION OR KNOCKED UP BY CAR GOING INTO DITCH. ANOTHER UNNECESSARY MOSQUITO-BREEDING SITE.

This results in the unwanted, and apparently in many cases, unknown, promotion of a greatly INCREASED number of breeding areas for mosquitoes and thus an increase in mosquito-borne diseases, like West Nile Virus, in the populations of cities around the world. Most cities do not even address or are not aware of this problem; i.e., that whoever is making/cleaning their drainage ditches too deep and leading to ditches with standing water that breed mosquitoes, is causing a very serious

health threat to city citizens. We would also not have to spend as much money on mosquito spraying if drainage ditches were properly sloped for total drainage after rains.

Drainage ditches should have sand bottoms (Figure 4), where the sand tends to fill low spots under water flow.

FIGURE 4. A CORRECTLY DONE DRAINAGE DITCH. NOTE SAND IN BOTTOM WHICH CAN SHIFT TO FILL LOW SPOTS. NOTE NO STANDING WATER IN DITCH OR AROUND PIPES UNDER DRIVEWAYS.

Whoever digs out ditches lower than drainage pipes should replace their procedures with those that periodically disperse sand to the low areas in the ditches. Any excess sand will be washed downstream in heavy rains, and tend to fill low areas of ditches. When excess sand just starts to enter drainage pipe, then one knows the contour is correct to prevent standing water and mosquito-breeding pools of water.

With the increased use of more flexible HDPE black drainage pipe, there is the added problem of not getting the pipe installed straight, or sloped downstream, and the ends can turn up, trapping water inside the pipe for mosquito breeding (Figures 2 & 3). Additionally, cars wrecking in ditches can push the ends of the pipes up, so the pipes then hold water.

Properly run ponds are needed to offset the drainage ditch errors made by producing the mosquito-eaters needed to control the mosquitoes raised in improperly-designed/maintained mosquito-breeding ditches found in cities throughout the world.

In crowded cities roof-top tanks can be utilized for rearing dragonflies and damselflies to help control mosquitoes; tanks should also be stocked with mosquitofish. Tree frogs may also be able to utilize roof tanks for reproduction; toads and various other frogs would not be able to get to roof-top tanks for reproduction. Tanks could be automatically filled by water from air-conditioning units.

To serve as holding area while water is being cleaned of toxins

Ponds, either on residential property or commercial property, serve as retention/holding ponds for street/parking lot/yard run-off waters that contain automobile pollutants (antifreeze, oil, transmission fluid, brake fluid, window washer fluid, etc.) and toxins from yard pesticides, etc., where toxins are broken down by bacteria into less toxic compounds. Water is partially cleaned in ponds prior to release and running to rivers or bayous and eventually to the ocean. Ponds thus serve to protect oceans from receiving the maximum pollution from direct land run-off. The longer the toxin is held in a pond, the more toxin bacterial break-down occurs, and the less toxin that reaches streams, and eventually the ocean.

As reservoirs to help recharge water table

Dirt ponds are needed in all drainage areas to slow down and hold water run-off flow to rivers and oceans and to help water seep down to replenish water tables. Many cities drain water off land as quickly as possible so water flow down drainage ditches is very fast, having little time to soak in to help replenish water tables. This is a very bad practice. Fast drainage also adds litter, sediment, toxins, organic debris, and fresh water at heavy rates with each rain to downstream bodies of water. Falling water tables in our cities result in constant land settling, which leads to the cracking/breaking of water lines and sewage lines and constant leaks and repairs.

Pond locations

Ponds should be located no more than twice the average distance that toads migrate away from their hatch pond in order to get good land coverage by toads and thus better insect control.

Ponds should be (at least) at regular intervals (this should be no greater than 2x the dispersal travel distance of toads away from their tadpole-stage pond)(e.g., if toads travel a quarter mile away from their home pond, then ponds should be less than a half-mile apart in a city) in order to:

---Get fairly uniform dispersal of mosquito predators throughout the city.
---Cut down on the mosquito insecticides sprayed.
---Cut down on garden pest insects.

Toad tadpoles recently turned to toads leave a pond enmasse and in several waves of tiny toads that spread outwards from a pond in all directions. The number of waves depends on the number of toad choruses (= mass matings) in spring, which can occur near times of rain.

