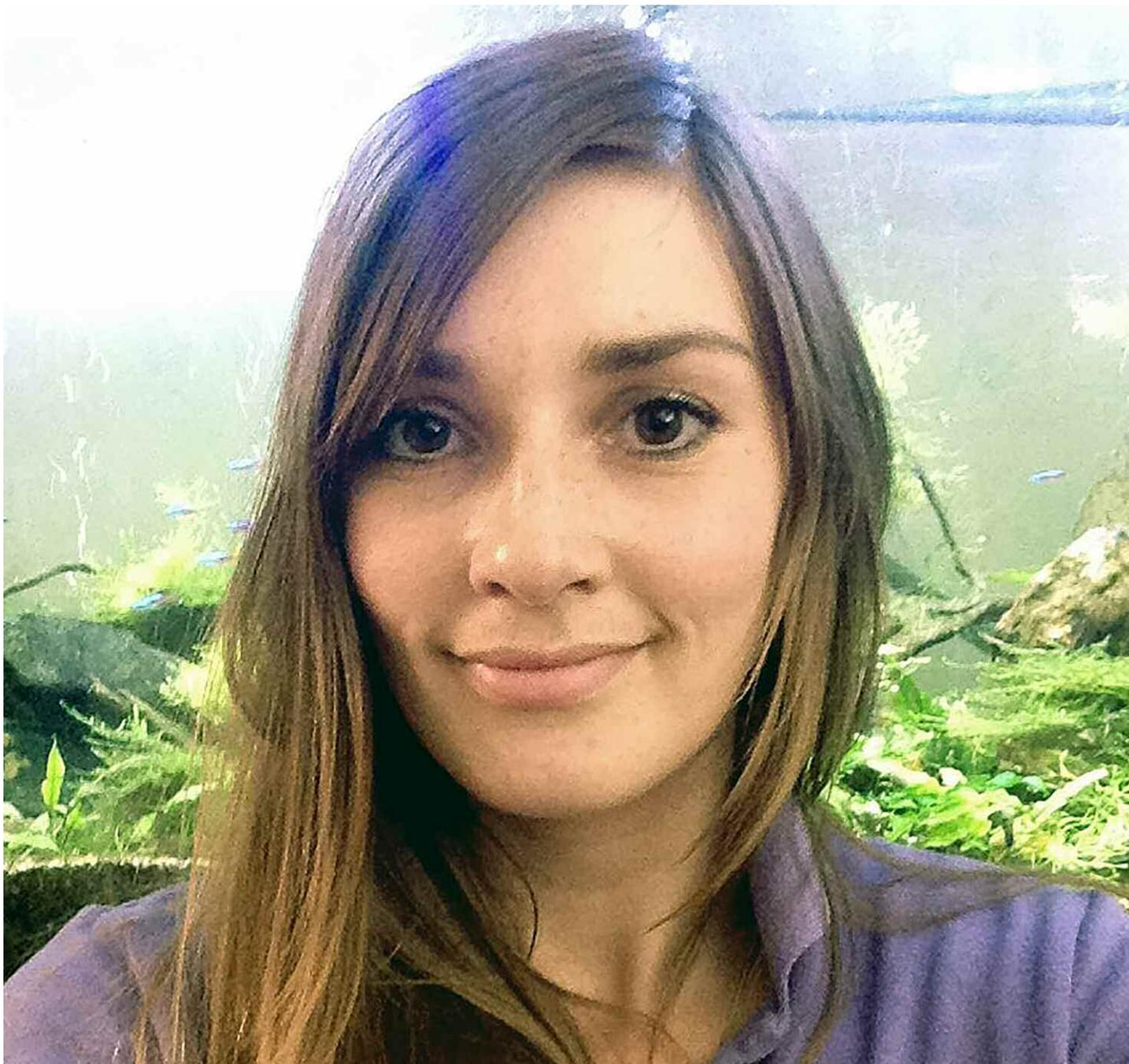


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The Oriental Weather Loach and its impact on our waterways. Meet Emmaline Bowman, the opening guest presenter for our June 2016 meeting.



Emmaline Bowman, Landscape Architect. *Photographer unknown.*

Emmaline Bowman was raised on a dairy farm on the outskirts of Rosedale in East Gippsland where, growing up, she was surrounded by nature. Fascinated by fish at an early age, she got a job at a local aquarium in Traralgon, managing the business after finishing high school and later moving to Melbourne to pursue studies in Biological Sciences and Zoology.

Emmaline transferred into Landscape Architecture when she realised that she wanted to be able to design and rehabilitate areas for animals with her newfound knowledge of plant and animal species. During this period, she worked in an aquarium and, as a side job, she set up aquariums, terrariums and planted out ponds to create frog friendly environments.

After obtaining a Bachelor of Design she decided to complete a Masters of Landscape Architecture. In her final years her research project involved designing spaces to privilege native animal and plant species in the hope that invasive species would find it difficult to thrive.

Now graduated, Emmaline works full time designing spaces both commercial and residential, and she also has her own business where she designs and rehabilitates land spaces, lakes, dams and wetlands.

Emmaline's presentation topic is about the impact of *Misgurnus anguillicaudatus* or as commonly known, the Oriental Weather Loach. She will also touch briefly on the impact of invasive species and how we enable these species to thrive.



The Oriental Weather Loach is native to East Asia but, being a popular aquarium fish, has been introduced to elsewhere in Asia, Europe, North America and some parts of Australia. The name Weather Loach comes from its ability to detect changes in barometric pressure which is evident in their change of behavior, namely frantic swimming or even standing on end. Weather Loaches do well at lower temperatures (13–15 °C), even suffering a reduced lifespan at “normal” tropical temperatures (24–28 °C), which has enabled them to proliferate in Victorian waterways. *Source: Wikipedia*
Oriental Weather Loaches have an appetite for snails and will reduce the population of beneficial pond snails to almost nothing (Greg Martin pers.comm.).

Keeping larger native fish.



Juvenile Mangrove Jack. *Lutjanus argentimaculatus*.
Photo: Dave Wilson

This month's main speakers are our own Gary Moores and Glenn Briggs talking about catching and keeping larger native species. With over 40 years of combined experience keeping many different species of fish one may ask what's the attraction?

