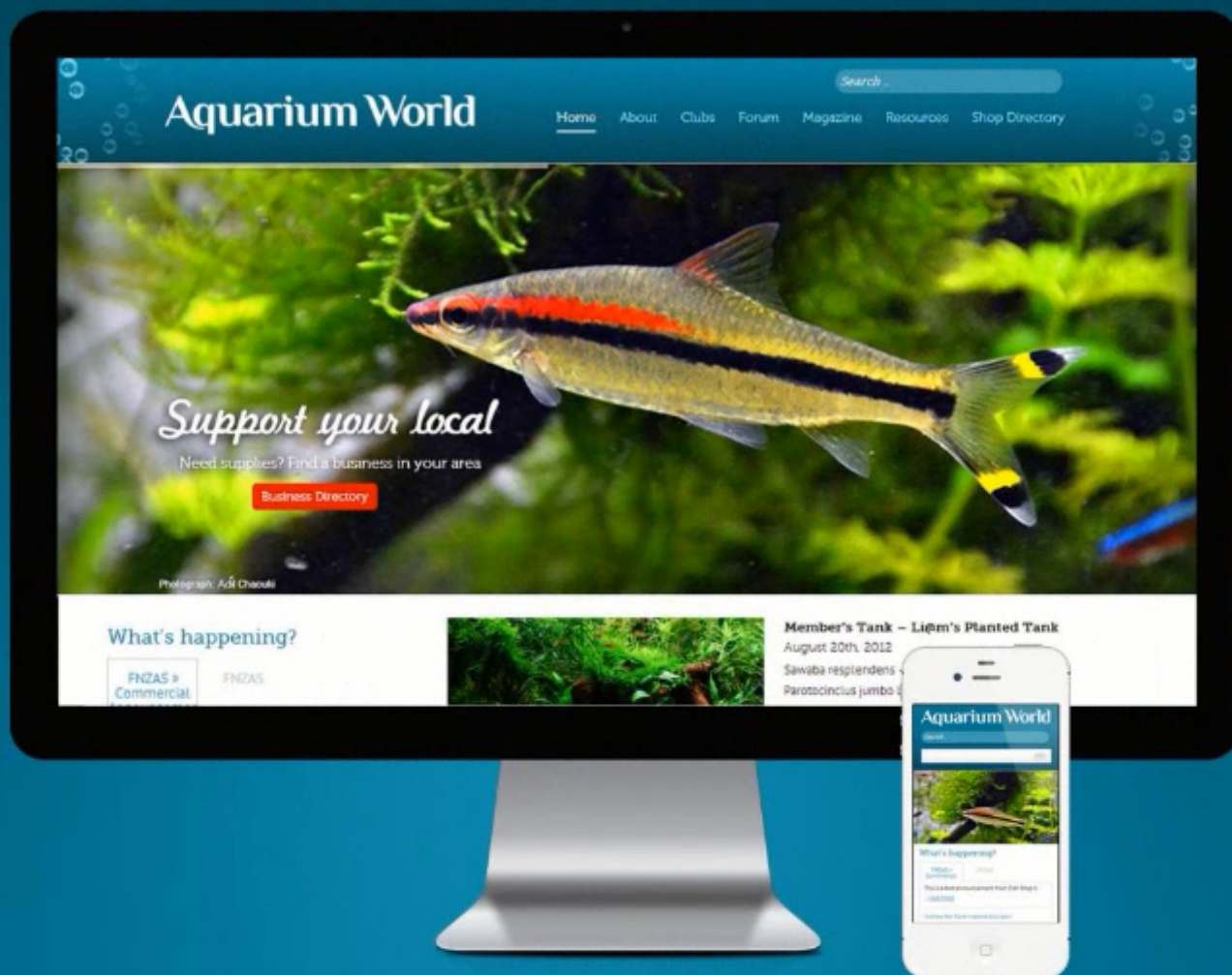


Aquarium World

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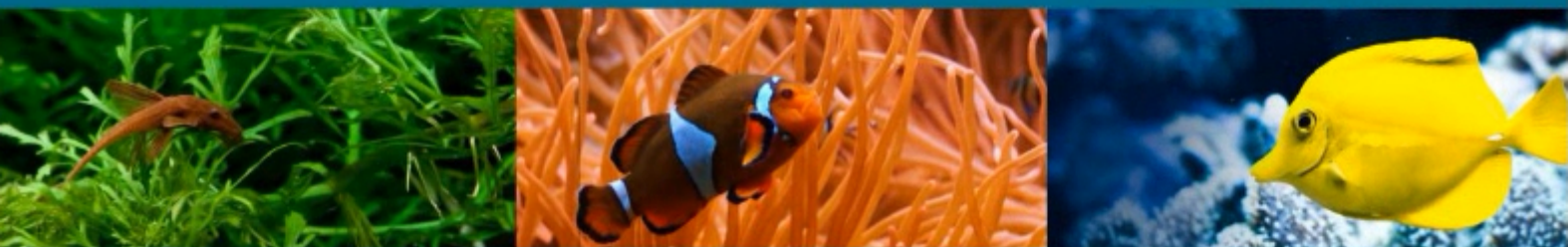
Volume 64 Issue 2 2019





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Aquarium World

magazine

Volume 64 Issue 2 2019

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Aquarium World Magazine is published biannually by the Federation of New Zealand Aquatic Societies Incorporated (FNZAS)

ISSN 1173-8375

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Rhinomuraena quaesita
Ribbon eel
Photo: Nicolene Palmer



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I hope you have all had an enjoyable and relaxing Christmas break.

Tropical marine tanks have always fascinated me and in this issue we feature a spectacular example, Nicolene Palmer's 800-litre marine tank. Nicolene's stunning tank features a pair of ribbon eels (which we also profile). These beautiful eels are difficult to acclimatise to aquarium life and Nicolene has kept hers for an impressive 4 years.

Blackwater ecosystems are named for their soft, acidic, tannin stained water and occur in many parts of the world. Callum Mac has become a blackwater convert and shares his journey. We also look at some of the botanicals you can use to try and create your own blackwater tank.

With their cute stocky bodies, large eyes, curious nature, and plenty of personality, pufferfish are great subjects for a dedicated aquarium. In this issue, we introduce the 20 species that can be imported into New Zealand.

Have you ever wondered how to tell oxygen weeds apart? New Zealand has four introduced species of oxygen weed, three of which are serious invasive pests that are banned from sale, propagation and distribution. In the first of a series of articles we learn how to tell the 'good' aquatic plants from the invasive ones.



Darren Stevens
FNZAS Editor



Diamond watchman goby
Valenciennaea puellaris
Photo: Nicolene Palmer



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Nicolene Palmer



Nicolene's interest in the hobby started in her teens. Her addiction began when she first ventured into keeping African cichlids & then onto breeding discus. She then took on the challenge of marines, eventually finding great success and satisfaction in reef keeping. Nicolene currently has a Mixed Reef 800L display tank of marine fish and corals ranging from soft corals to hard LPS - SPS corals, and enjoys sharing her knowledge with other reefers and hearing about their success.

Callum Mac



Callum is a 26 year old builder who has been in NZ since 2002. Nature, particularly anything aquatic, has always been his biggest fascination. Callum has 13 years in the aquarist hobby starting out with the most basic tank, to running a fishroom, to chasing down the ideal set ups that you dream about.

Melanie Newfield



Melanie returned to fish keeping last year after a 25 year break. She originally studied botany and is as keen on plants as well as fish. Her tanks are mainly planted, aquascaped community tanks. She also has a lifelong interest in invasive species, especially invasive plants.

Stella McQueen



From an early age, Stella was frequently found peering into troughs and ponds. She graduated to goldfish, but these were quickly replaced once she learned about New Zealand's native fish. Stella is now a free-range freshwater ecologist living in a motorhome, traveling the country and terrorising with fish in amazing places. She is also a very active science communicator, raving to the public about fish via social media, radio, and articles.

Scott Saunders



Scott is a current member of the Waikato Aquarium Society. He keeps large predatory fish and has a high tech CO₂ planted tank. He is currently in the process of starting to set up a fish room to continue his passion for the hobby. Scott is a mechanic in Hamilton, and spends most of his time with his young family.

Nicole Figgins



Nicole grew up helping her mother keep fish and a variety of birds and reptiles. As a parent herself, she has enjoyed keeping tropical aquariums over the past 20 years and making fish keeping a family activity. Since moving to New Zealand she has become more active in the hobby and her local club, the Waikato Aquarium Society. Currently focusing on planted aquaria of all types, Nicole has two outdoor fancy goldfish ponds and more than a dozen indoor tropical tanks.

Diane Wilkie



Diane has an interest in small biotope and aquascape aquariums, aquatic and carnivorous plants. She has held various offices in the NZKA, HBAS and FNZAS over the years and is currently the artistic director of the Aquarium World magazine. Her house is run by three cats of various ages and demeanours and contains three small species only planted tanks.

Mark Paterson



Mark began fish keeping when he was a child, keeping live bearers and siamese fighters. He has worked for circus and zoo parks in NZ and overseas. For the last 28 years he has kept many species of aquatic life but NZ local marine is his keenest interest. Mark loves to share this passion & knowledge with fellow hobbyists and is currently running the marine systems at a local university & is also FNZAS President.

