Addendum

After discussion with Dr Bob Johannes regarding the differences in our respective estimates of live reef food fish export figures from Indonesia (2,200 t/year by our estimate versus 6–9,000 t/year in the Johannes & Riepen report), we believe the major cause of the discrepancy is direct (unreported) export of groupers caught by live fish transport vessels (LFTVS). As described in footnote 12 of the Johannes & Riepen report, it seems that the LFTVS may either be catching fish directly or receiving transfers from larger 'catcher' vessels at unknown transfer sites, thereby completely bypassing the storage net systems installed at the main 'collection centres' we describe in our article. As our export estimate was based solely on the volume of fish which pass through these collection centres, we have obviously underestimated the total volume of live fish exported from Indonesia by an amount equal to that which exits Indonesia in the above-mentioned fashion.

If we assume that our estimate for the fish which pass through the collection centres is fairly accurate, and furthermore that the estimate given by Johannes and Riepen (1995) for total volume of live food fish exported from Indonesia is also accurate, we must conclude that a substantial volume of live fish (4–7000 t/year) is exported from Indonesia directly, without ever passing through a collection centre. This is particularly alarming, as these fish ostensibly were caught directly by the Hong Kong fleets, and have by all practical purposes been 'stolen' from Indonesia; Indonesian fishermen and their families did not even receive a short-term benefit from the sale of these fish. Furthermore, these fish are 'slipping' out of Indonesia completely unrecorded, making future efforts at control of the trade even more unlikely.

As of November 1966 prices received by fishers in the area had risen significantly, with *Plectropomus* species fetching US$ 12.50–16. These groupers, called *sunu*, are now generally shipped out by air. Between 250 and 500 fish per day were air-shipped in September and October. The less valued *Epinephelus* and *Cephalopholis* species, collectively referred to as *kerapu*, are still shipped out in live fish transport vessels. Fishers and middlemen report that the catch in the region is going down rapidly; after only two years the fish are far fewer and much smaller.

Despite the omission noted above in our export estimates, our basic message in writing this article still holds. While the use of sodium cyanide solution is certainly responsible for 'extensive collateral environmental damage' to reef ecosystems in general, our experience in Eastern Indonesia dictates that the reports in the popular media of 'barren moonscapes' left in the wake of the cyanide fishing boats are exaggerated and untenable. The most alarming issue here, and one which seems to be often overlooked, is the already-realised potential of the live reef food fish trade to completely decimate target fish species' stocks, leading eventually to local or even regional extinction of these species. Continued pressure on the governments of the consuming countries will hopefully avert such a disturbing denouement.

Australia bans exports of wild-caught seahorses

by Marie-Annick Moreau [1]

Seahorses, seadragons and pipefishes are among the most striking fishes in the world, and in Australia they are now among the most protected. In a landmark decision announced on 5 September 1997, the families Syngnathidae (seahorses, seadragons and pipefishes) and Solenostomidae (ghost pipefishes) became the first marine fishes to be officially recognised as wildlife by the Australian Government, as signalled by their removal from Schedule Four of Australia's Wildlife Protection Act (WPA).

A listing on Schedule Four effectively denies species wildlife status by exempting them from the WPA. (Tasmania's spotted handfish is the only other marine fish on the WPA—there by default as an endangered species but never removed from Schedule Four, and thus still technically not wildlife.)

Under the amended legislation, all exports of seahorses, seadragons and pipefishes will require permits as of 1 January 1998; these will only be

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granted for animals derived from approved captive breeding programmes or management plans.

Controls on the exports of seahorses and their kin addresses a major threat to these species: the vast and rapidly increasing international trade for traditional medicines, aquarium fishes and curios. Although dead seahorses make up the largest proportion of sales, trade in live animals is substantial.

Virtually all seahorses destined for aquaria are taken from wild populations. Seahorses are notoriously difficult to keep, and very few survive for long in captivity. Adults require a steady supply of varied live foods, and their vulnerability to a number of fungal, parasitic and bacterial infections means that seahorse tanks must be kept scrupulously clean. Dedicated care by experienced hobbyists is not enough to ensure success: much damage to the seahorse is incurred before the animal reaches the aquarist's tank.

Seahorses are hurt during capture and transport, and are mishandled at every level of the aquarium trade, from the exporters through to the retailers. Starving seahorses is a common practice among holders, given the animals' costly diet of live food. Even public aquaria, with their vast resources and expert staff, concede that these are among the most difficult fishes to maintain in captivity. In a cruel irony for seahorses, their basic unsuitability as aquarium fishes continues to drive the trade: aquarists whose seahorses die commonly go out and buy replacements, thinking that this time, they will get it right.

Seahorse numbers appear to be declining markedly in exploited populations throughout Asia. Australian waters harbour one-third to one-quarter of all seahorse species, many of which are heavily fished in other parts of their ranges. As a country with the legislative and legal ability to control seahorse trade, conservationists have envisioned Australia as a potential buffer against the disappearance of the species. The recent legislative reforms raise hopes that Australia is indeed assuming that responsibility.

Australia's move is particularly relevant and timely given the recent local emergence of plans for large-scale seahorse aquaculture. The conservation value of these culturing efforts is highly questionable. Proponents of aquaculture assume that culturing seahorses will enable them to flood the market with captive-bred stock, thus reducing wild harvest. Given the insatiable demand for the animals, this is unlikely to be true. Moreover, similar attempts around the world have had extremely poor success in rearing young, and depend on repeated removal of adults from the wild to maintain their broodstock.

The Australian aquaculture proposals also ignore the threat large-scale farming activity may pose to Asian subsistence fishers, who rely on fishing seahorses for cash income to feed their families; they are presently catching ever smaller seahorses which may become less valuable when set against larger cultured animals. Recent advances do indicate that the technical problems of seahorse husbandry are solvable, but rather than encouraging industrial production in developed countries, the international goal should instead be to establish low-technology seahorse aquaculture in subsistence fishing villages. The development of such alternative livelihoods in developing nations could directly reduce pressure not only on seahorses, but also on a whole range of marine species.

Hopefully , the new restrictions will provide much needed checks and balances on some of Australia's over-ambitious and misguided efforts to culture seahorses.

The Australian decision seems to reflect a growing international commitment to syngnathid conservation. Beginning on 1 June this year, the European Union began monitoring all imports of seahorses. Hong Kong is considering doing the same. Now Australia must administer the controls wisely, undertaking the appropriate research and management initiatives to ensure the long-term viability of these fishes. The precedent has been set: marine fishes can be wildlife too. Let us hope that syngnathids are only the first of many endangered Australian marine fishes to be so recognised.