Their talk will not only concentrate on their husbandry but also on how you can get your hands on different species that are seldom available in local aquariums.

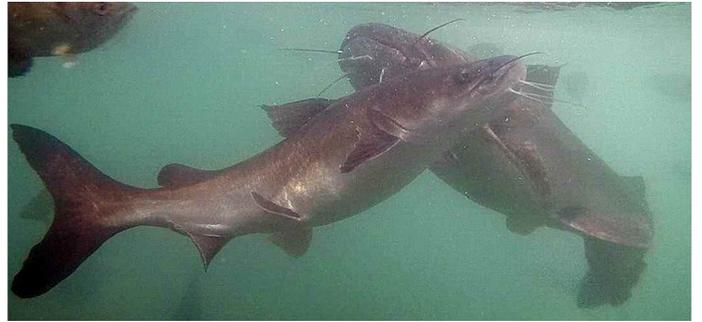
Grunters have long fascinated Gary and over the years he has kept 14 different species from across the country. While Glenn is well known for his love of Mogurnda, few people know that he has also kept many larger species as well and that he thinks that every fish room needs a "living disposal system".

Although many people keep the larger fish on their own there are plenty of compatible species that can be housed together to create a stunning display.



Giant Glassfish *Parambassis gulliveri*. Photo: Dave Wilson

This talk will provide something a bit different and may even have members looking around their homes to where they may be able to fit one more aquarium for something a bit different.



Salmon Catfish *Arius graeffei*, photographed at Lawn Hill.
Video still: John Lenagan

Above and Below: two very different Grunters. Photos: Dave Wilson



Barred Gudgeon *Bostrychus zonatus*. Photo: Dave Wilson



A Grunter from the Pentecost River, north western WA. Grunters are a passion of Gary's and he knows them well, having probably kept more species than anyone else in Australia. Photo: Greg Martin

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Editor's Note



Welcome. This edition of VICNews starts with an article on the amazing Mt Rothwell Conservation and Research Centre in Lara, on the way to Geelong. Kwai has worked there for several years and was able to invite us down to have our committee meeting within the sanctuary, right on dusk. For me visiting this area gave me a glimpse into what Australia's fauna must have been like before white man brought foxes, cats and rabbits into this country. As we know, these pests have decimated the once plentiful native marsupials that roamed in vast numbers across our land. Mt Rothwell has brought this back on a small, but incredibly important, scale. Read John Cousin's article for more information.

Our second article is a message from the Threatened Species Commissioner's facebook page reminding us of the devastating impact that trout are having on the smaller unique fish fauna of our waterways. Trout have been in Australia only since 1894 and in that short time have pushed various species of Galaxiids into extinction.

Our third article is a very interesting take on conservation by three scientists from Melbourne University: Ben Phillips, Andrew Weeks and Ary Hoffmann.

Lastly, We have an article on the proposed stocking of Murray Cod and Golden Perch into Rocklands Reservoir in the Grampians National Park. This idea is strongly opposed by both Native Fish Australia and ANGFA Victoria due to the impact it would have on the existing unique fish fauna that live in the upper reaches of the Glenelg River system.

President's Report June 2016



Welcome once again to our ANGFA Victoria club newsletter VICNews.

Gosh time flies! It is already nearly half way through the year which means, amongst other things, that we need to start thinking about nominations for our Annual General Meeting which will be held at our club meeting on Friday 5th August 2016. (Don't worry, our AGM's are an efficient business and are usually over in less than 10 minutes). But seriously, we *are* looking for fresh people with new ideas and lots of time and energy to help run the club and shape the way it evolves into the future, so if anyone would like to nominate for a position please do so.

For our June meeting we have organised two quite different talks: Emmaline Bowman speaking about her experience with the introduced Oriental Weather Loach followed by a presentation on catching and keeping the larger predatory native fish, given by Glenn Briggs and Gary Moores. Gary as you know thinks predatory fish are the only fish worth keeping and all the rest are simply fish food!

The committee has made three important changes regarding the trade table:

1. from our June meeting we will only accept native Australian or New Guinea Fishes for sale on the trade table.
2. we are purchasing a card reader which will enable people to use their credit or debit card instead of just cash.
3. The commission that is taken by ANGFA for all trade table goods sales is being lowered from 30% to 20%, effective from our June 2016 meeting.

Our May field trip is being run as this edition of VICNews is being closed off, so we will publish a comprehensive article on the event in the Field Trip Files section of VICNews 121 (August 2016).

Lastly, We would like to officially welcome Paky Pets in Pakenham as our newest Friend of ANGFA Victoria. Keith Stephenson, the owner of Paky Pets has been a regular attendee of our meetings for years and will be a familiar face to many. Keith's shop is a testament to native Australian fish keeping with many species available that are not usually represented in the retail arena.

Kwai

Mt Rothwell Biodiversity, Conservation and Research Centre, Little River. 7th May 2016



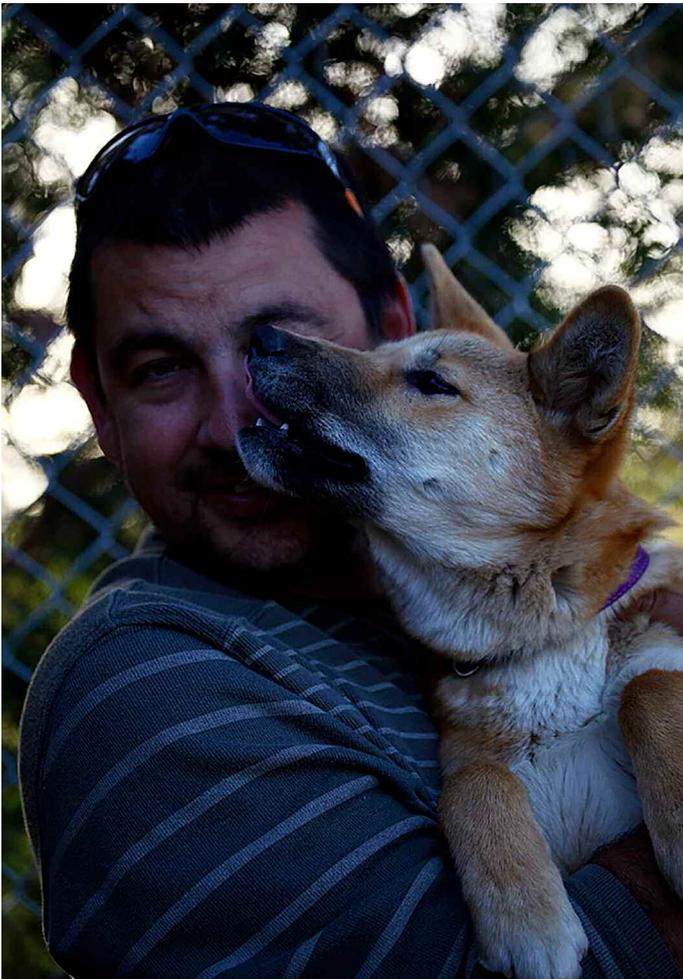
The distinctive landscape at Mt Rothwell; large granite boulders, sparse Eucalypts and the occasional Acacia—so very Australian. No wonder a few films have been shot on the property. *Photo: courtesy of Mt Rothwell biodiversity interpretation centre website.*