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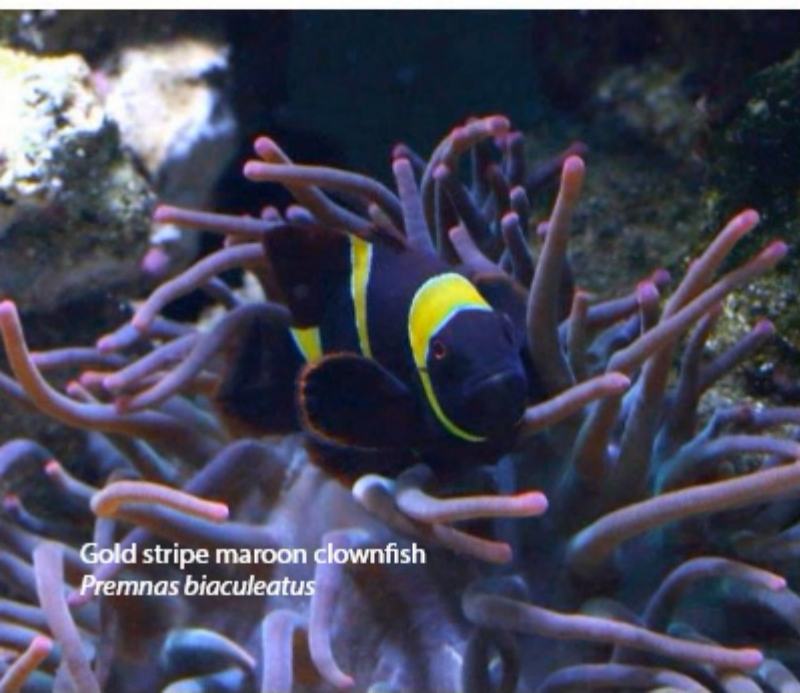
Nicolene Palmer's
800 litre
mixed reef tank





The inspiration for my tank came from the east coast of Southern Africa when seeing the abundance of life at the beach, looking amongst rock pools and looking at tank photos on the web, and the beauty of living creatures under the sea. It's a whole new world of beauty. When I started the journey to accomplish a

successful mixed reef marine system, it took a lot of patience and the right water chemistry and lighting. After many years of trial and error I finally achieved what I set out to accomplish. I now thoroughly enjoy passing on my knowledge to new reefers starting out in the hobby.



Gold stripe maroon clownfish
Premnas biaculeatus



Acropora validia



My two most favourite fish are the ribbon eels that I have had for 4 years. I have even got them to eat slithers of squid out of my fingers. They are about 1.2m in length and live in a maze which I built out of PVC piping. They seldom come out to explore but know when it's feeding time.



Humbug damsel
Dascyllus melanurus



Ribbon eels
Rhinomuraena sp.



Sixline wrasse *Pseudocheilinus hexataenia* and banggai cardinal *Pterapogon kauderni* with torch corals

In the future, I would really like to get a top of the range monitoring system such as Apex or similar, this would make life so much easier and worry free. I've heard Red Sea is due to release a monitoring system of their own.

I currently use a remote monitoring system called Seneye Reef which keeps track of my

water temp, pH and any sudden ammonia spikes. The Seneye unit alerts me via text if these parameters go astray. This unit can also be used to detect out of water conditions (i.e. low sump water level) and one big advantage is its capability to accurately measure led lighting PAR and LUX values which can be very helpful when setting up your led intensity as well as correct coral placement within your tank.

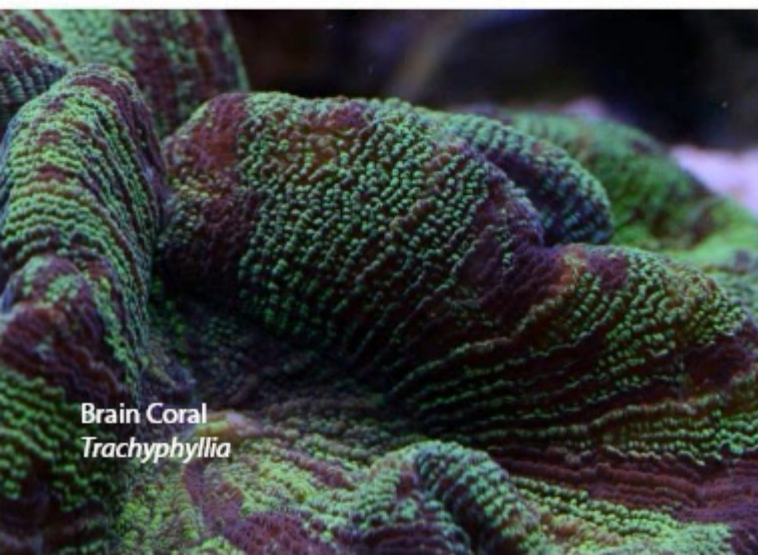
The tank dimensions:

Length: 1805mm

Width: 605mm

Height: 755mm

The tank consists of a crushed coral sand bed which is about 5cm thick and because I wanted to go for a natural look, it has coral rock in



Brain Coral
Trachyphyllia



Naso tang *Naso lituratus* and yellow tang
(*Zebrasoma flavescens*)

the middle of the tank leaning towards the back thus giving the fish space to swim in the front but enough space behind the rocks for shelter and all-round water flow. There are 2 cross-flow wave makers on either side of the tank for water movement, 3 x HYDRA 52HD led units for lighting, 2 dosing units with a

total of 7 heads which dose the following Red Sea Foundation and Colour Care Products; Calcium, Magnesium, Alkalinity, Iron, Iodine and NoPoX for a healthy bacterial colony. I find that I do not need to dose potassium for my tank as the water changes are sufficient to maintain required levels. I follow the Red Sea





long spine urchin under plating montipora

Mixed Reef and Colour Care Program which recommends the following water parameters; salinity 34ppt 1.024, calcium 450 ppm, magnesium 1350 ppm, alkalinity 11.5dkH (I tend to run my alkalinity at 10.5), nitrate 1-2 ppm, phosphate 0.08-0.12 ppm, iodine 0.06, potassium 400, iron 0.15, temp 25.5, ammonia 0, pH 8.2.

I do 80L of water changes weekly using Red Sea Coral Pro salt. I run a skimmer and a reactor with carbon in it. I also have some chaeto (*Chaetomorpha* spp.) in a refugium

with growth lights that come on at night. This helps reduce phosphates and minimizes the pH swing which usually occurs when the lights go out. Feeding is once a day and consists of a pinch or two of New Life Spectrum (with garlic) pellets, nori soaked in Seachem Garlic Guard for the tangs, slither of squid, raw fish or raw shrimp for the eels and defrosted mysis shrimp, raw prawn or muscle chopped finely for the fish as well as an additional defrosted clam for my copper band. Once the lights go out I put in the recommended amount of Red



Acropora, zoanthids and clams

Sea Reef Energy A and B which is basically an amino acid and liquid coral food together with reef roids or similar (dried phyto and zooplankton). The whole tank runs on one system which consists of 800L display, frag tank, sump and a refugium. (Approx. 1000L total volume).

Invertebrates

thousands of mysis shrimp (Mysidae),
feather duster worms (Sabellida),
sponges,

bristle worms (Annelida),
six turbo snails (and hundreds of babies)
(*Turbo fluctuosa*),
three hermit crabs,
one fire shrimp (*Lyasmata*),
hundreds of stomatella snails
(*Stomatella varia*),
Asterina starfish (Asterinidae),
hundreds of amphipods,
squamosa, crocea and maxima clams (4
in total)



green spotted mandarin fish
Synchiropus picturatus



Meat coral
Acanthophyllia

Fish

yellow tang (*Zebrasoma flavescens*),
 ribbon eels (*Rhinomuraena* sp.),
 copperband (*Chelmon rostratus*),
 cleaner wrasse (*Labroides dimidiatus*),
 humbug damsel (*Dascyllus melanurus*),
 flame angel (*Centropyge loricula*),
 2 golden maroon clowns (*Premnas biaculeatus*),
 rabbit foxface (*Siganus vulpinus*),
 lipstick tang (*Naso lituratus*),
 2 chromis (Pomacentridae),
 lawnmower blenny (*Salarise fasciatus*),
 2 diamond watchman gobies (*Valenciennesia puellaris*),
 2 banggai cardinals (*Pterapogon kauderni*),
 sixline wrasse (*Pseudocheilinus hexataenia*),
 yellowtail damsel (*Chrysiptera parasema*),
 domino damsel (*Dascyllus trimaculatus*),
 2 green spotted mandarins (*Synchiropus picturatus*)

Corals

I have a wide variety of corals, a few are listed below.

LPS: hammer (*Euphyllia ancora*),
 torch (Caryophyllidea),
Favia (Mussidae),
 brain (*Trachyphyllia*),
 frog spawn (*Euphyllia divisa*),
 bubble coral (*Turbinaria peltata*),
 cup coral,
 Scolymia coral



Favia



SPS: birdsnest (Pocilloporidae),
millie (Acroporidae),
blue staghorn (*Acropora formosa*),

gorgonian (Alcyonacea),
Pavona (Agariciidae),
scrolling montipora
(*Montipora peltiformis*)

There are three types of montipora: scrolling, encrusting, and branching.

