

To reference this article:

Browne RK. 2006. Imported Aquarium Fish Threaten Aquatic Biodiversity. Seadragon Foundation Articles. www.seadragonfoundation.org/SFI_Articles

This article talks about the importance of quarantine to protect the Leafy Seadragon.

Imported Aquarium Fish Threaten Aquatic Biodiversity

Dr Robert Browne and Neville Skinner

The import of Aquarium Fish to Australia threatens the endemic aquatic biodiversity of both freshwater and marine eco-systems, and could devastate Australia's aquaculture industry. This trade is mostly unnecessary and can threaten Australian species through the introduction of disease, escapees establishing feral populations, and discouraging the establishment of Australian endemics as aquarium species.

The risks associated with both pathogens and feral species demands the highest quarantine standards and a very high justification of the importation of any aquatic species. These requirements are not mandated in Australia's quarantine practices. The legislation and implementation of these requirements should be a high priority for any aquatic conservation organization. To fail will inevitably mean the devastation of whole groups of Australia's aquatic species.

Each year 8-10 million ornamental aquarium fish are imported into Australia from about 100 countries. The hazards of the import of these fish are little known with few scientific publications on ornamental fish disease, compared to farmed fish disease, and much fewer when compared to disease in terrestrial species. In 2006, 22 species of feral ornamental fish were established in Australian waterways with numerous freshwater plants and mollusks. These aquatic organisms can provide direct transmission for establishing pathogens in native fish and other aquatic life (ABC 2007).

Australia has a stringent policy relative to other countries which includes pre-border health certification and a mandatory quarantine period at border of 1-3 weeks in registered government supervised quarantine premises. Nevertheless many diseases have been established from ornamental fish in farmed native Australian and free living introduced fish. These include viral, bacterial, fungal, protozoal and metazoan pathogens with recent escapees including *Aeromonas salmonicida*. *Aeromonas salmonicida* has the capacity to devastate the salmon and trout industry and unknown species of native fish (Whittington and Chong 2007).

Australia's stringent quarantine policies for imported ornamental fish have been shown to be inadequate for the prevention disease incursions and exotic pathogens will

become established as a result of the ornamental fish trade. Prof Whittington said (sic), “The number of ornamental fish traded and permitted sources need dramatic reduction to facilitate hazard identification, risk assessment and import quarantine controls”. Although a quarantine period of three weeks is mandatory for imported fish, many introduced diseases have passed quarantine (ABC 2007). Quarantine requirements to prevent the establishment of any possible disease should be mandatory, irrelevant of the quarantine period required.

Neville Skinner, MLSSA secretary says “I understand Prof Whittington was talking about the potential diseases carried in on these exotic imports; but I would like to extend the point to why we allow these species in the first place! Perhaps a good starting point for fish quarantine would be a valid justification in terms of public benefit to import a species.”

Quarantine requirements should also include strict provisions to justify the import of any aquatic species to lower the risk of feral species. Imported species continue to offer a threat to aquatic biodiversity. A good example being the European carp now widely spread in Australian freshwaters. Besides disease prevention the restriction of the import of fish would also encourage the keeping of native fish and the establishment of attractive varieties to establish captive populations in case of crashes in wild stocks (Ziemann 2001). The creation of a dynamic and substantial aquarium and aquaculture industry with native Australian fish is essential to the maintenance of their biodiversity. Current aquarium species can be produced in Australia, with the need for novel types being generated from native species.



Images of AQIS officer Melissa Danielse with a red piranha. These and other exotic fish could become a nightmare in our waterways.

