

All trochus of 75–110 mm length for sex/size classification were graded as A grade (n = 30). Assuming a CI\$ 7.00 (≈US\$ 4.55) per kg for A grade product, the economic value of the harvest can be calculated.

- (iii) A total value of CI\$ 7,300 (≈US\$ 4,780) can be sustainably harvested.

Option 3. Harvest trochus from high-density areas and transplant the animals to possible sites around Penrhyn lagoon so as to encourage the establishment of trochus population.

The same amounts of animals calculated for a commercial harvest can be removed for the purpose of restocking the lagoon. Some possible sites for relocation are indicated in Figure 6. These sites acknowledge that *Te Tautua* settlement is distant from the trochus present stock, and from the potential trochus habitat in the north and south-west areas of Penrhyn lagoon.

Option 4. Selective harvest of suitably sized animals for use as hatchery broodstock.

As an exercise, trochus juveniles have been reared at the pearl oyster hatchery at Penrhyn. Hatchery-reared juveniles may supplement wild stock for harvesting and also prove useful in developing growth and recruitment models for management purposes.

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***Trochus niloticus* spawnings at Tongareva Marine Research Centre, Penrhyn Atoll, Cook Islands**

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The commercial topshell, *Trochus niloticus*, was introduced to Penrhyn Atoll from Aitutaki Atoll about 10 years ago. In a recent survey by the Ministry of Marine Resources, the broodstock trochus were mainly found on the west side of the lagoon, along the islet where the village of Omoka, the Tongareva Marine Research Centre [TMRC] and the airport are located. At the end of the first week of November 1996, 43 trochus were collected from the corals on the reef front outside TMRC. These were cleaned and set into a tank. The following day (8 November 1996) they were induced to spawn using the heavy aeration method in a small amount of seawater. The induction method

ceased at 18.00 h and the trochus were placed into a spawning tank with clean filtered seawater (fsw). The seawater temperature was raised and lowered a couple of times until release of sperm began, followed by eggs. Large quantities of eggs were spawned, but only a small batch of eggs was kept, fertilised and placed in two hatching tanks. The following day an estimated 5,600,000 trochophore larvae had hatched and after reaching the veliger stage these were stocked in a raceway tank filled to approximately 7,000 litres. Pearl oyster spat were later placed in this raceway with the trochus juveniles and, due to movements of spat and cleaning of raceways, many of the trochus

juveniles were lost down the drain. By mid-March the remaining juveniles had reached only about 5 mm basal diameter, but this was due to limited food and rather poor holding conditions in a small tank. In mid-May the juveniles were returned to a raceway along with a newly-settled batch of hatchery-reared trochus. They were subsequently placed in a raceway with trays containing blacklip pearl oyster spat of >5 mm. In late August 1997 the size of this first batch of trochus juveniles averaged 20 mm basal diameter.

The second spawning took place after 46 adult trochus were collected on 5 May 1997 along the reef front outside the TMRC. No induction method was used. Some sperm was released at the beginning of the night of 5 May but no further activity was observed later (to 23.00 h). A massive number of eggs had been spawned by the following morn-

ing (estimate 15,000,000 eggs). On the night of 6 May 1997, several females spawned eggs, but the total numbered only about 2,000,000 eggs. The counts of veliger larvae on 9 May indicated 770,000 larvae, and these were transferred into a raceway tank (7,000 litres). Once again, as pearl oyster spat was moved in and out of raceways and as raceways were regularly cleaned, many juvenile trochus were lost down the drain. On 30 August 1997 the average size of this batch of trochus was about 4–5 mm basal diameter. Both batches of trochus are foraging on raceway walls, bottom, and on trays containing blacklip pearl oyster spat. In future it is hoped that a proper study will be conducted to look at the advantage or otherwise of having trochus and pearl oyster spat in polyculture, in relation to control of filamentous algae, especially around pearl oyster spat.



First commercial trochus harvest from Palmerston Atoll

by Kelvin Passfield

Trochus were first introduced to Palmerston in the late 1960s, from Aitutaki. Further introductions occurred in the early 1980s, when about 3,000 trochus were transported to Palmerston, again from Aitutaki (Sims, 1985). A survey in September 1988 found that '... only small numbers persist in limited areas of the northern reef' and concluded that it was unlikely that trochus would constitute a major economic resource for the island (Preston et al., 1995).

A recent commercial harvest in Palmerston gives an indication that this initial pessimism may have been premature. About 1.5 t of trochus shell were harvested earlier this year (1997), and sold to a buyer on Rarotonga. However, the quality was reported to be very poor, with 70 per cent of shells being badly worm-eaten. The buyer is still waiting for a price from the world market, and is reported to be still holding most of the shells.

There was some concern by some Palmerston residents and Government officials that the harvest was not properly organised and regulated. This concern is backed up by the reports of poor shell quality, which could have perhaps been avoided if the harvest had been monitored in a similar manner to the approximately annual harvests in Aitutaki.

The significance of this harvest lies in the fact that it is the first commercial harvest of trochus in the Cook Islands outside Aitutaki, and occurred nearly 30 years after the original introduction. The first commercial harvest of Aitutaki trochus occurred in 1981, 24 years after the original introduction of trochus there from Fiji in 1957.

A trochus introduction programme in the 1980s has seen trochus introduced to 13 of the 15 islands in the Cooks group. Some of these islands, for example Penrhyn, Manihiki and Rarotonga, now report trochus as being abundant. It is probable that commercial harvests of trochus in some of these islands will begin before the year 2000.

With careful management, including controls on the quality and size of trochus harvested, it is possible that the trochus fishery in Palmerston could develop into a significant economic resource for the people of the island, especially considering there are only 49 residents of Palmerston to share the benefits.

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