Softies: leather (*Sinularia*)
finger leather,
toadstool,
mushrooms (Corallimorpharia),
Ricordeidae (*Ricordea*),
pulsing xenia (Xeniidae),
zoanthids (Zoantharia),
Palythoa coral



Sinularia

Nicolene Palmer

Photos by Nicolene Palmer & Gordon Pembridge

Ribbon E



eel

Rhinomuraena quaesita



The Ribbon Eel (*Rhinomuraena quaesita*), also known as the leaf-nosed moray eel, is found in the Indo-Pacific Ocean region from East Africa to southern Japan, Australia and French Polynesia where they usually inhabit shallow lagoons and reefs. They are not very territorial and two males can be often found sharing a hole or cave and most ribbon eels have been observed to stay in the same area for their lifetimes. This species is generally considered a protandric hermaphrodite, meaning that they can change sex from male to female if needed in their environment. Juveniles start out black and become a bright electric blue as males or yellowish when changed to females. Males generally reach a length of 100cm whereas females can get to 130cm.

Ribbon eels are carnivores and prey on small fish and crustaceans. They can be a very difficult fish to get feeding in the home aquarium if they don't feel comfortable. Success can be achieved by providing a layer of sand with PVC pipes to provide artificial caves and lots of rockwork giving a more natural feel to the tank for them. Tight fitting lids are a necessity and ensure all outlets are secure too as they can climb out of the tank if they don't feel at home. Live feeder fish, such as mollies and guppies, can help stimulate their feeding until they are ready to accept other prepared meaty foods.

Generally speaking, most ribbon eels don't settle to tank life and it is rare to find someone who has kept them for 2 years in the home aquarium, so it is real kudos to Nicolene's fish keeping abilities for the longevity of her fish (see Nicolene's 800 litre tank profile).

Mark Paterson

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<https://animals.mom.me/interesting-ribbon-eel-4353.html>



Above: Ribbon eel male *Rhinomuraena quaesita*
Photo: Bernard Du Pont

Below: Ribbon eel male
Photo: Barry Peters



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BLACKWATER TANKS

ARTICLE AND PHOTOS BY CALLUM MAC

As a child I was always highly fascinated by nature, particularly anything aquatic. All my childhood spare time was spent in the bush wandering around watching nature, in particular fish. The largest thing that always caught my eye was the look a natural ecosystem would give me. The peace, harmony and simplicity. Time passed and the fish that I use to watch in the creeks ended up at home in tanks or ponds!

Many years later life changed, we moved to a new country, and Multiple Tank Syndrome kicked in. I now run a small fish room in my garage. With the joys coming from the modern age in the form of the internet, I met one of the

Black neon tetra and head and tail light tetra
Photo: Callum Mac

head breeders from Imperial Tropicals Florida and Ted's fishroom.com on YouTube. These people got me heavily hooked into the imitation of nature following the natural aquarium approach. Black water aquariums started to challenge my mindset in the fish room.

Soon my mind changed, and I started to embrace the dark side, like Scott Fellman from tanninaquatics.com discusses in his blog. So I started allowing tannins to be in the aquarium! I also regularly add botanicals in the form of



oak leaves, twigs, alder cones and anything I can find dried which will have no adverse affect in, and on, the aquarium's ecosystem. Not only are these added, I make use of RODI (Reverse osmosis de-ionised) water to clear out all rubbish from the town supply and I then have zero TDS (Total dissolved solids) water to work with along with aged mixed peat water. For me, the approach of embracing the mulm biofilms from botanical decay has paid itself off over time. It's given me very stable aquariums with limited algae issues along with the benefits driven from enhanced colours in my fish. Some of the species I keep, like head and tail light tetra, *Hemigrammus ocellifer*, black neon tetra

Glowlight rasbora
Photo: Callum Mac

Hyphessobrycon herbertaxelrodi, and glowlight rasbora *Trigonopoma pauciperforatum* give such wonderful colours compared to the generally plain looking specimens commonly overlooked at the LFS.

The biggest bonus I have found with the biofilm in these small imitations of nature has been watching healthy happy fish and fry have an easy supply of micro-organisms and bio film to endlessly pick at, right before your own eyes. Now this all may sound so easy, you could





be saying to yourself, but it's not a matter of running out purchasing an aquarium, getting some sand or gravel, a filter, heater, light, drift wood, rocks and some botanicals. A bit of time is needed to understand the difference in how a black water aquarium works biologically and which species thrive in the type of water found in these habitats.

Also, the types of planting which are suitable for black water. Once this has been researched

Above left: Black neon tetra
Photo: Callum Mac

Left: botanicals amongst plants
Photo: Callum Mac

Red tailed shark hunting amongst narrow leaf java fern and anubias Photo: Callum Mac

the process of setting up your aquarium with botanicals starts. Add small bits at a time. Set up the decor to suit your nature aquarium. Next start the cycle off. Gradually adding a few botanicals at a time allowing for the beneficial bacteria to build up. Allow time for the aquarium to age and mature. Very soon all the patience has paid off and there is the natural slice of happy black water ecosystem found in nature.

Callum Mac

Botanicals

When botanicals for aquaria are mentioned often oak leaves or imported products such as Indian almond (*Terminalia catappa*) leaves or 'tea bags' are the first things to spring to mind, however there are a few other alternatives available in New Zealand. If you browse through some of the online stores that cater to blackwater enthusiasts you will see a vast selection of leaves, pods and bark that they deem suitable as botanicals for your tank. Many require growing conditions not offered by a New Zealand climate but there are some that you may be able to find readily here. But a few notes of caution first! Make sure the leaves or seed pods you collect are spray free. Seed pods and leaves should have matured naturally on the tree, collect leaves in autumn soon after they fall so they are clean and have not weathered or been contaminated. Always steep your botanicals in boiling water for at least 30 minutes then rinse so that you do not introduce unwanted dirt, dust or airbourne pollutants to your tank (some pods may require boiling for 30 minutes or more so that they sink rather than float around on the surface for days or weeks until they become waterlogged). And last but not least do not dump a whole bunch of botanicals into an existing setup if it already contains fish, the rapid change in bioload may upset the water parameters of your aquarium and cause it to cycle again or rapidly alter the pH and cause distress.

A NOTE ON BIOFILMS

When discussing the benefits of biofilms in an aquarium blackwater enthusiasts are not referring to the oily film that can form on the surface of the water, but to "the collection of bacteria, diatoms, algae, fungi and other multi-cellular organisms that can form a layer on any surface submerged in water". (Fishmosey, 2012)



Copper beech



Magnolia grandiflora



Black alder



Beech leaves

English or European beech *Fagus sylvatica* and Copper beech *Fagus sylvatica purpurea* produce leaves that are between 35 - 50mm in length. They are one of the faster deteriorating leaves when submerged leaving a lacy array of veins after three or four months. Dried branches are also suitable for placing in aquariums but the beechnuts or mast as they are referred to have a very spiky surface and may cause damage to your aquarium inhabitants. I am unsure if the Southern beeches of the genus *Nothofagus* are suitable as aquatic botanicals.



Magnolia leaves and seed pods

Magnolia grandiflora are large evergreen tree that produce large leathery leaves that can reach 200mm in length. They are glossy on the upper surface and slightly pubescent (furry) on the underside. Large creamy flowers when pollinated produce seedpods up to 110mm in length. The dry seedpods can also be used in aquaria but make sure you boil them before placing in your aquarium. They seem to be popular overseas placed in vivariums with frogs to harbour insects and isopods.



Jacaranda seed pods

Jacaranda mimosifolia are grown for their fern like foliage and show of brilliant blueish purple trumpet like flowers that bloom in spring and early summer. The green disk shaped seed pods grow to 75mm in length. They harden and become brown and woody and split in two when the seeds mature. You can pick them from the tree when they reach this stage. They can left whole in which case shake or pry all of the seeds out before boiling for around 35 minutes. They can be split in two if you are worried about your tank inhabitants getting stuck inside them.



Alder cones

Alnus glutinosa, the common, black or European alder or just plain alder tree produces cones between 10 - 16mm in length. Pick the cones off the tree when they are dry and dark brown. They are purported to have anti fungal properties and are rich in tannins that tint the water noticeably. The dried branches are also suitable to place in tanks. Alders are members of the Beutaceae family which include birches and hazels both of which produce leaves that are suitable for adding to aquaria.

There are many other leaves, branches and pods suitable to use as botanicals such as loquat leaves (*Eriobotrya japonica*) and dry branches from apple, pear or cherry trees. Conduct your own research to find what other blackwater aquarists have successfully used.

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Diane Wilkie

FISH MINI PROFILE

The rocket pencilfish *Nannostomus eques* is a small distinctive fish with a slender body, a broad dark lateral stripe which extends from the snout to the lower lobe of the tail, and an unusual head-up posture. They are a timid, peaceful, schooling species that is generally found in the top half of the tank. In the wild, rocket pencilfish are found in small sluggish waterways among dense vegetation, or

submerged wood and leaf litter, and are well suited to small, heavily planted, or dimly lit, blackwater tanks. They are micropredators and should be fed a varied diet of small dried and live foods. Rocket pencilfish grow to about 35 mm and are suited to temperatures from 22–28°C and pH values of 4.5–7.5. Photo Robert Beke



Rocket
Pencilfish

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A photograph of three Discus fish in an aquarium. The fish are of different colors: one is bright orange, another is dark blue with light blue wavy patterns, and a third is light orange with white markings. They are swimming near some green artificial plants and a piece of driftwood. The title 'ning classic' is written in a white, cursive font in the upper left corner.

ning classic

Discus (*Symphysodon* spp.) are a great feature fish for large planted or tannin stained blackwater aquaria. They are a shoaling species that are best kept in groups. To thrive, discus need clean stable warm water (28–30°C) and frequent water changes.

