

Solomon Islands has traditionally been one of the major trochus exporters of the Pacific, averaging 387 t yearly in the period 1962–1991. In 1986, over 600 t were exported, but in 1991 this had dropped to 87.5 t (although 98 t or more was purchased by local button factories). The latest 'marine shells' export figures we have from Solomon Islands are for the period January–September 1992, by which time 79 t had been exported. In 1991, trochus formed 47 per cent of the exports of 'marine shells'. If the percentage is similar in 1992, and scaling the estimate to allow for the missing final quarter of 1992, we estimate that the export of trochus shell from Solomon Islands in 1992 was approximately 49.5 t. Customs export figures have not yet been compiled for 1993 (Willington Piduru, pers. comm.).

New Caledonia is another traditionally major producer, averaging 347 t per year of exports in the period 1962–1991, although there was an enormous peak of nearly 2,000 t in 1978. In 1992, 185.5 t of trochus shell were exported from New Caledonia at a local buying price of 250 FCFP per kg (around US\$2.50 per kg). In 1993, exports were 222.5 t, and the average 'farm-gate' buying price in the Northern Province was 238 FCFP per kg (US\$2.35) (Régis Etaix-Bonnin, pers. comm.).

Trochus shell exports from *Vanuatu* have averaged 76 t per year over the past 20 years, with a peak of 220 t in 1976. Vanuatu had five domestic button factories in 1993, each of which had a quota of 75 t of raw shell per year. It is probable that most of the shell fished in Vanuatu is now locally processed, and thus it has become impossible to estimate production from the export figures for raw shell. Unfortunately, the Vanuatu Customs figures do not clearly categorise the export of raw shell, buttons or blanks, and scrap, so it is not possible to estimate production indirectly from the button export figures.

The other major producer in the Pacific Islands region is *Papua New Guinea*, which averaged 380 t per year in the decade 1980–1990 (and exported over 1,000 t in 1951). Unfortunately we have no recent figures on trochus exports from PNG.



Trochus reseedling experiments in Australia and Vanuatu

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A collaborative project between Vanuatu Fisheries Department and James Cook University (Australia) is looking into the ecology of cultured juveniles *Trochus niloticus* shortly after released onto coral reefs, in particular the effects of seeding density, juvenile size and habitat on juvenile survival.

The project is funded by the Australian Center for International Agricultural Research (ACIAR). Field work has been done at Moso Island (Vanuatu) and Orpheus Island (Australia), following similar methods to allow comparison of results at a geographical scale and to determine how general are the processes occurring to juveniles on reefs.

Results of various experiments indicate that, after 3 days, 20–40% of the juveniles released are missing and predation is likely to be most important cause of mortality. We used seeding densities between 5–30 juveniles/m² and found no significant effect of the initial density on survival.

However, based on natural densities of wild juveniles on the reef, seeding densities no greater than 10 juveniles/m² are advisable. The tidal height at

which the juveniles were released did not have a significant effect on survival. The intertidal zones at both Orpheus and Moso Islands average more than 200 m wide and more than 1 kilometre in length.

We released juveniles at various tidal heights and found that juvenile survival varies highly both within one tidal height and among the various tidal heights. Although homogeneous over a broad scale the intertidal habitat where *trochus* juveniles live is highly heterogeneous on a small scale, i.e. in distri-



bution of pools at low tide, amount and size of rubble and sand, and density of predators. This suggests that to seed *Trochus* it is probably better to release juveniles over a large area than to concentrate the release in a small one.

Laboratory and field experiments at Orpheus Is. to examine the effect of juvenile size on survival suggest that juveniles larger than 24mm shell diameter survive better, mainly because at this size vulnerability to predation by Portunid crabs and stomato-

pods is minimal. At Orpheus Is. wild juveniles smaller than 20mm than shell diameter have a flatter base and more pronounced knobs than cultured juveniles obtained from adults on the same reef (L. Castell, personal observation). This may provide some protection against predation in wild juveniles.

Field work is continuing and we expect to produce more detailed information about our results by 1995.

A study of the Enewetak trochus resource

by Flinn Curren

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Report summary and recommendations

Trochus (*Trochus niloticus*) resources on Enewetak Atoll, Republic of the Marshall Islands (RMI), were surveyed in July and August 1992. *Trochus* numbers appeared to be fewer than previously reported (Wright & Gillett 1989).

Samples of shells rejected by buyers were measured and potential reasons for their rejection were noted. Samples of live shells were also measured and inspected.

An opinion survey was presented to atoll residents concerning forms of trochus resource management. Shell and meat samples from three locations were sent for radionuclide testing to the Nationwide Radiological Survey in Majuro, RMI. A list (not exhaustive) of potential trochus-shell buyers was compiled using firms noted by Pacific Island governments. Two potential trochus meat-buyers were identified, although no buyers for trochus opercula were located.

The following recommendations were suggested for management and utilisation of trochus resources of Enewetak Atoll:

1. A trochus sanctuary should be established to encourage natural re-seeding of the reefs, and steps taken to protect trochus in those places before trochus season and until trochus shells are sold.
2. Some method should be found to establish trochus harvest quotas, limiting the total amount of trochus taken each season. This limit should

be appropriate for the current trochus resources of the island. The quota recommended by Wright and Gillett (1989), 100 tons/year, is an appropriate level of harvest for the trochus stocks as measured by this study.

3. Accurate trochus harvest records should be kept on the actual amount of trochus shell sold each season. Knowing the size of trochus harvests is very important in order to adjust future harvest sizes. The harvest size can then be changed depending on the abundance of trochus on the reefs.
4. Small and large shell-size limits should be set for live harvested trochus. The recommended size limits are 10.6 cm (3 in.) for the smallest size of trochus taken, and 14.2 cm (4 in) for the largest size of trochus taken.
5. Paid workers should be hired to work prior to and during each trochus season to implement trochus management. These workers would perform the following tasks:
 - a. Monitor the trochus resource with line transects at fixed locations and possibly conduct some tag/recapture efforts prior to and during trochus seasons;
 - b. Patrol trochus sanctuaries to discourage poaching;
 - c. Inspect live trochus for undersized and oversized shells and confiscate undersized and oversized trochus animals and return them to the reef;