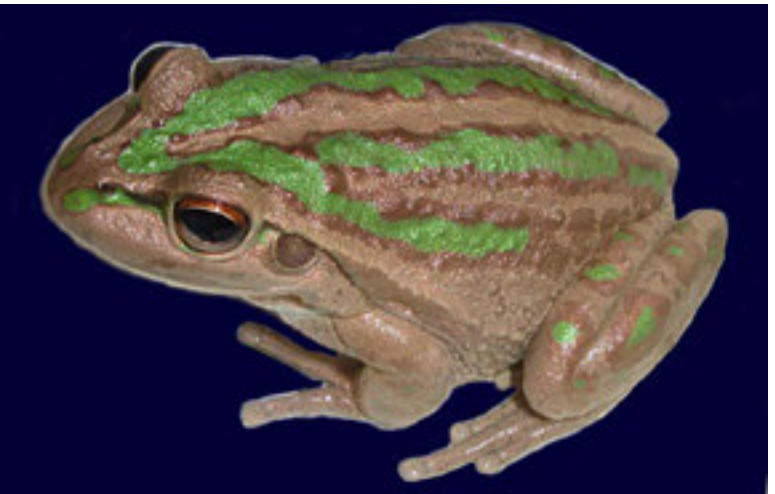
There have been a number of instances of close calls and failures to prevent the spread of disease from imported fish. Professor Richard Whittington says “...the gourami iridovirus killed 90 per cent of Murray cod on a farm in Victoria and could have been devastating if it infected wild Murray cod, which is considered a threatened species. Fortunately the farm did not discharge its effluent into a river, a common industry practice” (ABC 2007).

Another example of the ease with which fish escapees or associated disease could affect precious freshwater systems. Skinner says “And then consider this point in the light that a trout farm adjacent to Ewens Ponds discharges its water into Ewens Pond 3, which contains 6 to 7 species of protected &/or endangered native fish. What if either the trout or their diseases escaped into the Ewens Ponds/Eight mile Creek system.” Even if imports are allowed why can't they be managed to prevent reproduction. There are a number of ways to prevent the reproduction of fish, including chemicals, sterile hybrids, or the legal importation of fish of only one sex.

Disease through imported fish also threatens Australia diverse range of unique and freshwater crustaceans. These include the well known aquaculture and recreation species yabbies, redclaw and marron. However, Australia is also home to the largest freshwater crustacean the encouraged Tasmanian giant crayfish (Wikipedia 2007: IUNC 2007), and a range of large beautiful species of aquarium potential found along the eastern coast of Australia (NFA 2007). There are also many terrestrial crayfish of great biological significance.

In Europe, the crayfish plague fungus *Aphanomyces astaci* has eliminated many native European stocks of crayfish. The crayfish plague is believed to have originated in the 1860's in Lombardy, Italy from introduced North American freshwater crayfish and then the disease spread through Europe. Crayfish plague entered Britain in 1981 and also now infests Turkey, Greece and Norway. What is to stop similar diseases entering Australia through imported water or fish. The 21 day quarantine period would not necessarily expose such pathogens.

Environmental tragedy on a global scale has occurred to amphibians through the release by inadequate quarantine practices of aquatic Chytrid fungus. This disease is responsible for many frog extinctions in Australia, and is currently wiping frogs out on mass in South America.



The Green and Golden Bell Frog Litoria aurea almost died out mainly from Chyrid fungus. The Motorbike frog L. moorei is now part of extensive research program to gene bank Western Australian threatened frogs.

Nearly one-third of the world's 5,743 amphibian species are classified as threatened with extinction and the amphibian fungal disease chytridiomycosis is the worst infectious

disease ever recorded among vertebrates in terms of number of species impacted and threat of extinction (Browne et al. 2007; CI 2006).



The Lake Titicaca frogs Telmatobium spp. live in the cold mountain lakes in Bolivia, South America. Their numbers have dropped to a critical level. The last of the frogs are being taken for aphrodisiacs, to be blended up with banana. These totally aquatic frogs have loose skin through which they respire. The cold water with high oxygen enables these slow frogs to get enough oxygen without surfacing. This could have begun as an adaptation to overwintering under ice. Image by Dante Fenolio, University of Miami, Coral Gables, FL.

Problems with the importation of unsanitised aquatic products have already extended to the marine environment. These include both the possibility of aquarium supplies and unknown sources. *Caulerpa taxifolia* was probably introduced into South Australia, and other countries, from aquariums. This invasive marine weed has the potential to reduce fisheries production and reduce marine biodiversity (NOAH 2007).