It helps if the water is slightly acidic and soft, but some varieties will do well in a neutral pH.

Wild discus are rarely available in New Zealand but we do have a range of beautiful selectively bred varieties. Discus can grow to 22 cm and live for at least 10 years. They can be demanding and are not recommended for less experienced aquarists.

Photo Adrienne Dodge

What Oxygen Weed is that?

by Melanie Newfield

Oxygen weed is a favourite plant for the cold water tank or pond. It's easy to grow, provides your fish with shelter and variety in their environment, and goldfish love to have a munch on it. But one of oxygen weed's greatest virtues can also be a real problem - sometimes it is just a bit too easy to grow.

Oxygen weed is not a single species - there are four species known by this name in New Zealand. All but one are serious invasive species and are banned from sale, propagation and distribution. So if you are growing oxygen weed, you want to be sure that you have the right one. Fortunately, telling the different species apart is fairly simple once you know how. The easiest thing

| Egeria in Tarawera
| Photo: Rohan Wells, NIWA

to look for is the way that the leaves are arranged around the stems.

The "good" oxygen weed - the one which can legally be sold - is elodea, or Canadian pondweed (*Elodea canadensis*). This species does occur wild in New Zealand, in fact it is found in lakes, rivers and streams throughout both the North and South Islands. However it has been present in the wild for many decades and seldom causes much of a problem. It is the least vigorous and aggressive of the oxygen weed species.



Elodea has its leaves arranged around the stems in groups of three.

Of the three oxygen weed species which cannot be sold, lagarosiphon (*Lagarosiphon major*) is the most common. It occurs in the wild in both the North and South Islands, and is also often seen in farm and garden ponds. It causes problems in some of the South Island hydro lakes, where hundreds of thousands of dollars a year have to be spent on controlling it. It also affects lakes in the North Island, such as those around Rotorua.

Lagarosiphon has leaves which are curled and occur singly on the stems.

Egeria (*Egeria densa*) occurs mainly in the top half of the North Island, although is found in a few other locations in the North and South Islands. It is the largest of the oxygen weed species. It mainly causes problems in the Waikato hydro lakes and the Rotorua lakes.

Left: Elodea from Morrinsville stream and cross section
Tracey Burton, NIWA

Below: Lagarosiphon
Photo: Caryl Simpson





Egeria has leaves arranged in fours or fives around the stems.

The final species of oxygen weed in New Zealand is hydrilla (*Hydrilla verticillata*). This species has never been common - it has only been reported from four lakes in the Hawkes Bay. It is fortunate that hydrilla is uncommon in New Zealand because it has a reputation as the most difficult species of oxygen weed to control. Although it has not spread far in New Zealand, it is a major problem in North America.

Hydrilla has leaves arranged mostly in groups of four to six around the stem, but

Left: Egeria flowers

Photo: Tracey Burton, NIWA

Right: Egeria shoot with flowers

Photo: Rohan Wells, NIWA

it is more variable than the other species. Sometimes the number of leaves can be less or more. The edges of the leaves of Hydrilla are obviously toothed.

Hydrilla is under eradication in New Zealand, and it is hard to find even in the lakes where it was previously reported. Any suspected sightings of hydrilla should be reported to your local council or to MPI.



Above: Hydrilla weed bed
Photo: John Clayton, NIWA



Left: Hydrilla
Photo: Rohan Wells, NIWA

If you see any species of oxygen weed apart from elodea for sale, it should be reported to your local council Biosecurity Officers. Fortunately, in my experience, I have never seen an aquarium or pet shop selling anything but elodea in all the years since I first learned to tell them apart.

Melanie Newfield

Puffer fish



Whether you're a fan of salt or fresh water aquariums, one of the biggest personalities in the aquarium hobby is the puffer fish. Their large eyes can move independently (to identify both predators and prey) giving them their inquisitive appearance. Many species will also interact with their owners, further increasing their appeal.

Puffer fish get their family name Tetraodontidae from their four large teeth that are fused into upper and lower jaws. This gives them the ability to crush the shells of crustaceans and molluscs, which are some of their favourite prey. The common names of puffer, blowfish, and globefish all come from their defense strategy of filling their stomach with water (or air when not in the water) until they inflate into a ball like shape. As an additional defence many

Carinotetraodon travancoricus

Photo: Nicole Figgins

puffers have pointed spines that, when they are inflated, make them an awkward and prickly meal for a predator. These abilities are coupled with the fact that the skin and some internal organs in most puffer species contain tetrodotoxin, a toxin that can cause death and paralysis in humans. Puffer fish generally move by using their pectoral, dorsal, anal, and caudal fins which makes them highly manoeuvrable. Their tail fin can also be used for a sudden burst of speed if frightened.

There are approximately 120 species of puffers. Most species are found in tropical marine or brackish waters, but 35 species are found in freshwater. They are typically small to medium in size, though a few species can

reach lengths of greater than 100 cm. There are 20 species on the New Zealand allowable fish import list, though obtaining them can be quite difficult.

In the aquarium, most marine puffers will reach about 20cm while the smaller *Canthigaster* puffers get to about 8cm. The freshwater and brackish species are generally small with the dwarf puffer only reaching 2.5cm. Whether marine or freshwater they are not generally considered a community fish as they can be territorial and get more aggressive as they age. They also can take a good bite out of other fish. As the teeth continually grow on most puffers, they need regular meals of shelled invertebrates such as snails, small crab legs, cockles, shrimps etc., to help prevent their teeth from growing too large and not allowing them to eat. Saltwater puffers are not reef safe as they will snack on invertebrates.

All puffers are very messy eaters that should be fed a protein-rich diet. This means that they release a lot of ammonia into the water through their waste, and good filtration is a must for their survival. Being a scaleless fish they are more susceptible to elevated levels of ammonia and nitrite, so a fully cycled tank is necessary with regular water changes and maintenance.

In aquaria saltwater puffers should be fed a varied diet of meaty foods such as squid, krill, clams, and hard-shelled shrimps (to help wear down their teeth). Suitable foods for freshwater puffers include small earthworms, chopped shellfish, and live or frozen bloodworms or brine shrimp. Dried foods should not be the main part their diet but harder pellet foods can be useful.

Freshwater and brackish water parameters vary by species. Water parameters for salt

water species should be: Temperature: 24-26C, pH: 8.1-8.4, hardness: 8-12°, salinity 1.020-1.025 specific gravity (SG).

Arothron stellatus

The starry or stellate puffer is from the Indo-Pacific region. Juveniles have a yellowish body with large black spots on it which become smaller and increase in number with age. They can grow to 120 cm so are really



only suitable for very large public aquaria. They can be kept in a male female pair and can live for 5 to 8 years.

Arothron hispidus

The white-spotted or stars-and-stripes puffer is from the Indo and Eastern Pacific. It can grow to 50 cm so ultimately needs a large aquarium of at least 900 litres.



Arothron meleagris

The guineafowl puffer is from the Indo and Eastern Pacific. It is also found in a golden yellow and white forms. It can grow to 50 cm so will require at least a 900-litre aquarium.



Photo: Bryan Harry

Arothron nigropunctatus

The blackspotted or dogfaced puffer is from the Indo-Pacific. It also has a phase with a yellow underbelly. It can grow to 33 cm so will require an aquarium of at least 400 litres.



Photo: J Petersen

***Canthigaster* species**

There are 37 recognised toby or sharpnosed puffer species. Most species grow to 7-12 cm and are found in the Indo-Pacific region where they are generally associated with shallow water reefs or lagoons. They

have a varied diet which usually includes algae, tunicates, sponges, polychaetes, echinoderms, corals and crustaceans. In aquaria sharpnosed puffers are generally peaceful, although they are not considered to be reef safe as they will feed on sessile invertebrates including algae, corals, sponges, echinoderms, fanworms, etc. They are generally good with other fish, although some individuals may fin nip leaving circular bite marks. Six species can be imported into New Zealand.

Canthigaster amboinensis

The spider-eye or Ambon pufferfish is found in Australia, Indonesia, Japan, Papua New Guinea, Taiwan and the Hawaiian Islands. It grows to 11 cm.



Photo: Phillippe Bourjon

Canthigaster jactator

As its common name suggests, the Hawaiian whitespotted toby it is found around the Hawaiian Islands. It grows to 9 cm.



Photo: Bill Eichenlaub_NPS

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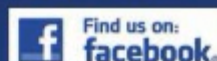
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Canthigaster janthinoptera

The Honeycomb puffer is found in the Indo-Pacific and grows to 9 cm.



Photo: Elisabeth Morcel

Canthigaster margaritata

The pearl toby or spotted sharpnose puffer is found in the Indo-West Pacific. It is a large toby species and can grow to 31 cm.



Photo: Margaritata Schildewaert

Canthigaster solandri

The blue spotted toby or spotted sharpnose puffer is found from east Africa waters east to the Hawaiian and Line Islands. It is very similar to the Papuan toby (*C. papua*) but the blue spotted toby has little or no orange on the underside of the snout versus orange on



Photo: Nick Hobgood

the underside of the snout in Papuan toby. It grows to about 12 cm.

Canthigaster valentini

Valentin's sharpnose puffer or the black saddled toby is widespread in the Indian Ocean, including the Red Sea, through to the oceanic islands of the Pacific Ocean. It has four distinctive black saddles (stripes) on its back and grows to about 11 cm.