We were due for a committee meeting and Kwai suggested we have it at Mt Rothwell? To increase the fun, the trip was open to members, friends and families.

Mt Rothwell is a 420 ha property dedicated to the conservation of native fauna and flora. The big problem with most endeavours to preserve our wildlife is that attempts to control the major threat—feral animals—are

usually ineffective. So a couple of decades ago a company called ‘Earth Sanctuaries’ developed a proposal to have examples of most of the major Australian ecosystems included in a program of fencing and feral eradication. This was obviously an expensive proposition because fencing to keep out rabbits, foxes, cats and wild dogs needs to have different characteristics for each species, and eventually the company failed. Mt Rothwell survives and although the property is now in private hands, it continues with conservation in a very proactive way.

Our first activity on arrival was a tour with our club President Kwai to see the property by daylight and to have a look at some of the species they are working on in enclosures. Mt Rothwell is a low granite rise on the northern slopes of the You Yangs, between Melbourne and Geelong. Because most of the land around it is flat (apart from the You Yangs), you can get very long-range vistas of the surrounding countryside that is predominantly farmland.



Kwai with one of the two resident Dingos. *Photo: John Lenagan*



Southern Brown Banicoot. *Photo: John Lenagan*



Our beloved treasurer John Lenagan, cooking meat on the BBQ. John Cousins and Neville Amos discuss how their dinner is progressing with Leanne Ipsen in the background. *Photo: Greg Martin*

A major project at the site is breeding rock wallabies because they are in danger of extinction: there are only a few in the Grampians and not many more in a gorge in Gippsland. (In this case the major feral pest is the fox). Some individual animals of the same species (but a different bloodline) have been brought in from NSW to add genetic diversity to the ones being bred at Mt Rothwell. As part of the breeding program, animals are set up in pens of 15 to 20 with their own rocky structures to climb on. Some of these have been built by volunteers, the standout being the ‘Eyefull Tower’. Kwai told us that some movies had been filmed at Mt Rothwell including the village scenes in ‘The Dressmaker’ and also one of the Ned Kelly films. It’s one way that Mt Rothwell can earn much needed income.

Halfway through the tour the ANGFA committee members broke away from the group and returned to base to work on planning for the rest of the year. The



Kwai answers questions asked by the group during our nighttime walk around the property. His knowledge of the animals living here and the local landscape is incredible. *Photo: Greg Martin*

remaining group walked back slowly, looking at and photographing wildlife and the granite landscapes. As an aside, let me say that committee meetings are a real pleasure. Our ANGFA VIC committee is a diverse group of enormously talented but humble people that I have really enjoyed working with over the last 14 years. I thoroughly recommend involvement, not necessarily for that long though!

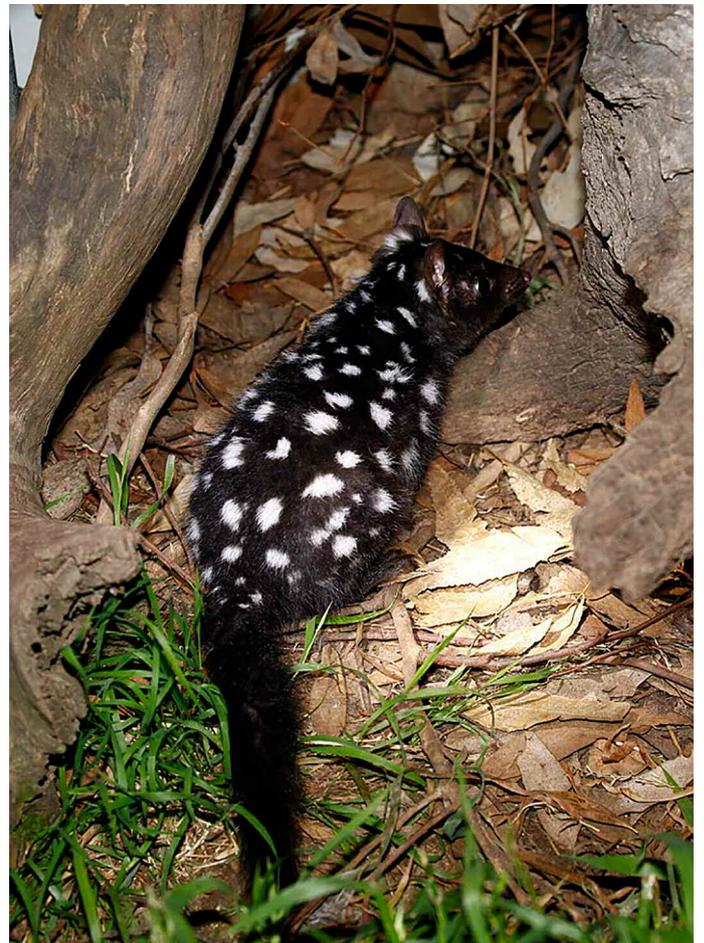
The sound of the dingoes howling said it was time for dinner.