ARTICLE INFORMATION:
Author: John Dawes
Title: Marine Fishkeeping - The Basics
Summary: A complete guide to starting a tropical marine fish aquarium.
Contact for editing purposes:
email: editor: gerald@calypso.org.uk
Date first published:
Publication: Aquarian publicity leaflet
Reprinted from Aquarticles:
2004: Reproduced on *www.AquaticQuotient*, Singapore
August 2003: Posted by Jesse B. Hunt, of Mississippi, on his *Aquarium Information Source*
October and November 2004: Reprinted in two parts: *Aqua Babble*, Aquarium Club of Edmonton

2. **Link** to http://www.aquarticles.com and original website if applicable.
3. Advise Aquarticles

Printed publication:

Mail one printed copy to each of:

Gerald Jennings,
c/o Calypso Fish and Aquaria Club.
2 Gatcombe Road,
London N. 194PT
England.

Aquarticles.com
#205 - 5525 West Boulevard
Vancouver, British Columbia
V6M 3W6
Canada

Note from Aquarticles: This is a long article which could be split into two or three parts for reprinting if necessary.

Marine Fishkeeping - The Basics

By John Dawes

Originally published as an Aquarian publicity leaflet

Aquarticles

The keeping of marine organisms in aquaria has come a long way in a remarkably short time. For example, successful spawnings of the various species of Clownfish (Amphiprion spp) no longer make headlines, although the achievement (rightly) continues to rate very highly in the eyes of most aquarists. Yet, in spite of the spectacular progress that has been made, many people still feel that the marine hobby is so difficult and demands such high levels of expertise, that no-one but the dedicated specialist can ever hope to be a successful marine aquarist. Experienced marine hobbyists, on the other hand, have been stressing for years that a sound, commonsense approach, coupled with a desire to seek correct advice and act upon it, is usually enough to set the beginner on his/her way.

There are three main "types" of marine aquaria:-

(i) native marine, housing species found around "home" coastlines;
(ii) invertebrate, containing species of marine organisms lacking internal skeletons; and
(iii) tropical marine, a term commonly used when referring to aquaria housing tropical marine fish (even though an invertebrate aquarium may well be "tropical" in nature).

Each of the above categories requires a complete Guide to itself to do it any justice. *This particular Guide, therefore, concentrates on just one category, Tropical Marine Fish.* Although it cannot hope to cover even this limited subject in great depth, it nevertheless attempts to tackle the main principles of this side of the hobby in sufficient detail to allow the potential marine aquarist to make an informed start.

The Aquarium

Choosing a suitable aquarium is one of the most fundamentally important decisions that need to be made. It is, therefore, well worth spending some time weighing up several possibilities before making a final choice.

As with the freshwater hobby there are two main points to consider: the type of aquarium and its size.

It must be stressed straightaway that some of the aquaria which can be used for freshwater fish

are out of the question when it comes to marine organisms. The most obvious (and potentially lethal) are old angle-iron tanks. Iron reacts with both fresh and saltwater, but marine organisms are much more susceptible to the harmful effects of these chemical reactions than freshwater organisms are. Therefore, what would normally be a tolerable level of toxic substances in freshwater, is likely to be lethal in the marine aquaria.

The best way of avoiding this is, clearly to give this type of aquarium a miss and opt for a safer one instead. This can actually be an angle-iron tank which has been coated in such a way that there is no direct contact between the metal and the water. PVC. is one such suitable coating, but there are others as well.

Plastic or Perspex aquaria, obviously do not present any of the above problems. They also have the added advantages of being relatively light and inexpensive. However, counter-acting this, there are several disadvantages, such as the discolouring that occurs with age and the ease with which plastic scratches, thus spoiling the appearance of the aquarium as a whole.

The most popular aquaria today are those made entirely of glass. Their advantages are numerous, including ease of construction. This has been made possible by the development of silicone-based aquarium sealants which set in a few hours but can last, without leaks, for ten years or more.