Photo: Jenny Huang

Carinotetraodon lorteti

The red eye puffer comes from slow moving, often heavily-vegetated, freshwater streams, rivers and lakes in Thailand, Vietnam, and Cambodia. It grows to about 6 cm. They need an aquarium with plenty of branches and plants. Adult males have well-developed dorsal and ventral keels on the body that they can raise when threatened or during courtship. Males also have a uniformly coloured body and tail versus a reticulated pattern in females. Excellent water quality



is essential. Another aggressive puffer that should be housed alone, unless the tank is large and properly arranged. Temperature: 24-28°C, pH: 6.6-7.1, hardness: 3 - 13°.



Carinotetraodon travancoricus

The dwarf or Malabar puffer only grows to only 2.5cm. It is a freshwater species usually found in slow moving, heavily-vegetated waters. It is endemic to the state of Kerala, India. They like a heavily planted tank, which helps stop aggression between individuals, and are more active in low light conditions. Adult males have a clear dark line running lengthways over much of the ventral surface and often closely-arranged lines behind the eye. They have been bred in captivity many



times. Tank mates should still be chosen with care as they may fin nip and don't compete well for food. Temperature: 22-28°C, pH: 6.8-8.0, hardness: 5-25°.

Colomesus asellus

The Amazon Puffer, as its name implies, comes from the Amazon basin in Brazil, Colombia, Peru, and Ecuador where it is found in rivers, floodplain lakes, and streams. They can grow to 128 mm, but in aquaria they typically reach 70-80 mm. This species can't tolerate organic waste and require spotless water to thrive. Reasonable levels of dissolved oxygen and water movement should also be provided. They are not overly aggressive but are best kept in a species only tank. They found loose schools

Photo: Oliver S



in the wild and are best kept in groups of 6 or more. Temperature: 20–26°C, pH: 5.5–8.0, hardness: 36–268 ppm.

Dichomyctere nigroviridis (formerly *Tetraodon nigroviridis*)

The green spotted puffer is found across South and Southeast Asia in coastal freshwater and brackish water habitats. It can grow 17 cm. In February 2009, it was successfully bred in captivity at University of Florida. These fish are an aggressive species and will nip the fins or scales of other slow-



Photo: Starseed

moving fish. Though they are occasionally found in fresh water, for long-term care, they should be kept in salt water. Brackish water is suitable for younger fish, but adult fish can be kept full marine. Temperature: 24–28°C, pH: 7.5–8.5, hardness: 10–20°, salinity 1.005 SG.

Dichotomys ocellatus (formerly *Tetraodon biocellatus*)

The figure eight puffer comes from



Photo: ColdmachineUK

freshwater and brackish areas in Southeast Asia such as Cambodia, Malaysia and Borneo. They get their name from the markings either side of the caudal fin which resemble the number eight. Growing to about 8 cm, they are relatively peaceful and have been kept successfully with other fish such as bumblebee gobies and other brackish species. To house these a fully mature aquarium with excellent filtration is required as they are sensitive to nitrites and nitrates, Temperature: 24–28°C, pH: 7.8–8.3, hardness: 5–12°, salinity 1.005–1.008 SG.

Dichotomys fluvialis (formerly *Tetraodon fluvialis*)

The green pufferfish is also from Southern Asia and lives in brackish rivers, estuaries, lakes and flood plains. It grows up to 17 cm and becomes more aggressive as it ages, often harassing and fin nipping other tank



Photo: Steven G. Johnson

mates. In a large aquarium it can be kept with other brackish waters species such as scats and archerfish. *D. fluviatilis* is very similar to *D. nigroviridis* (and a further species *T. schoutedeni*) but it is more slender. It is also a true brackish water species while *D. nigroviridis* can be kept in freshwater. Temperature: 24–28°C, pH: 7.8–9.0, hardness: 10–30°, salinity 1.005–1.010 SG.

Pao cochinchinensis (formerly *Tetraodon cochinchinensis*)

Fang's puffer is found in freshwater lakes, rivers, and ponds in Thailand, Cambodia, Laos and Vietnam. It is a small species growing to 7 cm but aggressive and is best



Photo: Simon J. Tonge

kept by itself. It is very similar to 4 other puffers from the same region but can be distinguished by a clear red spot near the rear of the fish. It is best kept in a heavily planted tank. Temperature: 24–28°C, pH: 6.5–7.8, hardness: 8–15°.

Pao palembangensis (formerly *Tetraodon palembangensis*)

The humpback puffer is found in freshwater streams, rivers, and ponds in Thailand, Laos, Malaysia and Indonesia. It can grow to 19.5 cm. It is an ambush predator and not very active, often lying on the bottom (unlike *P. suvattii* it doesn't tend to bury itself) until

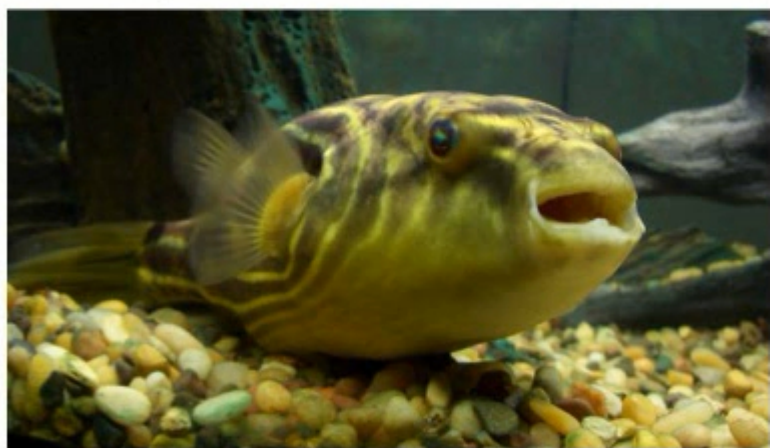
food is offered. Unlike many puffers, several can be kept together in a large tank if plenty of line of sight barriers and refuges are provided. Temperature: 24–28°C, pH: 6.8–7.6, hardness: 8–20°.

Pao suvattii (formerly *Tetraodon suvattii*)

The arrowhead puffer is found over mud, sometimes rocks, in main river channels in Thailand, Laos. It is an aggressive ambush predator that should be kept by itself, although it can sometimes be kept in a group in a large tank if plenty of line of sight barriers and refuges are provided. It will bury in to the substrate, so a deep bed of sand is essential. Temperature: 22–26°C, pH: 6.5–7.5, hardness: 5–12°.

Tetraodon lineatus

The fahaka puffer is found in freshwater lakes and rivers in northern Africa and grows up to 43cm but rarely attains that in captivity. They are best kept alone as they generally get too aggressive as they mature. A 450-litre tank is large enough to house one. Temperature: 24–26°C, pH: 6.5–7.5, hardness: 5–15°.



Mark Paterson

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An Introduction to Native Fish

by Stella McQueen

New Zealand's fishkeeping hobby is all about the exotics. Colourful mixtures of tropical fish, slow and graceful goldfish, spectacular corals, and biotopes evoking faraway jungle pools.

Meanwhile, our streams are home to a wonderful variety of fish found nowhere else in the world. Many of these adapt well to aquarium life, and are so full of life themselves, with very distinct individual personalities. Native aquaria are still so unusual that your visitors will often be as surprised and intrigued as if you had a pet kiwi.

The Fish

My all-time favourite native aquarium fish are the bullies, of which we have seven species. These are the zippy little fish you see in the shallows of a stream, darting away in a zigzag of little spurts, using their massive 'jazz hands' (pectoral fins) as sudden brakes. Often

The male redfin bully is our most spectacularly coloured native fish

Photo: Stella McQueen

overlooked as being common and a little drab (male redfins excluded!), these goby-like fish are easy to look after and have huge personalities. Despite not being named for their unsociable attitude, they can be very territorial and are always keeping an eye on each other, just in case one should dare to stray too close.

In spring and summer, the male bullies turn black and start advertising to all and sundry that this particular cave is theirs and that all passing females should spawn with him. The female has nothing more to do with him once she lays her eggs, but he remains fiercely protective of them (ideally only the occasional one is lost to snacking). They will readily spawn in the aquarium, but not all species can be raised there.



It often comes as a surprise to learn that whitebait grow up to become bigger fish. The whitebait are only in the 'toddler' part of their lifecycle, with babyhood spent near the mouths of rivers. Once in fresh water they quickly grow into five different species. Inanga

Kōaro are one of the whitebait species and a fast-water specialist.

Photo: Stella McQueen



Giant kōkopu are a lurking ambush predator with a voracious appetite

Photo: Stella McQueen

are the smallest – a slim, schooling, torpedo of a fish. The banded and giant kōkopu are much bigger and chunkier. These ambush predators lie in wait in slowly flowing, shady streams and wetlands, ready to flick their stout square tails and launch their massive mouths onto any clumsy insect that falls on the water's surface. Kōaro are a slim, shark-like, fast-water specialist, usually found perching on the stones and constantly scanning the flow above for tasty morsels. The fifth species, the shortjaw kōkopu, is much rarer and should not be taken for the private aquarium.

Kōura (freshwater crayfish) are built like mini tanks, but for the most part it is all about defence. It has to be, because practically



everything wants to eat them. Including other kōura. Two pairs of their legs have tiny pincers on the ends which they can taste with, so as they wander they are constantly probing deep into the gravel in search of morsels. They will eat anything that they can lay their pincers on – animal, vegetable or indeterminate – which makes them really useful as little vacuum cleaners in the aquarium.

These are just some of the more common species. Others include the torrentfish (unsurprisingly, a fast water expert), mudfish (graceful and curious wetland specialists) and smelt (similar to inanga only shiny and cucumbery).