Talking of diversity: the variety on offer for the BYO barbeque was quite an eye-opener. There was the full range from vegan fare to that brought along by those who think that red meat is the only true food. Regardless of peoples’ dietary choices there was one common



Rufous Bettong. *Photo: John Lenagan*

consensus—the need for wine! Coatesy and his hardy souls ate outside in the open, whilst softies like Kwai, Gary Moores and I were inside. It could have been that those inside were more suspicious about what they were



Eastern Quoll. *Photo: John Lenagan*



A Pobblebonk frog *Lymnodynastes dumerilii*. Photo: John Lenagan

being fed. It was BYO.

The end of the meal was a bit chaotic though as who should gate crash our dinner but a black and white Eastern Quoll. For most of us it was our first sighting of a quoll in the bush and it was so very exciting!

I guess my highlight of the trip was an after-dusk walk around part of the park led by Kwai; his knowledge of the animals is amazing, and his ability to spot creatures, incredible. Admittedly we had strong torches, but Kwai was able to spot a small brown frog (Spadefoot Toad) from about 40 metres and direct the kids to it who couldn't actually see it until they were almost on top of it. It was good to see that the young kids also had an interest in, enthusiasm for and knowledge of the animals, including wolf spiders! We were easily able to see the very rare Eastern Barred Bandicoot, Rufous Bettongs (rated 9.5 on the 'cuteness scale' by Greg Martin), Pademelons, brushy-tailed and ringtail possums, a Pobblebonk frog and even a pest rat. The only terrestrial marsupials we missed seeing on the night were Southern Bandicoots, Potoroos, Tiger Quolls, Red-necked Wallabies and wild Sugar Gliders. The bettongs were surprisingly tame and we often got to within 10 metres of them.

At one point we walked to the top of a huge granite outcrop for a view across to the city. It was a balmy night and the lights of the city sparkled in the distance.

The discussion in the group at that point was about a proposed large national park between Mt Rothwell and the city which would be an attempt to compensate for the expansion of the city into this special area of basalt plains with its unique fauna and flora.

So there we were wandering around the gentle Australian bush with bettongs, bandicoots, quolls and



The Common Spadefoot Toad *Neobatrachus sudelii*. This one was spotted by Kwai from a great distance away by its distinctive eyeshine. "spiders' eyes twinkle, frogs' eyes do not" Kwai told the group. Photo: Greg Martin



Eastern Barred Bandicoot. Photo: John Lenagan

possums and it reminded me of the quote from Graeme Pizzey in his book 'A Separate Creation':

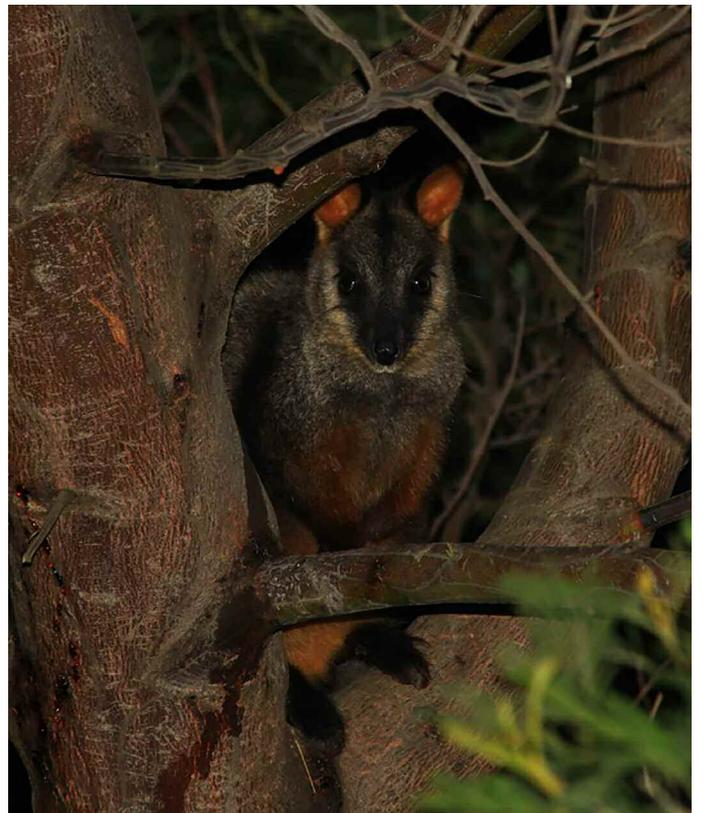
Once discovered, European boarding parties swarmed aboard this ancient Ark. They produced a vibrant new European culture, but laid waste, carelessly, ignorantly and often needlessly, much of the richness that 50 million years of shaping by isolation, climatic change and ice age had worked.

We.....may look with mixed emotions upon....the cruel destruction of ancient Aboriginal peoples and cultures, and the devastation of the ground-dwelling Australian marsupials, plant associations and now the very rivers and soils of this extraordinary...continent.

Walking around with Kwai I imagined it was a bit like the early explorers might have seen: so much more diverse, so much more interesting and so unique. The work at Mt Rothwell is an attempt to recover what was. I'm very pleased to report that we raised \$155 for the work at Mt Rothwell.

Kwai organised for us a most memorable experience. Thanks for your patient explanations and for sharing your knowledge with us.

Cuz



Red-necked Wallaby. Photo: John Lenagan

Message from the Threatened Species Commissioner

26th April 2016



Barred Galaxias *Galaxias fuscus*. Photo: Tarmo Raadik

Introduced trout are great fun to catch, but did you know they are having a devastating impact on native fish like these precious little galaxias? There are 27 species of galaxias in Australia and eight are on our national threatened species list. One species, the Kosciuszko galaxias, can be found in waterways almost on the summit of Mount Kosciuszko, including in the well-known Blue Lake! They live in some of our most remote and tiny mountain streams, but many of these streams are being occupied by introduced brown and rainbow trout that are eating our galaxias out of existence.

Brown and rainbow trout were introduced into Australia in the late 1800s and are the basis of some valuable recreational fisheries. However, this role needs to be balanced with the serious environmental impacts they have. Our streams and rivers are uniquely and naturally stocked with diverse Australian species, and while Australians love fishing for the North American rainbow trout and the English brown trout – native fish such as Macquarie perch and galaxias belong in our waterways and give our Australian streams their unique character.

