

The 2011 harvest of trochus in Aitutaki, Cook Islands

by Teuru Tiraa-Passfield,¹ Richard Story,² and Kelvin Passfield³

Background on Aitutaki trochus

There have been various secondhand reports on the original introduction of trochus — *Tectus* (formerly *Trochus*) *niloticus* — to Aitutaki. Some of these have indicated that there was a single shipment of 300 shells from Fiji in 1957, although at least one report stated there were only 40 shells in that original shipment. However, an old copy of the original typewritten report written by Ron Powell, the Fisheries Officer in the Cook Islands at the time of the introduction, has surfaced. Powell, along with Loba Marsters, was a key figure in the introduction of trochus, and his report reveals some interesting facts.

In December 1956, 300 trochus were brought to Aitutaki by air transport. Mortality was high, and it was estimated that only about 100 of these survived (Powell 1957). There would most certainly have been additional mortality after the trochus were placed on the reef due to stress related to the trip. Because of the poor survival rate of this initial shipment, Powell and Marsters, who were overseeing the shipments, conducted some research and found that transporting the shells in damp bags rather than in water actually increased the survival rate markedly. Another 300 trochus were introduced in March 1957; this time with about 220 surviving (Powell 1957).

A survey was conducted in 1965 by scientists from the Smithsonian Institute, and a number of live trochus of various sizes were observed, indicating that trochus had

survived and successfully reproduced. A follow-up survey was conducted by Tom Wichman and Tom Marsters (now Deputy Prime Minister) in 1974 (Wichman and Marsters 1974), and they counted more than 14,000 trochus shells, although an estimate of total stock could not be found. The report recommended a commercial harvest at that time.

Harvest history

Despite the recommendation for a harvest in the Wichman and Masters 1974 report, the first commercial harvest in Aitutaki did not occur until 1981, when an estimated 200 tonnes (t) were taken over a period of 15 months. The last harvest in Aitutaki was in 2001, when approximately 37 t were taken. Overall, approximately 600 t, with a value of approximately NZD 2 million, have been harvested during 14 separate harvests since trochus were first introduced. The total harvest history for Aitutaki is shown in the table below.

2011 harvest

The world price of trochus dropped after 2001, and in order to try and obtain the best return for the resource, the Island Council did not authorise another harvest for several years, as they were waiting for prices to improve.

However, prices have remained comparatively low. In addition, a number of harvest surveys have indicated that the trochus population has not increased much, although the reason why is not clear. The lack of population increase may suggest that there is some density-dependent effect that is limiting the total shell population. It was, therefore, decided that a harvest should be undertaken in 2011, in the hope that it may stimulate some revitalisation of stocks, and also provide some additional income to the people of the island, especially around the Christmas season.

A pre-harvest survey by the Ministry of Marine Resources (MMR) (Turua et al. 2011) indicated that 18 t of shells, equivalent to one full 20-foot shipping container, could be harvested without over depleting the stock. After tendering the pre-harvested shells to select



A local family harvesting trochus (Image: Kelvin Passfield)

¹ Fisheries Research Intern, Ministry of Marine Resources, Cook Islands (teuru06@gmail.com)

² Senior Fisheries Officer and Aitutaki Marine Research Station Manager, Ministry of Marine Resources, Cook Islands (fisheries@aitutaki.net.ck)

³ Senior Policy Adviser, Ministry of Marine Resources, Cook Islands (K.Passfield@mnr.gov.ck)

a buyer, the fishery was opened by a declaration from the Island Council on 28 November. Approximately 2,000 individual, 9-kilogram (kg) quotas were issued for every man, woman, child and infant resident on the island. Each 9-kg quota attracted a “licence” fee of NZD 2. Not everyone chose to take up their allocated quota, and so much of the individual 9-kg quotas were given to other community members to use. In the end, 79 families were involved in the 2011 harvest, which is estimated to be around 17% of all households. While typically only two to four family members are involved in the actual harvest, all able-bodied family members are involved in the boiling and cleaning of the shells, and the extraction of the meat.

The harvest was planned to be open for just one week. However, after surveying households, MMR staff determined that only 12.5 t had been harvested. This was likely because weather conditions were far from perfect, as well as the fact that many families had other commitments leading up to Christmas. In order to meet the quota, the harvest period was extended for another week by the Island Council, until 13 December. By that date, the quota was reached, and the harvest period was closed.