Kōura are a living vacuum cleaner, but with far more personality

Photo: Stella McQueen

The Aquarium

The native aquarium is reasonably easy to set up and maintain. It is no more difficult to look after than a tropical or goldfish aquarium, it just has different requirements. With a little awareness, fish may be taken from the wild legally and ethically. The fish are often found in streams not too far from home and usually adapt easily to captivity. The adult size for most species ranges from 80 -250 mm in length, which is appropriate for a medium to large aquarium.

Basic Requirements for the New Zealand Native Aquarium:

- Cold water – not just room temperature. These fish like it cold, ideally under 18°C.
- Clean water – weekly or fortnightly partial water changes are a must. Healthy water means healthy fish.
- Lids – all native fish can climb or jump out, even through tiny gaps.
- Hiding places – more hiding places make them feel safer, so you see them more.
- Large ground area – these fish all prefer length over depth.
- Carnivorous diet – live invertebrate foods are best.
- Ethical collection – they are wild animals, native to New Zealand. This must be borne in mind at all times.
- Ich/white spot elimination – this common parasite can be a major problem, but it is easily eliminated during the quarantine stage.
- Knowledge – really, this is the most important bit. The more you know the more successful you will be at fish-keeping. Don't stop reading, searching and asking.

Cold water is absolutely critical for success with native fish. Cold water holds more oxygen than warm water, and our fish have evolved to need those higher oxygen levels. Summer indoor temperatures get surprisingly warm once you start tracking it with a thermometer, and they fluctuate wildly over the day. A chiller or fan (which cool through evaporation) is critical over summer in most places. Or you can go the whole hog and simultaneously cut down your maintenance time by hooking the aquarium up on a recirculation system with a large rainwater tank. The greatly increased volume of water will be cooler, have more stable water quality, and require fewer water changes due to the lower bioload per litre.

One thing that sets native aquaria apart visually is the lack of plants. We don't have any native algae eaters, and the fish prefer lower light levels than needed for a typical planted aquarium. However, this works out perfectly as most pristine streams are naturally devoid of native aquatic plants – they can't grow in the deep shade from the forest above, or get ripped up by floods, fast flows and kōura.

In the place of plants, you can fill the vertical space with wood and twisted roots. Ponga fronds lend a strong New Zealand feel and last underwater for months. Leaf litter softens the look of the gravel below, and provides tasty snacks for the kōura and more hiding places for the fish while giving the impression of thick forest above.

All native fish like to hide. One would think that taking away their hiding places means you would see them better. On the contrary, the more nooks, crannies and caves the fish have, the more secure they feel, so they come out more and display more natural behaviours. Because of this ground-dwelling behaviour, a large ground area is really important. Since many normally live in quite shallow streams, a deep tank is just so much wasted space.

Native aquaria are also perfect for creating biotopes. Not only can you see and experience their natural habitat in person, but you can source the rocks, gravel, fish and wood directly from the stream that you are seeking to replicate. General biotope themes include the shady forest stream with leaf litter and wood; the fast flowing 'riffle' featuring nothing but a mass of well-worn cobbles hiding a powerful pump, the wetland with an unusual but very low maintenance peat substrate; and the sandy, reedy coastal river.

Collecting Native Fish

Collecting native fish from the wild for home aquaria is perfectly legal, however there are a

few restrictions and conservation must be borne in mind at all times. Permits are required to take fish from DOC land, to sell them, or release them into the wild, including back to where they came from. Small juvenile fish adapt easier to the aquarium and it is far less damaging to take juveniles than it is to take breeding stock.

Always be sure you know which species it is that you are taking, and that you know and can provide their requirements before you get them home. If you caught them once you will be able to catch them again later when you know more. If it was rare and you worry that you may not be able to find it again later, then it probably shouldn't be taken out of the wild.

What next?

For everything you could want to know about keeping native fish in aquaria, including the ethics and legalities of wild collection, aquarium requirements and interior decorating, feeding and diseases, see my book *The New Zealand Native Freshwater Aquarium* (208 pages, paperback, 2018, New Holland Publishers, \$25).

To learn about all native and introduced freshwater fish, see my other book *A Photographic Guide to Freshwater Fishes of New Zealand* (144 pages, paperback, 2013, New Holland Publishers, \$26)

Both can be ordered directly from me, email nznativefish@gmail.com



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The New Zealand **Native Freshwater AQUARIUM**



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Discusses the species most suited to aquaria, with a strong focus on conservation and ethical fish keeping.

Covers how to find, catch and look after native fish, with tips on how to identify different species.

Provides an understanding of the fish in their natural environment, with suggestions for creating an attractive aquarium reflecting these habitats.

MAKE A DIY DRIP SYSTEM

BY SCOTT SAUNDERS

As life got busier with a young family I started looking for a way of reducing the maintenance on my big tank and, after some research, I found the continuous water change system (drip system). This system dramatically reduces or eliminates water changes for, as the name says, water is continuously added into the tank in the form of a slow drip which helps dilute the ammonia, nitrate, and nitrites.

Any excess water overflows from a drain in my sump directly to a drain outside thus giving me my water changes, which I was finding hard to get the time to do. The only maintenance I need to do every week now is change/clean the filter socks and scrub the inside of the tank.

The drip system can be fully controlled by turning the valve on the feed pipe to give more, or less, flow depending on how the tank is responding to water changes. (Do weekly water tests to see what the tank is doing then, if no changes over a month or two, reduce the flow until you see ammonia/nitrate and nitrite rise. Then adjust the flow until everything evens out and you get nice even water tests).

This system is easiest to add to a tank with a sump but can be added to a tank without one, you just need to make sure the input and output are at opposite sides of the tank or system. (So the fresh water is diluted throughout the tank before exiting). Having the drain in the floor as

low as you can get (and as high as you can in the sump or main tank) is best as I did have trouble when I set it up with water not actually draining out of the tank. If you have a sump you need to work out how much water will drain out of the main tank into the sump to make sure you have enough space to take the excess overflow in case the pump turns off.

Here's how I went about installing my drip system.

I plumbed the drip system from the coldwater house system using normal garden hose tap fittings, so I've got other options if I change my mind about the setup. I used a pressure regulator as I found without it I couldn't control the flow going into the tank finely enough.

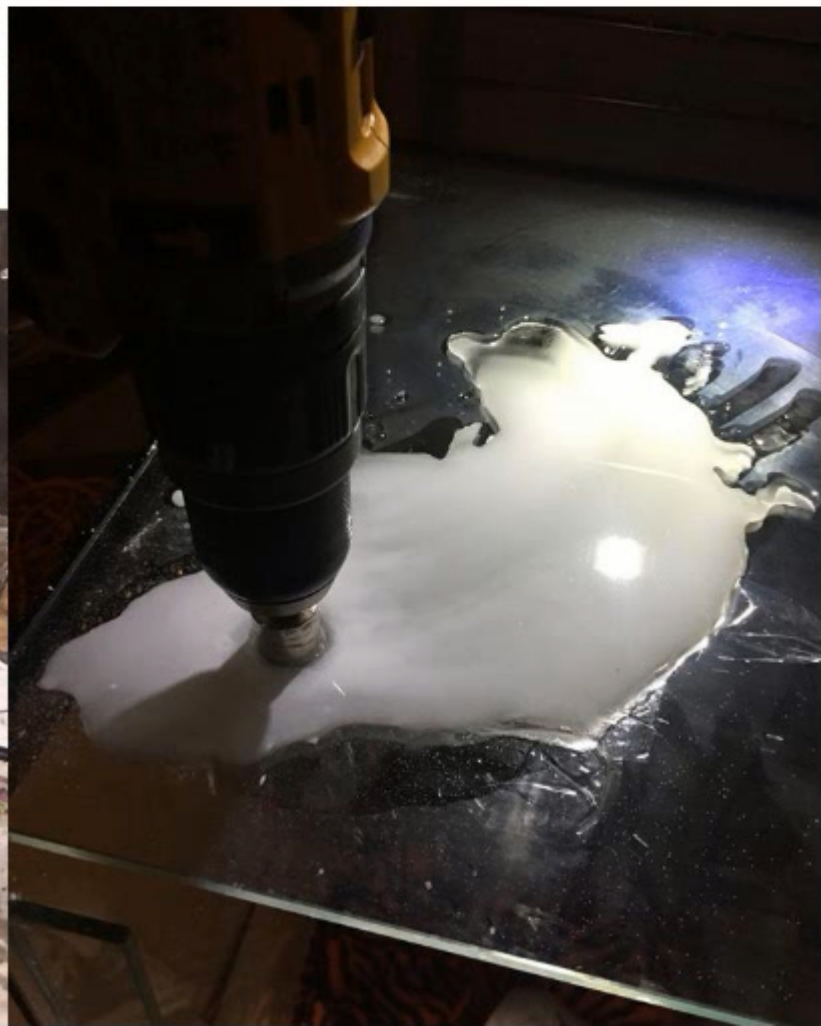
There are different ways to connect the tap and regulator to a small supply hose. I used a standard garden hose fitting with a permanent irrigation attachment for a

4-6mm hose, which made it clean and tidy. These are available in garden centres or on online sites such as TradeMe or eBay. The cheapest I found was on Wish for \$4 which included shipping.

The next step was easy, adding the supply hose. I used hose from a garden drip system but you could use airline hose. I then ran the hose along the side of the garage behind everything, so it was out of the way.