The flexibility that this major development has brought to aquarium construction has led to all-glass aquaria of sizes, prices and shapes (including cylindrical ones) to suit virtually every conceivable need and pocket. The ease with which many of the basic shapes can be constructed has also resulted in a higher incidence of home-built aquaria, particularly amongst specialist fishkeepers. each tube of sealant carries full instructions, so I will not take this matter further other than to stress that tanks measuring 3ft. (90 cm.) or more in length should carry at least one front-to-back strut to prevent bowing and possible disaster. Although the range of aquarium types discussed above is not fully exhaustive, it includes those most commonly met. In addition, there are stainless steel, anodised aluminium, glass-fronted fibreglass and other types of aquaria, but space does not allow fuller consideration of these here.

Aquarium Size

However large an aquarium may be, it is still minute when compared to the natural environment in which fish normally exist. Therefore, no matter how careful or experienced an aquarist may be, conditions inside an aquarium will inevitably be artificial, to a greater or lesser extent.

As a consequence of this, there will be a build-up of certain substances and a possible lack of others which can cause serious problems if the maintenance routine is inadequate.

One factor that will help or hinder the development of an adequate routine is the size of the aquarium. the reason for this is that the smaller the volume of water present, the more susceptible it is to changes. Therefore, even a minimal amount of overfeeding will lead to serious pollution in a small aquarium. In a large one, its effects are proportionately less and should, at least, give the aquarist the margin of safety required to remedy the problem before it really gets out of hand.

Although this principle applies to both freshwater and marine aquaria, its significance is considerably greater in the latter because marine organisms are much more sensitive to water quality changes.

It, therefore, makes sense to go for the largest aquarium possible from the start. The extra expense involved will more than pay for itself in a short time, simply by the number of expensive problems that will be avoided.

In any case, a 36"'x 15" x 12" (90 x 38 x 30 cm) tank should be considered the minimum by anyone who has not kept marine fish before. Experienced aquarists can go below this without courting disaster, but not the beginner, unless (s)he is lucky or a very fast learner.

Aquarium Covers

There is a wide range of aquarium hoods on the market, ranging from simple covers to

sophisticated, partitioned units designed to house lighting and other equipment. It is really up to the aquarist to decide which of the available models best suit his/her needs.

Two points, though, are worth bearing in mind. First, it is essential that there are no exposed metal parts. If there are, they will react with the saltwater and will cause, at best, distress to the fish and, at worst, their death. This can be avoided by painting the exposed metal with a non-toxic gloss paint. If this is done, several days, at least, should be allowed for the paint to dry out thoroughly. The second point referred to above concerns evaporation and splashing of water. Both are unavoidable, particularly since aeration is usually quite vigorous in marine aquaria.

The easiest way to avoid these potential problems is simply by using a condensation or cover sheet. These can be bought ready-made in plastic or can be made out of a sheet of glass cut to a size slightly smaller than the tank itself. by supporting this sheet either with glued-on strips of glass or by resting it on the back-to-front struts mentioned in an earlier section, the water will drop back into the aquarium without making contact with the hood, frame or sides.

Water Quality

Whereas one can get away to an extent, with a certain degree of deterioration in water quality in freshwater, the same cannot be said of marine aquaria.

As I have mentioned earlier, marine fish are very sensitive to chemicals in the water. Some of these can be introduced by the aquarist (various ways of avoiding this have already been discussed) while others are produced by the fish themselves. Of the latter, the two most toxic ones are Ammonia and various Nitrites which can prove lethal even at very low concentrations. Maintenance of good water quality is, therefore, an absolute must in marine aquaria and the aquarist who ignores this does so at his/her own peril. The collection of seawater must be avoided, not because it is harmful in any way (!) but, rather, because it soon becomes "imbalanced" in the confines of an aquarium and can cause all sorts of problems through the introduction of unwanted micro-organisms, such as pathogenic (disease-causing) bacteria.

The following are the most significant aspects of water chemistry that need to be appreciated before a start in the marine hobby is made:

Specific Gravity, Salts and Trace Elements

Saltwater, as the name implies, carries a number of chemicals dissolved in pure water. These chemicals make the water heavier, or denser, and it is the way in which this compares to the weight of pure water at 40C that gives' the figure referred to as Specific Gravity.

