

# FINAL STAGES OF WORLDFISH-SPC SEA CUCUMBER PROJECT

Why is there so much interest in sea cucumbers? The answer is simple: prices for sea cucumbers have increased over the past decade, while export prices of some other island commodities have fallen. Top grade beche-de-mer, the name for the dried product, now sells for USD 100–300 per kilo at distributional markets in Singapore and Hong Kong.

Lucrative returns to fishers have motivated heavy fishing pressure on sea cucumber stocks and depleted numerous areas of viable breeding populations (Uthicke and Conand 2005). Sea cucumbers can have complex life histories with long life spans, and annual recruitment is often sporadic. Recent research provides empirical confirmation of the notion that sea cucumber populations are often fragile (Lovatelli et al. 2004, Uthicke et al. 2004). A frequent lesson is that sustainable yields will only be maintained at low fishing pressure, for example less than 5% of the standing biomass per year. But amidst the pandemic of over-exploitation, many Pacific nations are taking encouraging actions to bolster their management of sea cucumbers.

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How can breeding populations of sea cucumbers be restored to productive levels? One potential approach is to release hatchery-produced juveniles into the natural habitats, and when these reach sexual maturity they can then become breeding populations that then “kick start” the recovery of a depleted fishery (Purcell 2004a). This idea is at the heart of a WorldFish-SPC research project now in its fourth year in New Caledonia, funded by ACIAR, the three provinces of New Caledonia, the government of France and the ATSE Crawford Fund.

The focal species of the project, the sandfish *Holothuria scabra* (Fig. 1), fetches the highest price of any tropical sea cucumber on the Asian dried food market. The project’s main aim is to develop optimal methods of releasing hatchery-produced sandfish into the wild; how, when, where and at what size and in what density. Originally planned for Solomon Islands,

the WorldFish Center project was relocated to New Caledonia and has been hosted and partnered by SPC.

Since an earlier article on the project (SPC Fisheries Newsletter # 103, Oct–Dec 2002), the hatchery team produced thousands of juvenile sandfish in three consecutive summer seasons. Recent experiments at the hatchery north of Noumea have refined new methods, pioneered by the WorldFish Center in Vietnam, to grow the juveniles in net enclosures within earthen shrimp ponds up to larger sizes for release (Figs. 2 and 3). The sea cucumbers can grow rapidly in earthen ponds, eating only the organic waste matter in sediments, and have a further function of bioturbating pond sediments (Purcell 2004b).

Hatchery production of sandfish has been kept to an experimental scale, this year totalling 20,000 juveniles. This has allowed resources to be spread to the field research and stock assessment surveys. An initial study showed that sandfish can have limited gene flow among neighbouring populations, giving evidence that sandfish should not be translocated to distant sites, in order to preserve genetic diversity of wild stocks (Uthicke and Purcell 2004). Further work showed that the putative sub-species *Holothuria scabra* var. *versicolor* (golden sandfish) is actually a separate species, but can naturally hybridise with *Holothuria scabra* (sandfish) (Uthicke et al. in press).



**Figure 1: The sandfish, *Holothuria scabra*, the most valuable of tropical sea cucumber species in a seagrass bed near Noumea. (Photo: Steve Purcell)**



**Figure 2: “Bag net” enclosures within an earthen shrimp pond.**

**Figure 3: Hatchery-produced sandfish juveniles, around 1 g in weight, grown in the bag nets.**

Other completed studies in the project include the following:

- Methods for broodstock maturation and spawning
- Optimal methods for transportation of juveniles for restocking
- Optimal habitats for release
- Best times of the day for release
- Methods for tagging juveniles
- Diurnal burrowing cycle of wild sandfish in New Caledonia
- Co-culture of juvenile sandfish with juvenile shrimp
- Broad-scale stock assessments of sea cucumbers in the three provinces of New Caledonia

- Modelled dispersal of sandfish from release sites for the sizing of no-take zones

A current large-scale experiment, launched in April 2005, involves an initial 9000 hatchery-produced sandfish juveniles (Fig. 4). At each of four sites along the main island of New Caledonia, “La Grande Terre”, juveniles were released into replicate sea pens (500 m<sup>2</sup> each) at three different densities. The sea pens are simply a short plastic mesh fence, without cover, to limit the emigration (escape from sites) of the juveniles from the natural habitat but allow predators to reduce numbers as they would in a normal restocking situation without sea pens. Survival and growth of the juveniles will be monitored for 12 months.

We hope this final experiment will provide a “proof of concept” that sufficient numbers of sandfish can survive to maturi-

ty to make restocking a viable option. The costs, and likely benefits, of restocking can only then be weighed against other forms of management (Bell and Nash 2004). The project is due to finish in June 2006, after which the WorldFish Center hopes to embark on the final (Phase 3) project of the programme. That project will seek to apply the hatchery methods from Solomon Islands and the release methods from New Caledonia to carry out broad-scale restocking of sandfish in several Pacific Island countries.

**Literature cited**

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**Figure 4. Southern Province fisheries technician, Marc Homou, with a bag of juveniles prior to release into the sea pens.**