Next, I needed to make a new sump as the original one didn't have enough room in the last compartment to hold excess water from the display tank if the pump shut down in a power cut, or any other reason.

Drilling the drain in the sump
Photo: Scott Saunders





This compartment also needs to hold enough water so when the pump comes back on it doesn't run dry as the tank fills back up to the overflow level.

I used K1 Media, so I only needed 2 baffles in the sump. Water flows in from the right to the bottom then passes through the media then goes to the return pump/drain. The top holes in the last baffle are low enough so it's under the height of the drain (makes the sump quiet as there is no sound of running water). I used 6 mm acrylic baffles with lots of 6 mm holes. The drain is a Hansen bulkhead with a built-in hose fitting. I used one for 13 mm hose but I'd suggest going bigger as I had some issues at first with it not draining away.



I found out the inside diameter of the bulkhead was 8 mm, so I drilled it out to 10mm. It now seems to be working better.

I had to drill a hole in the stand for the drain. The hose I used for the drain is 13 mm food grade clear hose and it goes out through the garage to a drain outside.

I use a Jebao dosing pump for water treatment and dose Seachem Prime every 2 days. I've got wavemakers in the main tank circulating everything into the water column and also use power heads in the sump to circulate the K1 Media.

Hope this helps anyone else keen to try a drip feed system.

Scott Saunders





Blue diamond discus and koi angelfish
Photo: Aakash Sarin

If the blackwater tank and botanicals articles have inspired you to set up a South American blackwater tank, there are plenty of great blackwater fish on the importers lists.

For fans of large blackwater tanks, it's hard to go past angelfish or discus. While you'd be hard pressed to get wild caught angelfish or discus in New Zealand, there

are plenty of great varieties available. For angelfish, why not try a black, ghost, gold, gold diamond, gold marble, koi, leopard, platinum, platinum marble, silver zebra, or zebra? For discus, blue diamond, brilliant blue, cobalt blue, gold face snow whites, marlboro red, pigeon yellow, red map, red melon, red turquoise, and snakeskin are great options.



Glowlight Tetra
Photo: Britta Niermeyer



Cardinal Tetra
Photo: Marcin



Rummynose tetra
Photo: Robert Beke

If you have a smaller tank, there are several blackwater tetras on the lists including; bleeding heart, blue emperors, neons, cardinals, glowlights, rosy, and rummynose tetras. Rocket pencilfish (*Nannostomus eques*) are another great blackwater option.

For dwarf cichlid fans, Agassizi's dwarf cichlid (available in goldfire red and double red varieties) and cockatoo cichlids (available in regular and super red varieties) are available. Keyhole cichlids are also great for blackwater tanks but grow a little larger. For fans of large tanks with



Apistogramma agassizi
Photo: Jennifer Hamlin



Uaru
Photo: David Rummary

character fish, severums, uaru, and oscars are all good options. Banded leporinus also go well in a large blackwater tank with other large tankmates.

For bottom dwellers; bandit corys (*Corydoras melini*), panda corys, and green corys (now *Corydoras splendens*) are all good options. If you are after a blackwater pleco, starlight bristlenose (*Ancistrus dolichopterus*) and butterfly plecos (now *Dekeyseria picta*) are stunning

and for those with an extra large tank with large fish, Demini leopard cactus plecos (*Pseudacanthicus cf. leopardus*, L114) are a great option.

As with any new tank, it pays to do your research before adding fish as not all these blackwater species are compatible. For example, large adult discus or angelfish love eating small tetras.

The editorial team



Butterfly pleco
Photo: Aakash Sarin

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Demitry Pet Supplies is located on the main street in Morrinsville at 15 Thames Street. With an extensive online business both through their own website and Trade Me, what looks like a quiet little shop in a small town can actually be a buzzing location any day of the week.

Demitry Pet Supplies shares a shopfront with the family's other business - but don't be confused as there is a lot to see in this small shop.

While Demitry does carry some other pet supplies, the main focus of the business is freshwater tropical fish keeping and the owners,





Suzanne and Craig Dalton, are knowledgeable hobbyists in their own right.

Demtry has a good selection of dry stock including aquariums, parts, filters, food, medications and other supplies on hand and are able to place orders for anything a bit more obscure.

There are two rooms with tanks full of fish and plants and a good variety, including special orders waiting to go to their new tanks. The first room has a large aquatic plant display and a variety of stem and rhizome plants. Demtry often carries pre-soaked driftwood both with attached anubias or java moss, and without.





The second, smaller room holds more tropical tanks, including a few larger varieties such as plecos and oscars.

Suzanne and Craig Dalton are passionate members of the Waikato fish keeping community, active in their local club and always available to offer advice. Local club attendees





are lucky enough to be able to place and pick up orders at our monthly meeting in Hamilton.

If you find yourself in the Waikato looking for a new LFS, don't miss out on this gem.

Nicole Figgins

Interesting species

Imported Thailand plakat fighters \$75-85

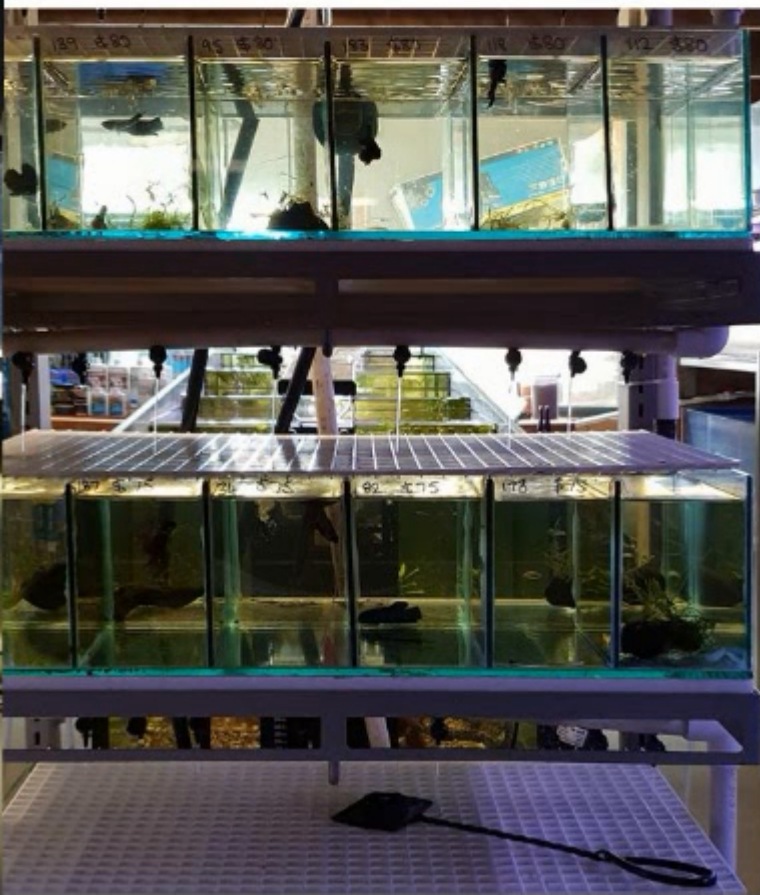
Black ghost knifefish \$60

Horseface loach \$17

Zodiac loach \$17

Female dwarf gourami \$18

White cloud mountain minnows – standard, longfin, and sunset \$4.50-7.00



Rank	
Tropical fish	★ ★ ★ ★ ★
Catfish	★ ★ ★
Cichlids	★ ★ ★
Oddballs	★ ★ ★ ★ ★
Coldwater fish	★ ★ ★
Marine fish	N/A
Marine inverts	N/A
Marine corals	N/A
Display tanks	★ ★ ★
Pond plants	N/A
Tropical plants	★ ★ ★ ★
Dry goods	★ ★ ★ ★
Pond supplies	N/A

REEF SYNERGY

Reef Synergy is a family owned company based in sunny Tauranga.

We aim to bring quality brands at affordable prices, direct to aquarists around New Zealand.

Since entering the market in 2015, we have secured direct distributorship for iconic brands, such as Neptune Systems, Korallen-Zucht (ZEOvit), Aquaforest, Pacific Sun and are in the process of securing other lead brands.

We operate from an online store, and have recently established ourselves as wholesalers to select stores nationwide.

One of our key brands, Aquaforest, is an exciting range of aquarium products for both freshwater and marine systems. They have been tried, tested and used by some of the top aquariums internationally and have become a household name among aquarist here in New Zealand.

For more information about our products visit our website and like our Facebook page to stay up to date with our news.

Authorised Distributors For

 Aquaforest®

 Pacific Sun

 korallen-zucht.de

 AVAST
MARINE WORKS

 NEPTUNE
SYSTEMS

 Aquaforest®
Freshwater



The Federation of New Zealand Aquatic Societies is a group of aquarists dedicated to supporting and promoting fishkeeping as a hobby, both in our local communities and globally with regard to conservation of aquatic species and their environments. The organisation is dedicated to the improvement of the aquarium and fishkeeping hobby and it has a 60 year history of representing aquarium societies in New Zealand.