Saltwater from seas in which "aquarium" species of fish are found can vary from 1.020 (in parts of, e.g. the Pacific) up to as much as 1.035 (Red Sea). Most seas, however, have a S.G. value of between 1.020 and 1.022. While keeping fish in water having a higher than recommended S.G. will have deleterious effects on them in the long run, fish kept under lower S.G. conditions (provided the change is carried out gradually) can adjust and often live longer. In the aquarium, a range. between 1.020 and 1.023 is suitable for most species. This value is achieved by dissolving balanced, prepared aquarium salt mixes in the recommended amounts of water (tap water is adequate - you do not need to use pure water), and measuring the S.G. with a hydrometer.

Hydrometers are calibrated to give readings at the range of temperatures at which most tropical species are kept, i.e. around 24-260C (approx. 75~80 deg.). Aeration helps the salts to dissolve so this should be provided, particularly when time is short.

Many of the salt mixes available also contain all the essential trace elements which fish and other organisms require. This should, therefore, be checked beforehand and provided as a supplement if required.

Ammonia, Nitrites and Nitrates

These three chemicals, despite some differences, all have one thing in common -Nitrogen. For

this reason, they are usually considered together as part of the Nitrogen Cycle.

Basically they relate to each other as follows:- Fish and other marine organisms break down protein as part of their normal digestive processes. Some of the nitrogen contained in the proteins is retained but the rest will be eliminated as Ammonia. This substance is highly toxic but is soon converted in a balanced aquarium into Nitrites by the action of bacteria, e.g. Nitrosomonas. Unfortunately Nitrites are also toxic, but other bacteria, e.g. Nitrobacter; convert the Nitrites to Nitrates which are considerably less harmful. Some of the Nitrates can be converted into free Nitrogen while some will be assimilated by plants and algae. If these are eaten directly by fish, or indirectly by fish feeding on other animals which, in turn, have fed on the plants, the cycle will have been completed.

Clearly it is essential to keep the Nitrogen Cycle under control, with Nitrite readings at, or near, zero. This can be achieved in a number of ways, most of which involve some form of filtration (see section on Aeration and Filtration).

pH -Acidity and Alkalinity

Pure water is said to be neutral and is given a pH value of 7 Lower figures represent progressively higher degrees of acidity while higher figures represent higher degrees of alkalinity. The complete scale runs from 0 to 14. However, it is not a linear cycle - it is logarithmic. This means that water at pH 8 is 10 times as alkaline as water at pH 7 A reading of pH 9 indicates, therefore, 10 times the alkalinity of water at pH 8 and 100 times that of water at pH 7.

This explains why even small changes in pH can have such dramatic effects, particularly if the changes are abrupt and do not give the fish a chance to adapt. The pH range for tropical marine tanks should be between 8.0 and 8.3, i.e. alkaline. This can be measured (as is the case for Nitrites) by means of reliable, inexpensive test kits. The addition of a buffer solution will help prevent abrupt fluctuations in pH and should be considered as a useful part of every aquarist's "armoury".

Aeration and filtration

Aeration and filtration systems vary so much in design, complexity and price that it would be impossible to present a comprehensive review here. Basically they all aim at oxygenating the) water and reducing or eliminating toxic wastes from it. Although some toxic wastes (such as Ammonia and Nitrites) occur in solution, others occur as actual particles. This applies in particular to faeces ("droppings"). Clearly at least two types of filtration are required: (a) mechanical to remove the debris and (b) biological (or biochemical) to remove the rest. Many of the filtration systems that are available today can do both jobs, and aerate the water, all at the same time.

a) Box filters

These channel water either under the influence of an air stream from an aerator or a water current from a motor, through a box which can be internal or external to the aquarium. In this box, various "sandwiches" of filtering medium can be arranged, e.g. filter wool, charcoal, gravel/shells, or even diatomaceous earth.

Box filters are used primarily for mechanical and/or chemical filtration.

b) Undergravel filters

These consist of a specially designed plate which is placed under the gravel and one or more air-lift tubes into which are introduced air lines connected to the aerator (pump). As the bubbles of air rise, they lift water up these tubes and drag water from the aquarium down through the filter plates. If these plates are covered with a suitable medium on which the beneficial Nitrosomonas and Nitrobacter bacteria can grow, then the water will be purified as it flows through.