Trout are pushing galaxias to the extreme upper reaches of streams, leaving them vulnerable to bushfire and stream drying in droughts. An example of this dev-

astating combination occurred in 2009, when the Black Saturday Bushfires incinerated the forests and bush surrounding barred galaxias catchments. Ecologists took fast action and saved these populations from ash poisoning, keeping them alive in special aquariums for several years until their streams were safe to return to.

Despite the known impacts of introduced trout on native species, illegal stocking of trout in Australian waterways is still occurring. The ultimate goal is to improve galaxias conservation outcomes while still maintaining legal recreational trout fisheries. Improving habitat is also crucial to maintaining healthy galaxias populations and the Australian Government is investing over \$265,000 through the 20 Million Trees and National Landcare Programmes to benefit galaxias species, and providing 10 green army government teams for on-ground action.

From Threatened Species Commissioner's Facebook page, 26th April 2016 at 7.00am

<https://www.facebook.com/TSCCommissioner/>

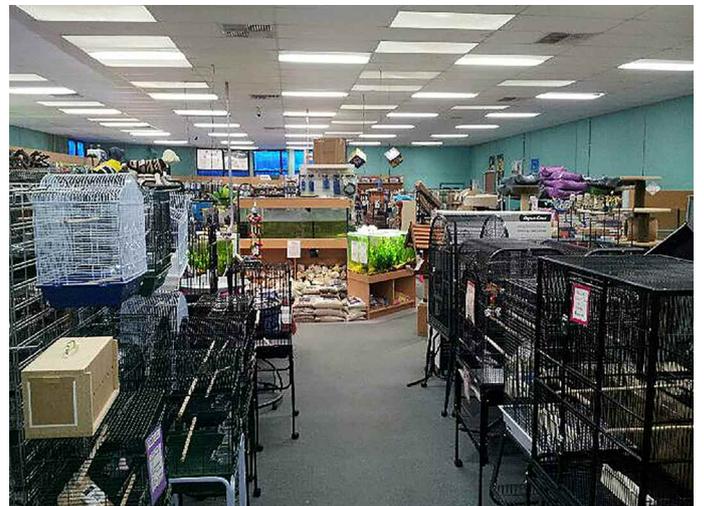
Paky Pets. Our newest friend of ANGFA Victoria.



A world of pets awaits: the front of Paky Pets from the spacious carpark. *Photo: Keith Stephenson*

We've often seen ANGFA member Keith Stephenson, owner of Paky Pets, at ANGFA meetings and conferences but I confess I've never made the trip down to Pakenham to check out his store. So it was high time, and a very worthwhile trip too.

As you can guess from the title the shop has more than fish, so let's mention those other animals before we get aquatic. Keith used to stock a variety of reptiles but the internet killed that side of the business, however he does have green tree frogs and some very cute baby



Not just an aquarium shop, but with plenty of rocks and different gravels. *Photo: Keith Stephenson*

long-necked tortoises for sale. Occasionally there are blue tongues and water dragons for sale, all bred and grown by local clients.

No cats or dogs were evident for sale but from time to time Keith has had some puppies from private breeders not 'puppy farms'. Keith said that the legislation is changing soon and local farmers who might have bred a litter of Border Collies for farm work for instance will no longer be able to sell them. A couple of rabbits were available, again just those from private breeders that



A central rack of plants showcasing mainly cichlids. *Photo: Keith Stephenson*



Lights, tanks, plastic plants, even some Mitchell's Hopping mice. This area is going to have marines. Photo: Keith Stephenson

Keith and the staff can vouch for. Oh I almost forgot: Mitchell's Hopping mice too, a lovely pet for those with little space; not smelly like house mice and very active.

For me the greatest temptations were in the aviary section, some hand-tamed parrots, some of the usual budgies, cockatiels, zebra finches and canaries too. There were some beautiful Gouldian finches, African fire finches, a very tempting pair of the rare Superb or Barraband parrots and a couple of nearly everyone's favourite King parrots. I only weakened for a pair of king quail, beautiful little birds.

Now to the fish: Keith has one of the best, if not the best, range of ANGFA fish in Melbourne. Most of his clients are the colourful fish devotees, choosing either guppies or goldfish, without the patience to wait for the beauty of a mature rainbow. Despite that though, Keith, being a true hobbyist, has plenty of tanks of fish other than goldfish and guppies, and not just your normal rainbows: *Melanotaenia boesmanni*, Goyder River Rainbowfish, *M. lacustris* etc, but a range of *M. splendida*'s, *M. dubolayi*, *M. trifasciata*, *M. parva* etc. What was impressive too is that he can remember which river system they came from and what they look like in their adult colours. A true hobbyist, Keith also has in his shop fish tanks with NFS (not for sale) signs on them where the fish that don't fit into the dozen or so tanks at his home are kept; fish like *M. eachamensis*, *M. papuae*, *M. nigrans*, *M. Pagwi* and a *M. splendida* from Wild River. His absolute favourite is a trio of *Glossolepis wannamensis*.

Not just rainbows either, there were *Pseudomugil gertrudae* and *P. signifer* Blue-eyes, barramundi, western pygmy perch, spangled perch, coal grunters, salmon tailed catfish, luderick (blackfish), Briggsy's favourite Mogurndas, empire gudgeons, etc. Even some Victorian fish were available: golden perch, smelts, jollytails and striped sand gobies.

If you already have a big 'barra' or a 'freshie' there are yabbies and feeder fish available too.

Then we get into the non-natives. There's a lovely display tank of Malawi cichlids and one of South American cichlids and tetras too. There are tanks and tanks of fish, some of the common and some of the unusual. Have you seen Exclamation Point Rasboras, Fire Rasboras, Reed tetras to name just a few? Lots of cichlids too. One small marine tank is a portent of things to come; one of the bays in the shop is being developed as a marine section.

Before you leave Paky Pets, you must have a look at the unique way Keith feeds lettuce and zucchini to his vegetarian fish. Unforgettable.

For the aquarium plant lover there's a really nice display of a good range of plants. (I was impressed with what I saw & Keith said it was the day before the next delivery!)

There is a good range of tanks and dry goods on display too. Keith has gone with one major supplier so that he can stock any spare parts that might be needed for pumps, filters etc.

As you enter Paky Pets, there's a very impressive large (6' x4'x 2') tank – ex Boronia aquarium-, but minus the ugly *Osphromenus gourami*, Luke. Instead there's going to be a collection of the best of the native fish.