In southern Australia the mass die offs of pilchards followed a pathology pattern consistent with a novel exotic pathogen. However, no direct evidence was obtained to determine the possible method for any introduction (Fletcher et al. 2007).



A novel type the Willyama seahorse was the victim of mass stranding over the last few years. There were particularly large strandings in 2006 with the sea "to thick with the bodies to cast a line". These strandings are the largest ever recorded in human history. Their strandings cause is still unknown.

Skinner says another example of poor quarantine in general is the importation of unfumigated wooden pallets. Australian manufacturers exporting to Europe are

compelled to use clearly marked 'Fumigated Pallets' in accordance with the "ISPM15" international standard, but the same companies when importing goods on wooden pallets are not required to specify 'Fumigated Pallets' indicating a general malaise in quarantine laws in Australia.

Even though the quarantine regulations need improvement the Australian Quarantine and Inspection service is vigorously pursuing offenders. In 2007 offenders imported aquarium fish in Perth, a 45 year old female was fined more than \$30,000 for attempting to smuggle 51 exotic aquarium fish through Melbourne airport, and as a consequence of a two year investigation a Brisbane aquarium fish importer was sentenced to two and a half years prison for attempted fish smuggling. A 2.5 kilogram red piranha that may have been imported legally in the past as a fingerling was seized in Adelaide (AQIS 20/04/07).

All four cases illustrate the importance of Australia's quarantine laws. Prohibited fish could introduce exotic viruses, fungi or parasites that could threaten Australia's native fish and amphibians and aquaculture industries. Escaped aquarium fish could also prey on native species, compete for food or destroy river and lake habitats (AQIS-20/04/07).

References:

ABC Science Online. 2007. Aquarium fish 'threaten biodiversity', Anna Salleh,

<http://www.abc.net.au/news/newsitems/200705/s1927246.htm>

AQIS Press release 20/04/07 AQIS 20710. Media contact Carson Creagh: 02 8334 7645, 0414 577 427.

Browne, R.K., Zippel, K., Odum A.R., Herman, T. 2007. Physical facilities and associated services. Use of amphibians in research, laboratory, or classroom settings. Institute for Laboratory Animal Research (ILAR), Volume 48, 3 (in press).

CI. 2006. Conservation International. Science: Global Action Team Needed to Stem Amphibian Extinction Crisis. http://www.conservation.org/xp/news/press_releases/2006/070606.xml

NFA. 2007. Native Fish Australia. Spiny Freshwater Caryfish. <http://www.nativefish.asn.au/spiny.html>

NOAA. 2007. Facts about *Caulerpa taxifolia*. NOAA. National Marine Fisheries Service. Southwest Regional Office. <http://swr.nmfs.noaa.gov/hcd/caulerpa/factsheet203.htm>

Fletcher WJ, Jones B, Pearce AF, Hosja W. 2007. Western Australian Department of Fisheries. Environmental and biological aspects of the mass mortality of Pilchards (Autumn 1995) in Western Australia. <http://www.fish.wa.gov.au/docs/frr/frr106/index.php?0401>

Whittington RJ, Chong R. 2007. Global trade in ornamental fish from an Australian perspective: The case for revised import risk analysis and management strategies. *Previews of Veterinary Medicine*. Epub ahead of print. <http://www.citeulike.org/user/sarahferriss/article/1296825>

Wikipedia. 2007. Tasmanian giant freshwater crayfish. http://en.wikipedia.org/wiki/Astacopsis_gouldi

AQIS ISPM15 Frequently Asked Questions:

<http://www.daffa.gov.au/aqis/import/timber/ispm-15-faq>

http://www.daffa.gov.au/data/assets/pdf_file/0017/114236/ispm15.pdf

Ziemann DA. 2001. The Potential for the Restoration of Marine Ornamental Fish Populations through Hatchery Releases. *Aquarium Science and Conservation*. 3(1-3): 107-117.