A suitable medium (substratum) for this is either a mixture of crushed shells and coral sand, or layers of these, made up of one part of shell to two parts of sand. The depth of this layer is also important - anything less than 3 inches (ca. 8 cm) will not be fully effective. The chemical

composition of the shells and coral sand also help maintain the pH in the required region of 8.0 to 8.3.

As the air bubbles out at the top of the air-lifts, aeration occurs. However, if the bubbles are large (rather than a "mist") or if the aerator is not strong enough, then supplementary aeration by means of diffuser stones must be provided.

c) Reverse flow filtration

This system is similar to undergravel filtration in that it uses the substratum as the filter medium. However, in reverse-flow filtration, water is forced down the air-lifts by means of a power head, power filter outlet or pump, and up through the gravel. One advantage claimed for this method is that the water can be mechanically filtered before it reaches the gravel whereas, in normal undergravel filtration, the gravel itself has to do this job.

If reverse-flow filtration is used, then aeration does not occur to the same degree and a separate aerator must, therefore, be used.

d) Power filtration

Power filtration can have all (or most) of the advantages of undergravel filtration, plus several others. For example, regular cleaning is easy and a range of filter media can be used, e.g. charcoal, filter wool, foam, shells, etc. In addition, faster flow rates allow for a vigorous circulation of water which, when combined to a spray-bar attachment, ensures efficient aeration without the need for a supplementary air pump.

One disadvantage of power filters is that they do not normally harbour as many beneficial bacteria as undergravel filters. Therefore, if the aquarium is fully stocked, there is a possibility that further water purification may be necessary. Regular monitoring of water quality by the use of test kits will soon show if this is the case. This supplementary equipment can take the form of an Ozonizer, and Ultra-violet Sterilizer or a Protein Skimmer.

e) Ozonizers, Ultra-violet Sterilizers and Protein Skimmers

(i) Ozonizers are useful in that they can restrict/control the growth of bacteria. They may also help in controlling certain diseases. Overdoses will cause serious problems.

(ii) Ultra-violet Sterilizers will kill bacteria if used in sufficient doses. It is also claimed that they will control algae, fungi and several pathogenic organisms.

(iii) Protein Skimmers produce a foam which is capable of collecting organic matter in an easy-to-clean trap. When combined to an Ozonizer efficiency is improved even further.

f) Combined filtration System

Protein skimming, mechanical filtration, biochemical filtration and aeration are all combined in a sophisticated, effective but expensive system which has become available in recent years. The aquarist must, of course, make up his/her own mind, particularly since there are other expenses to be considered when first setting up, and other filtration/aeration systems are also highly effective when properly managed. Whichever system is adopted, one should aim for a turnover rate of around three times the capacity of the aquarium every hour

Temperature Control

Most of the commonly available marine fish are at their best at temperatures between the mid- and high 70ºs F (24º-26º C). Although this temperature can be allowed to fluctuate slightly these fluctuations must be gradual. Sudden changes in temperature can cause similar problems to sudden fluctuations in pH, as mentioned earlier.

The easiest method of heating an aquarium is by means of combined heater/ thermostats. This is not the only way of course, but it does have one outstanding advantage over other methods in that it is very easy to set up.

Separate heaters and thermostats of various designs are also available. One of their advantages

over combined units is that individual components can be replaced more easily. Separate units also make it possible to operate more than one heater from a single thermostat. In some cases, the savings thus made can be significant.

When calculating the heating requirement for an aquarium, allowances should be made for major drops in external (room) temperature. If the wattage of the heater chosen is approximately twice the figure arrived at through strict mathematical calculations, this will provide sufficient reserve power to cope with most situations. Adopting this approach, one can arrive at a reasonable wattage by applying the following rule-of-thumb:- For tanks measuring approximately 24" x 12" x 12" allow 10 watts/gallon For tanks up to 48" long, allow 6 watts/gallon For tanks up to 72" long, allow 4 watts/gallon

APPROXIMATE RATING REQUIREMENTS
Aquarium Size/Wattage:
24x12x12/75-100
36x15x12/100-150
48x15x12/120-180
60x 18x 18/150-210
72 x 18 x 18/ 200-300

Aquarium Lighting

Aquarium lighting usually receives a great deal of attention where freshwater aquaria are concerned. However, when it comes to marine aquaria, this subject is often given no more than superficial treatment. Perhaps the fact that few, if any marine plants are cultivated by most hobbyists has something to do with this.