So the range of fish at Paky Pets is really significant, the service is great, and of course there is a discount for ANGFA members!

I'd like to thank Keith for the time he spent showing me around (it was his day off) and for the way he looks after ANGFA members.

Cuz



Hand-tamed and aviary birds, including some for which you need a licence. Don't forget to check out the Gouldians!

Photo: Keith Stephenson

Move it or lose it: exploiting genetic diversity to fight extinction



The endangered Dwarf Galaxias *Galaxiella pusilla*. Photo: Andrew Weeks.

We need to think differently about species conservation.

Despite our best efforts to curb biodiversity loss, extinction rates are increasing globally. Extinction rates are now arguably approaching or exceeding those seen during historic global extinction events, such as the event that wiped out the dinosaurs 60 million years ago. With climate change and a growing human population, these trends will only continue.

In the face of this impending avalanche of extinctions we will need every foothold we can gain if we are to minimise the loss of biodiversity. The 'business as usual' approach to species conservation simply will not work.

Whether we like it or not, we can't conserve every population.

During the 1980s and 1990s the paradigm for conservation was to conserve species through conserving populations; species are composed of sets of populations, after all. This approach has the added benefit of conserving genetic variation within each species.

Many species including most of our native fish, plants, mammals and invertebrates are composed of sub-populations that have been more or less isolated from each other for millennia, and each subpopulation may represent tens of thousands of years of independent evolution. For example, the mountain pygmy pos-

sum is restricted to three regions of Australia's alpine zone and each of these regions has been isolated for more than 100,000 years.

Conservationists rightly sought to preserve this variation by both conserving populations but also by minimising movement of individuals between populations.

Increasingly, however, we find ourselves in a situation of triage, where we cannot possibly conserve every population.

As a consequence, over the coming decades there will be increased attention on the species, rather than the population, as the fundamental unit of conservation.



The mountain pygmy possum exists as three isolated populations. Photo: Andrew Weeks.



Rock wallabies have suffered from genetic drift. *Photo: Andrew Weeks.*

Let's capitalise on the last 30 years of conservation effort

Conservation efforts over the last thirty years have ensured, as far as possible, that we have multiple (often long-isolated) populations for many species. It is time that we look hard at capitalising on this resource to ensure the persistence of species over the coming decades.

Without such intervention, many species simply don't stand a chance.

Species are becoming restricted to smaller and smaller habitats due to human pressures, climate change and the onslaught of invasive species. Once fragmented, or reduced in size for other reasons, populations become prone to the loss of genetic diversity through a process called genetic drift.

What is drift? Well, when you flip a coin 100 times, there's an almost 100 percent chance that you'll get at least one head. When you flip it once, you've only got a 50 percent chance of seeing that head. So too with genetic variants in populations: produce only a small number of individuals and there becomes a good chance that some genetic variants do not appear in the new generation. Unlike a coin toss, once these variants are lost, they may never re-appear.

We have good evidence that populations of species ranging from rock wallabies and bandicoots through to lizards, snails and endangered birds as well as Grevilleas and banksias have lost genetic variation through drift processes.

Lowered genetic diversity is bad for two reasons. First, it tends to result in populations that are less fit (i.e., which produce fewer offspring on average). Second, it severely restricts a population's ability to adapt to changing circumstances. This is why some authors have referred to the combination of climate change and fragmentation as a "deadly anthropogenic cocktail": populations are having to adapt to climate change at the same time as they are losing diversity through small population size.

All is not lost, however. One powerful way to increase genetic diversity is to move individuals between subpopulations. When variants are lost from a population, we can bring variation back by introducing individuals from a different population. Simply adding new individuals to a very small population increases genetic diversity, and can immediately increase both the fitness of the population and its capacity to adapt to changing conditions. We call this gene pool mixing.

But we can also be more strategic in our translocations using a process called targeted gene flow, which aims to deliberately increase the frequency of beneficial variants in a population.

Gene pool mixing: helping populations interbreed

Studies have repeatedly shown that rapid reductions in genetic diversity, as we are seeing in populations worldwide, increase the risk of extinction. By moving individuals between populations, and allowing those individuals to interbreed with local populations, we generate offspring with increased genetic diversity. In doing so we often find the population starts to produce more offspring, and we can also expect the population to adapt faster to future change.

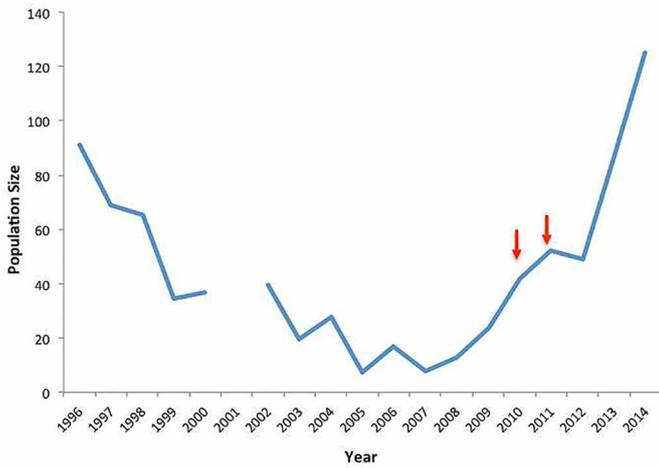
It's like when zoos exchange animals with other zoos to stop inbreeding within their own tiny populations; this happens for relatively common zoo animals (e.g. giraffes, elephants, gorillas), but also in global zoo breeding programs for threatened species (e.g. black rhinoceroses, Asian elephants and red pandas).

Although this strategy makes a lot of sense, it differs from traditional conservation approaches because it aims to maximise and increase genetic variation within populations, rather than maintaining (or minimising the loss of) genetic variation found across different populations.

Gene pool mixing is an innovative strategy gaining



The eastern barred bandicoot could benefit from gene pool mixing. *Photo: Andrew Weeks*



Mountain pygmy possum numbers at Mt Buller since 1996. The red arrows indicate the years when six males were moved from Mt Hotham to increase the genetic variation in the local Mt Buller population.

momentum internationally and locally. Overseas, for example, the approach has been instrumental in the recovery of the American greater prairie-chicken, the Florida panther, and the Mexican wolf.