There are currently 12 affiliated aquarium clubs around New Zealand:

AUCKLAND FISHKEEPERS ASSOCIATION

Contact: Alex Fleming aucklandfishkeepers@hotmail.com

BAY FISH & REPTILE CLUB

Contact: Jim Sytema sytema@vodafone.co.nz

CHRISTCHURCH TOTALLY TANKED

Contact: James Butler muh47_6@hotmail.com

DUNEDIN AQUARIUM AND POND SOCIETY

CONTACT: Nic Smith dapsdunedin@gmail.com

HAWKE'S BAY AQUARIUM SOCIETY INCORPORATED

Contact: Chris Drake cdrake@paradise.net.nz

MARLBOROUGH AQUARIUM CLUB

Contact: Caryl Simpson caryl@simtronics.co.nz

SOUTH AUCKLAND AQUARIUM & WATERGARDEN SOCIETY

Contact: Paul Munckhof monkie@orcon.net.nz

TARANAKI AQUARIUM & POND SOCIETY - IN RECESS

Contact: Mitch Minchington & Debbie McKenzie, 21 Maire St. Inglewood 4330

TASMAN AQUARIUM CLUB

Contact: Glen George hellcazy@hotmail.com

UPPER HUTT AQUARIUM SOCIETY

Contact: Maxine Lynch uhaquariumsociety@gmail.com

WAIKATO AQUARIUM SOCIETY

Contact: Danielle Wall waikatoaquariumsociety@gmail.com

Online Clubs

NEW ZEALAND REEFKEEPERS

Contact via: <https://www.facebook.com/groups/nzreefkeepers/>

The following businesses offer discounts to our members, remember to ask politely, this is a privilege not a right. You must show your current FNZAS Membership card at the time of purchase.

AUCKLAND

Hollywood Fish Farm - 10% discount on selected non-sale items

36 Frost Rd. Mt. Roskill Ph 09 620 5249
10/2 Tawa Drive, Albany Ph 09 415 4157
www.hollywoodfishfarm.co.nz

The Bird Barn - 10% discount on fish and accessories

158 Lincoln Rd. Henderson. Ph 09 838 8748.

New Pupuke Aquarium Centre - 10% Discount

1 Lydia Ave, Birkenhead Ph 09 480 6846

CHRISTCHURCH

GISBORNE

Eastland Aquariums - 10% discount as well as great in-store specials.

Grey St, Gisborne Ph/Fax 06 868 6760

HAMILTON

Pure Aquatics - 10% discount on everything.

966 Heaphy Tce. Hamilton. Ph: 07 855 2176

HAWERA

Wholesale & Industrial Supplies - trade price, equating between 15 - 40% off retail prices

49 Glover Rd, Hawera Ph 06 278 7525

NAPIER

Carevets N Pets - 10% discount on fish & fish related products

120 Taradale Rd, Onekawa, Napier Phone 06 842 2033

NELSON

The Fishroom

www.thefishroom.co.nz/

Email: getfish@thefishroom.co.nz

ROTORUA

Wonderworld Aquarium and Pet Centre - 10% discount

82 - 84 Clayton Road, Rotorua Ph: 07 348 0328 Email: info@wonderworldpetcentre.co.nz

TAURANGA

KiwiPetz - 10% discount

Shop T30, Fraser Cove Shopping Centre, Tauranga Ph 07 578 8623
email kiwipetz@xtra.co.nz

Carine Garden Centre & Water World - 10% discount on fish, fish related products & aquatic plants

Cnr SH2 & Te Karaka Drive, Te Puna Ph. 07 552 4949 www.carine.co.nz

WELLINGTON (and Greater Wellington area)

CareVets@Johnsonville Pet Centre - 10% discount

31 Johnsonville Rd. Johnsonville Ph 04 478 3709

CareVets 'N' Pets - 10% discount

Porirua Mega Centre, 2 - 10 Semple St. Porirua Ph 04 237 9600

Paws and Claws - 10% discount on all fish & fish keeping items

Logan Plaza, 207 Main St. Upper Hutt. (opp. McDonalds) Ph 04 528 5548

The Pet Centre - 10% discount on all fish and aquatic products

Lower Hutt - 28 Rutherford Street, Lower Hutt 5010, 04 569 8861

Upper Hutt - 82 Queen Street, Upper Hutt 5018, 04 9745473

Lyall Bay - 117 Tirangi Road, Rongotai 6022, 04 282 1242

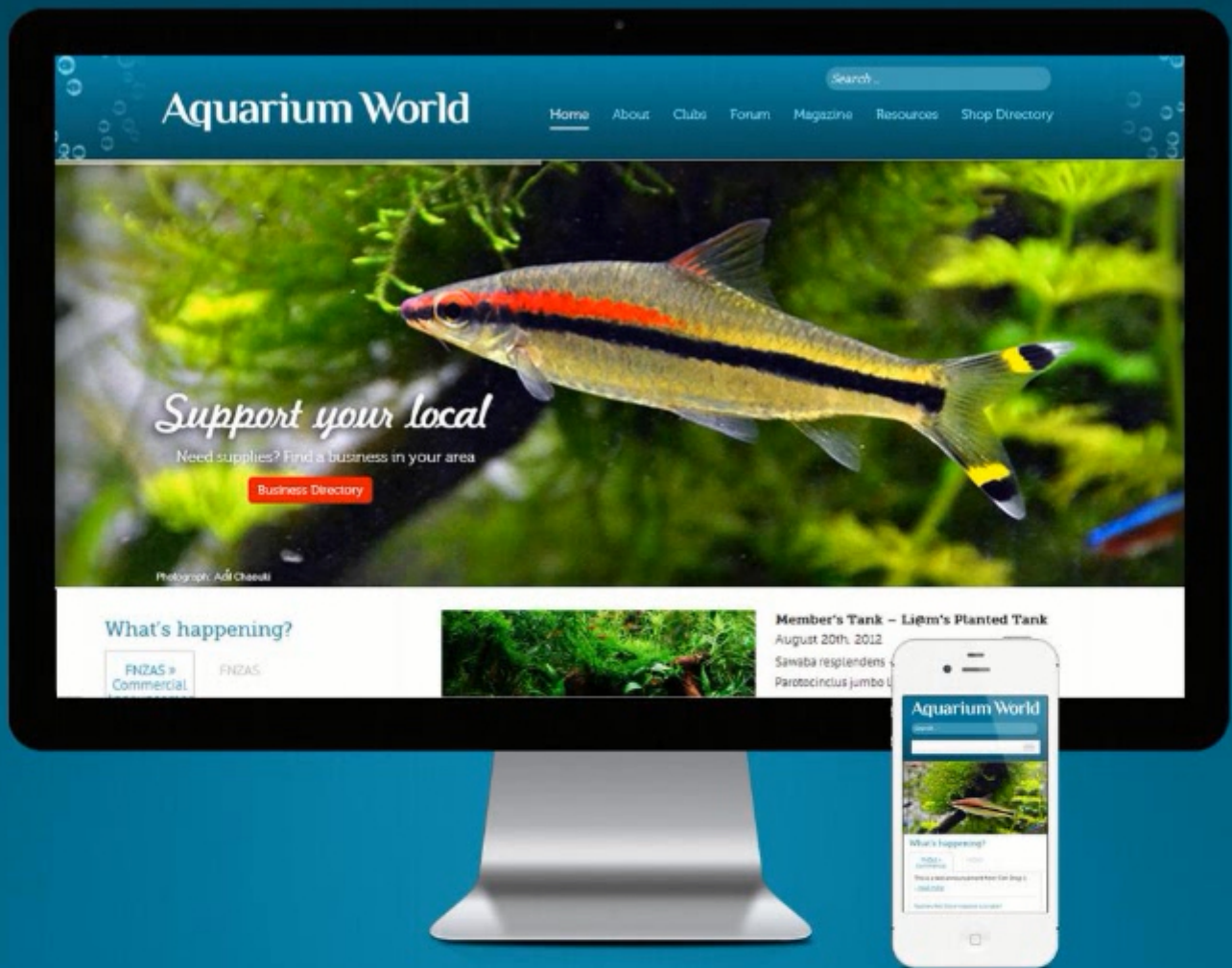
Thorndon Quay - 56 Thordon Quay, Pipitea 6011, 282 0199

Online @ www.thepetcentre.co.nz

Free shipping with orders over \$30 + fish club discount still applies

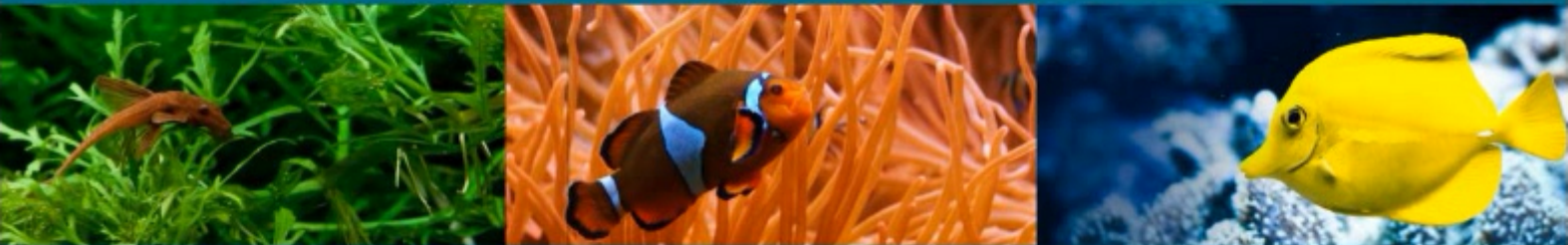
The Pet House - 10% discount

Coastlands Mall, Paraparaumu Ph 04 296 1131



Join the Community

Online advice and support for all levels of the hobby
find your nearest club • support local suppliers



Aquarium World

www.aquariumworld.nz