Indeed, if the tank is to contain just fish, and if the aquarist dislikes seeing algal growth on the rocks and sides of the aquarium, then reduced light intensities will serve both aims satisfactorily. However, it must be stressed that those fish which like/require/prefer algae in their diet must have this (or an equivalent) otherwise provided. Aquarian Vegetable Diet is an ideal source of high-quality vegetable food.

There are two main forms of "marine" lighting: tungsten and fluorescent. Recently high-pressure mercury vapour lights have also become available. Each of these has its own advantages/disadvantages and the aquarist must weigh these up before coming to a final conclusion.

Tungsten bulbs are cheap but hot and do not enhance the appearance of the fish as much as fluorescent tubes do. They do, however, produce light relatively rich in "red" wavelengths which are beneficial to the growth of green seaweeds.

Fluorescent tubes exist in a number of types, each emitting its own range of wavelengths from brilliant white to deep purple. If red or brown algae are being cultivated, then those tubes emitting light close to the blue end of the spectrum will be found more suitable.

Mercury bulbs produce light of high intensity and are, therefore, particularly suitable for deep tanks or for those where good algal growth is essential. These bulbs are, however, expensive to install but are long-lasting and relatively cheap to run.

Assuming that the lights will be switched on for an average of 14 hours per day the following table may be used as a rough guide for fluorescent tube illumination. With marine aquaria, some experimentation is almost always necessary in order to establish adequate lighting levels to suit individual aquaria.

Approximate total wattage:

Tank Dimensions.	For viewing only.	For algal growth
24x12x12	30w	60w

36x15x12	40w	90w
48x15x12	60w	120w
60x18x18	140w	220w
72x18x18	160w	270w

Wherever possible, the above wattages should be divided equally among several tubes, for evenness of distribution. This also allows for combinations of tubes emitting different types of light.

Other Aquarium Requirements

In addition to the items mentioned in the previous sections, there are several other "musts": Nets, replacement heater/stats (wired up and ready to use at a moment's notice), thermometers, algae scrapers, siphon tubes, "spot" cleaners, e.g. aquarium vacuum, long forceps (for removing objects, dead fish, etc.), plastic buckets (for water changes), glass jars (for equilibrating temperatures prior to introduction), spare diaphragms (for aerators), etc. will all make life easier.

A selection of test kits, to include Water Hardness, pH and Specific Gravity should also be considered essential.

Foods and Feeding

Good quality commercially prepared foods, such as Aquarian, contain very little moisture and very high levels of nutrients. Therefore, a little of this food goes a long way. Some aquarists overlook this fundamental point and overfeed their fish. The results are, invariably disastrous.

Food should be consumed within a few minutes. If uneaten flakes can still be seen after, say ten minutes, then the fish have definitely been overfed. It is worth noting that it is far more difficult to underfeed than overfeed, so it is best to start off with very small feeds and increase these gradually until an optimum level is reached. Two small feeds per day should be sufficient.

Some marine fish can be a bit awkward at first but we have found at Aquarian (in laboratory controlled trials) that flake food is readily taken as long as it has been prepared from all-fresh ingredients, such as whole fish, minced beef or liver, or (even) rabbit. Aquarian Marine Flake contains four all-fresh ingredient flakes, plus a black vitamin and mineral flake and a green seaweed flake. Most of the other flaked foods in the Aquarian range are also avidly taken by tropical marine fish and Aquarian Vegetable Diet should be considered essential for all those marine species which require algae as part of their food. Aquarian Pacific Shrimp is a particularly good food to offer all marine fish are a regular treat.

Live foods (with two exceptions) are best kept out of the marine aquarium because of the risks of introducing pathogenic organisms; also most of the commoner types of live food are fresh-water in origin and die very quickly with awkward consequences.

The two safe ones are Brine Shrimp (newly-hatched or adult) and chopped, clean, earthworms. Even earthworms need to be treated with caution, with all uneaten bits being removed after a short time. .