In Australia, the approach has recently been applied to the endangered mountain pygmy possum at Mount Buller in Victoria. A small number of males from a healthy genetically differentiated population near Mt Hotham were translocated to Mt Buller. Subsequent monitoring has shown the dramatic benefits of this strategy; within three generations of the translocation we have seen the complete reversal of both the demographic and genetic decline, with population size now the highest ever recorded on the mountain.

The same strategy could, of course, be applied to many other threatened Australian animals and plants. And it might also be extended to crosses between sub-species that have been isolated for some time, although the approach would then need to be applied more cautiously. For some sub-species that exist only as a single, small and declining population (for example the western ground parrot) this may be the only option. Without widening the gene pool, many of our threatened species have few options for adaptation, and are at an increasing risk of suffering the consequences of maladaptation and inbreeding.

Targeted gene flow: helping species adapt by introducing beneficial traits

Many processes that threaten populations are predictable. We know, for example, that the world is going to get a lot hotter over the coming decades. We also know that cane toads will continue to spread through the Kimberley and cause declines in native predators such as goannas and quolls. Targeted gene flow looks to bolster populations against predictable change. By moving warm-adapted variants to currently cool-adapted populations we may massively increase the capacity of those populations to adapt to

climate change. Similarly, by moving toad-adapted variants to populations about to be impacted by toads, we bolster those populations' chances of surviving that impact.

The strategy of targeted gene flow is very new and, as such, has few well-documented examples. Nonetheless, it is beginning to be practiced, particularly in forestry and vegetation restoration projects. In these contexts the usual rule was to obtain seed and seedlings with local provenance. Increasingly, however, it is clear that on the time-scale that it takes forests to grow, the climate will change substantially. Thus foresters and restoration practitioners are increasingly looking to source founder stock from warmer locales. Doing so makes good sense, and protects their investment.

Genetically-motivated translocations: a new paradigm in conservation

In the coming decades most species will have less space available to them than they do today, and therefore will likely be composed of fewer populations. By careful use of genetically-motivated translocations, however, we may be able to help species persist and adapt to their rapidly changing world.

Doing so is a departure from the ordinary way of doing things, but it will be necessary; we live in extraordinary times.

By Dr Ben Phillips Ecologist, Senior Lecturer, School of BioSciences, Faculty of Science, the University of Melbourne, **Dr Andrew Weeks** Senior research fellow, School of BioSciences and Bio21 Institute, University of Melbourne and **Professor Ary Hoffmann**, School of BioSciences and Bio21 Institute, University of Melbourne.

First published in Science Matters, Species, Genetics, Conservation, *Bioscience* on 14 April 2016.



Some populations of northern quoll have adapted to avoid cane toads. Photo: Andrew Weeks.

Proposed stocking of Rocklands Reservoir, Grampians National Park, by VRFish. Notes compiled by G. Martin.



Murray Cod *Maccullochella peelii*. Photo: Michael Bell

VRFish (Victorian Recreational Fishing Peak Body) are intending to stock Rocklands Reservoir with Murray Cod and/or Golden Perch. Native Fish Australia and ANGFA Vic oppose this is due to the large and real risks to current biota in the Glenelg system.

This is an important issue from ANGFA's perspective and was brought to our attention by Tim Curmi, from Native Fish Australia. Stocking has NOT yet happened but is being proposed at this stage. If we get in quickly we may be able to stop this from happening. ANGFA Vic will be sending a letter to the relevant decision maker, stating the reasons we oppose this. Below is a letter written by one of Tim's mates from Monash Uni outlining in more detail the issue at hand:

"We wish to express our concern about the risks associated with a proposed stocking program of Murray cod and golden perch in Rocklands reservoir. Our research team has studied the Glenelg River and its tributaries for almost two decades, so we are very familiar with this river system and the threats it faces (summarised in the attached publication). The translocation of these two species of large predatory fish, pose the following risks for the Glenelg River (GR) ecosystem:

*1. The GR ecosystem is unique, because it harbours short-range endemic freshwater species found nowhere else in the world, such as the only large populations of the threatened Glenelg spiny crayfish (*Euastacus bispinosus*), the threatened Glenelg River mussel (*Hyridella glenelgensis*), a genetically distinct population of smelt (*Retropinna* sp.), the listed dwarf galaxids (now Little galaxias, *Galaxiella toourtkoourt*), variegated pygmy perch (*Nannoperca variegata*), Yarra pygmy perch (*Nannoperca obscura*) and western swamp crayfish (*Gramastacus insolitus*) and two additional undescribed but very short range species of freshwater crayfish (Robson & Mitchell, 2010; Chester et al. 2014 - attached). These species have evolved in the GR basin and have not evolved alongside Murray cod or golden perch. Therefore they are likely to either be vulnerable as prey for these species or in the case of the mussel, their host fish may be vulnerable, potentially further limiting the chances for survival of these threatened species.*

2. Rocklands Reservoir is connected to both the upper and lower Glenelg River and its tributaries. The upper Glenelg, within the Grampians National Park, contains streams with very few exotic fish and is therefore a haven for native fish. It is also a haven for at least seven species



Golden Perch *Macquaria ambigua*. Photo: Gunther Schmida

of native freshwater crayfish (Johnston & Robson 2008, Chester et al. 2014 – attached). These streams and wetlands lie within the conservation estate and have a very high conservation value, being the last remnant of natural stream populations within western Victoria. The lower Glenelg harbours threatened species such as the spiny cray and Glenelg mussel and until recently was one of the few remaining carp-free rivers. The invasion of carp into the Glenelg appears to have been facilitated by Rocklands Reservoir and the inter-basin transfer to the Wimmera River, and it clearly shows that fish can move out from Rocklands into the wider GR system.