Filling and Stocking the Aquarium

Synthetic salt mixes carry full instructions on mixing and these must be followed to the letter to avoid problems later on.

Before placing any water (pre-mixed or otherwise) in the aquarium, the undergravel filter with its air-lifts, plus the coral sand and shell mixture/layers must be in place. At this stage, no electrical equipment is either installed on switched on.

If the salts are going to be mixed with the water inside the aquarium (instead of in a plastic bucket or other container), then it is best to do this after half the water has been added. Once the tank is half full, the complete salt complement is put in and the tank is then filled to within an inch or so from the top. At this point, the heater/stat is placed into position and switched on, along with the aerator and undergravel filter (power filtration is unnecessary at this early stage).

The aquarium can now be left with all systems running for about 24 hours by which time, the salts will have dissolved completely. Specific Gravity is then checked and altered if necessary by addition of more salt (to raise the S.G..) or by the replacement of some of the aquarium water with tap water (to lower the S. G.).

Although the tank may be balanced in terms of temperature, pH, hardness and S.G., it is far too raw at this stage to accommodate any fish. The maturing process may be speeded up considerably by the addition of special water treatments that have been developed specifically for this purpose and by leaving the lights on all the time. Over the next fortnight or so, the Nitrite level should first increase well beyond the tolerance limit of most fish and then drop to around zero. When this is achieved (and assuming that pH is between 8.0 and 8.3), conditions should be suitable for the first fish to be introduced. Power filtration and/or "charcoal" (chemical filtration) can now be put into operation. Saltwater holds considerably less oxygen than freshwater. This, added to the high sensitivity of marine fish to environmental conditions, means that only relatively low numbers of fish can be kept in tropical marine aquaria. One other factor to bear in mind is that it takes anything up to six months for a marine aquarium to mature fully. Therefore, until this happens, the stocking density should be kept to around 50 percent.

APPROXIMATE RECOMMENDED STOCKING LEVELS
No. of fish approx. 2" long:

Surface Dimensions(inches)	New tank	Established tank	
24x12	3	6	(This size nor recommended for beginners)
36x12	4	9	
48x12	6	12	
60x18	11	22	
72x18	14	28	

When introducing fish, temperatures must be equilibrated by floating the bag in the tank for about fifteen minutes. If at all possible, debagging should occur in subdued light and no food should be offered for at least several hours.

Quarantine and Diseases

A new tank with its collection of fishes will inevitably act as a quarantine tank. However, later additions should be kept for at least a fortnight in isolation in a separate tank, until all risk of disease has passed. The expense involved in setting up this tank will more than pay for itself in a very short time.

Even when precautions are taken, fish may succumb to disease from time to time, but it must be stressed that, despite the distressing effects that diseases can have, most are easy to prevent through proper water management, reasonable stocking, etc. In addition, marine fish are generally quite resistant to disease and outbreaks should, therefore, be infrequent.

Routine Maintenance

Every aquarist soon develops a maintenance regime suited to his/her circumstances, such as time availability numbers and sizes of aquaria, numbers, sizes and types of fish, etc. However, every programme should include the following:-

Daily

Check on temperature; state of health of fish; feed fish in the morning and early evening; switch tank lights off ten minutes before room lights.

Weekly/fortnightly

Check specific gravity pH, hardness and nitrite levels; check heater/stats for leakage; check on supplies of food and remedies; top up tank with tap water if necessary Every three to four weeks Clean out box, power and sponge filters; clean cover glass, scrape algae off sides of tank if

necessary; check aerator and lighting equipment.
Every four to six weeks Gently stir topmost layer of coral sand or gravel; allow mulm to settle and then remove with siphon tube; carry out a 20-25% water change; prepare the new water 24 hours in advance, aerate it vigorously and check all parameters before adding to main tank.

A note about fish

The tropical marine hobby is expanding very quickly. As it does so, more and more exotic species become available. Often, little is known about their ease/difficulty of maintenance in aquaria. If one is starting up as a marine aquarist, it is, therefore, advisable to steer clear of difficult, unknown and expensive species. There is enough colour and interest among the tried-and-tested ones to provide both great enjoyment and realistic challenges for months, or even years.

Trading Post

Crenuchus spilurus $5
Boehlkea fredcochui $3
Hyphessobrycon loretoensis $3
Paraceirodon innesi (neon tetra) $1
Carneguiella myersi $3
Carneguiella strigata $3
Heterocharax sp.)Kolibrisalmler $4
Moenkhausia agnesae $7
Thayeria oblicua $4
Corydoras sychri $6
Corydoras arcuatus $4
Corydoras pygmaeus $1.5
Corydoras rabauty $4
Albino ancestris (1 inch) $5
L226 only 2 left $25
Apistogramma agassizii $25
Apistogramma eremnophyge $30
Apistogramma eunotus $25
Apistogramma bitaeniata ORANGE $25
apistogramma cacatuoides $25
Apistogramma panduro $25
Apistogramma Atahualpa $25
Neolamprologus multifasciatus $7

**If you would like to purchase any of the fish listed above, please contact John Patterson at jrpatter@hotmail.com.

If you would like to participate, please email us at raleighaquariumsociety@yahoo.com

Monthly Web Links

Raleigh Aquarium Society Forum on Yahoo Groups
http://groups.yahoo.com/group/raleighaquariumsociety/

Potomac Valley Aquarium Society in the Washington D.C. area http://www.pvas.com/

Atlanta Area Aquarium Association in Atlanta, Georgia http://www.atlantaaquarium.com/

Carolina Fish Talk http://www.carolinafishtalk.com/

Charlotte Area Aquarists Society http://pvelasco.net/CAASBBS/index.php

Marine Aquarium Society of the Carolinas http://masotc.net/

North Carolina Koi & Watergarden Society http://www.nckws.com/

Carolina Aquatic Plant Enthusiasts http://www.ncaquaticplants.org/

Aquatic Gardeners Association http://www.aquatic-gardeners.org/

KingFish Services http://www.kingfishservices.net/

If you would like your site to be added above, please email us at raleighaquariumsociety@yahoo.com!

Club Sponsors

(The following businesses give RAS members a discount on purchases)
You may be asked to show your RAS membership card

Critter Country Inc 14 Technology Drive, Garner (10%) **919.772.3761**

Down Under, Salt Water Fish & Corals Highway 70 (in between Agri Supply and White Oak Shopping Center) in Garner. 20% on livestock, 15% on dry goods) **919.662.8820**

Fins, Furs & Feathers Pet Center 303 S. Horner Boulevard, Sanford, NC 27330 (10% on everything except tanks) **919.718.0850**

Pet Mania 7901 Falls of Neuse Rd #125, Raleigh (10%) **919.676.3225**

Pet Paradise 9101-141 Leesville Road, Raleigh (10%) **919.848.8881**

The Pet Pad 1347 Kildaire Farm Road, Cary, (10%) **919.481.6614**

Triangle Tropical Fish 3600 N. Duke St. Suite #36 Durham (10% excluding aquariums and stands) **919.479.0088**

Reef Keepers Aquarium 1673 Old US Highway 70 West, Clayton, NC 27520-6566 (10%) 919.359.2424

If you would like to sponsor us, please email us at raleighaquariumsociety@yahoo.com.

Please contact Emily Hirtle at raleighaquariumsociety@yahoo.com if you are an active member of the Raleigh Aquarium Society and do not have an up to date membership card. Membership cards can be picked up at any meeting.

PLEASE HELP SUPPORT YOUR LOCAL FISH STORES BY SHOPPING WITH THEM :)

Raleigh Aquarium Society Application for Membership

Membership privileges include:

-Ability to post items in trading post section of monthly newsletter

-A discount card good at participating local pet stores

-All club discounts on club functions

-Education from the most knowledgeable aquarium experts in NC

-Yearly Membership - $15.00 (includes spouse and children)

(Membership dues run from March 1st each year. New members joining any other time will be pro-rated at $3 + $1 for each month remaining in the year.)

Name(s):_____

Date to begin membership: _____/_____/_____

Address: _____

City: _____ State: _____ Zip: _____

Phone: (____) _____ (2) (____) _____

Email Address: _____

New Membership ____

Renewal Membership ____

Mail to:

Raleigh Aquarium Society
PO Box 31564
Raleigh, NC 27612-1564