3. Feral fish such as carp and redfin perch have been observed entering the formerly feral-free streams of the upper GR basin, showing that fish can move from Rocklands into streams, rivers and wetlands. Researchers from Deakin and Murdoch Universities have sampled fish in headwater streams of the Vic range since 2006 (Cultivation, Deep, Honeysuckle, Hut), and collected only locally native species (Chester et al. 2014). However, following the large flood in Jan 2011, nearly 500 redfin perch were sampled in five headwater streams of the Victoria Range (inside the Grampians National Park) during February 2011 and December 2011 (Cultivation, Hut, Deep, Mosquito and Honey-suckle). More recently, carp have been observed in large numbers in the upper Glenelg, within close proximity (see photos attached) and inside the GNP. This demon-

strates that there is a considerable risk that Murray cod and golden perch will make their way into these headwater streams inside the National Park. These headwater streams contain populations of fish and crayfish that are either rare or very poorly described (e.g. spiny crays, river blackfish, at least 2 species of *Geocharax*, western swamp cray, obscure galaxiids and dwarf galaxiids), and there is a considerable risk that these large, predatory fish will have a negative impact on these populations. These populations of locally-native fish and crayfish are already impacted by stream-flow regulation (see Chester et al. 2014), declining rainfall and increased wildfire frequency and intensity (Johnston et al. 2014).

The GR river system has an extraordinarily high conservation value, not just in Victoria, but Australia-wide because of the rare and threatened species it contains. To introduce any non-locally-native aquatic species, even if they are native elsewhere in Victoria, threatens a large group of freshwater species that are already facing a range of serious threats associated with climate change amongst other things. For these reasons, it is our opinion that the introduction of any species not native to the GR system into Rocklands Reservoir is likely to further threaten the endemic biodiversity of the GR system.”

We will kept you posted on the progress of this issue in future issues of VICNews.

Club Meeting Details

General Meetings:

ANGFA Victoria's meetings are held on the first Friday of every second month starting the year in Feb, at The Field Naturalists Club of Victoria which is situated at 1 Gardenia Street Blackburn. (Melways map 47 K11). Doors open at 7:30pm. Meetings start at 8.15pm sharp and aim to be finished by 10pm, followed by supper.

Next Meeting Date: Friday 3rd June 2016

ANGFA Vic Committee Meetings:

Venues: to be announced. Contact Kwai Chang Kum if you would like to be further involved (0430 434 488).

Trading Table

Any financial ANGFA member who has fish, plants or live food that they would like to sell is invited to bring their goods to the trade table. All items being presented for sale must be clearly marked: fish showing species name and location if applicable and plants identified by species. Goods will be accepted prior to 7.45pm and the Trading Table will operate between 7.45 and 8.15pm.

ANGFA Vic key contacts



President: Kwai Chang Kum
Phone: 0430 434 488



Treasurer: John Lenagan
Phone: 0413 730 414



Secretary: Glenn Briggs
Phone: 0408 771 544



Vice President and Membership Officer: Gary Moores
email: kathmoores@yahoo.com.au



VICNews: Greg Martin
Phone: 0407 094 313
email: greg@aquariumsbydesign.com.au



ANGFA Vic Website: Lyndon Giles
email: webmaster@angfavic.org

Contribute to ANGFA Vic on Facebook

ANGFA Vic Website: www.angfavic.org
ANGFA National Website: www.angfa.org.au
Postal mail: ANGFA Victoria
P.O. Box 298 Chirnside Park, Victoria. 3116.

Other Fish Groups in VIC

EDAS

Meets last Friday of the month starting Jan.
Contact: Daryl Maddock (03) 9874 1850

EDAS Plant Study Group

Meets Second Friday of the month (at various members' homes).
Contact: Eddie Tootell (03) 9337 6435 (a.h.)

Aquarium Society of Victoria (AS of V)

Meets last Friday of the month, alternating with EDAS.
Contact: Daryl Maddock (03) 9874 1850

Marine Aquarium Society of Victoria

Contact: MASOV (03) 9830 6073.

Victorian Cichlid Society

Meets first Wednesday of the month.
Contact: Graham Rowe (03) 9560 7472.

**Join ANGFA now!!!
New expanded membership package now applies**

To join ANGFA or to renew your membership online, follow these 4 easy steps:

1. Go to www.angfavic.org
2. Click on membership
3. Select membership renewal tab for ANGFA then ...
4. Click the Paypal icon to pay with Paypal.

To pay with your Debit Card or your Credit Card talk to the Treasurer John Lenagan at a meeting.

If you want to use snail mail and pay by cheque, print out the form below, fill out your details and send it to: ANGFA Victoria, P.O.Box 298, Chirnside Park. Vic. 3116

Businesses who support ANGFA Victoria

The businesses listed below actively promote Australian Native Fishes by making native fishes available in the aquarium trade. ANGFA suggests that members show their appreciation by supporting these businesses.

Amazing Amazon

Paul and Ben
365 Springvale Road, Glen Waverley
Phone: (03) 9545 0000
www.amazingamazon.com.au

Aquagreen

Dave Wilson
Phone: (08) 8983 1483
aqua.green@bigpond.com

Aquariums By Design

Greg Martin
Phone: 0407 094 313
greg@aquariumsbydesign.com.au

Coburg Aquarium

Greg Kirby
Phone: (03) 9354 5843
232-236 Bell Street, Coburg
www.coburgaquarium.com.au

Exotic Aquatic

Adrian
300a Neerim Road, Carnegie
Phone: (03) 9079 3899
www.exoticaquatic.com.au

Paky Pets

Keith
Phone: (03) 5940 1091
Shop 2/114 Princes Highway, Pakenham

Subscape Aquarium

Justin and Kim
Phone: (03) 9427 0050
310/312 Victoria Street, Richmond

Upmarket Aquarium

Greg Kirby
Phone: (03) 9600 9051
442 Queen Street, Melbourne

Victorian Reptile Supplies

Adam
Phone: (03) 8742 1283
6/75-85 Elm Park Drive, Hoppers Crossing

Join ANGFA now and enjoy benefits including regular meetings, digital versions of two regional club magazines and buyer discounts.

To the Treasurer, ANGFA Victoria, Please accept my application for membership to ANGFA.

(Please print)

NAME.....
.....

ADDRESS

.....
.....

Postcode.....

Phone Bus

A/H:.....

1. I enclose \$45 for my ANGFA Membership which includes digital copies of Fishes of Sahul (FOS), VICNews and the ANGFA NSW magazine.
2. I enclose \$65 (in total) to get a printed copy (at the end of the year) of the four editions of FOS for this subscription year, as well as the above items.

Forward application and cheque to: ANGFA Victoria, P.O.Box 298, Chirnside Park. Vic. 3116.