Processing, buying and grading

After harvesting, the trochus were cooked in order to get the meat out and to clean the shells for shipping. This was usually done by boiling the shells in vats made by cutting 200-litre drums in half, and heating the water using firewood.

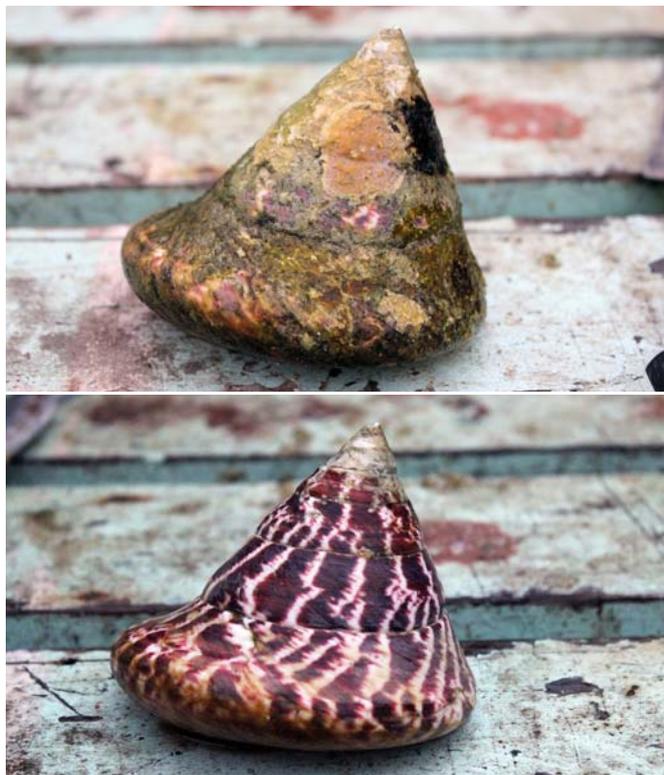
A survey of a number of harvesters found that it can be quite difficult to extract all of the meat and gonads from the upper twirls of the shell. This was the case especially for female trochus because the green gonad coil at the top of the shell often breaks off and is left behind, and then rots, making the whole shell smelly. In comparison, it is fairly easy to get the entire animal out whole in male trochus.

Different harvesters had several different methods of attacking this problem. Some recommended cooking the trochus in salt water for several hours, while others used fresh water with the addition of some baking powder, which they thought firmed up the gonad and made for more complete meat and gonad removal. This method, however, affected the flavour of the meat. No good solution was determined.

After several days, most of the shells were cleaned and dried. Grading started on 20 December and lasted for three days. Sellers were paid cash on the spot by the buyer, which was likely to have been a welcome Christmas bonus for them. In general,



*Rima Mata of Aitutaki, cleaning her trochus shells in the lagoon
(Image: Teuru Tiraa-Passfield)*



Trochus shell before and after cleaning (Images: Kelvin Passfield)

the shells were received in good condition, and most were A-grade. A few shells that were rejected due to smell were taken away for re-cleaning by the sellers, and then returned in good condition. The buyer was impressed with the quality of the shells, and the way the harvesters had managed to target mainly A-grade shells. In total, 8,830 kg of trochus were graded and packed. This consisted of 12,249 kg (or 65%) of A-grade, 4,269 kg (or 23%) of B-grade, and 2,312 kg (or 12%) of C-grade. Harvesters received NZD 5.50 per kg of dry A-grade shell, and less for lower grades. Overall, an average price of NZD 4.40 was earned. Total pay out to fishers was NZD 83,000.

Tag and recapture experiment

Tag and recapture studies are an ideal method to more accurately determine the population of a single stock, such as the Aitutaki trochus population. A tag and recapture stock assessment was undertaken in conjunction with the 2011 harvest. Prior to the harvest, a number of trochus were marked with a pencil mark inside the lower part of the shell. Any of these marked shells that were collected during the harvest were recorded on forms supplied to the harvesters. A future report will provide information on the results of this tag and recapture study.

Recommendations

The following recommendations are provided in order to try to improve future trochus harvests, both in Aitutaki and any other islands in the Cooks Islands where harvests may occur, such as Rarotonga.

Although minimal, there was some wasted effort by harvesters in collecting shells that were found to be outside the legal range of 8–11 cm. This could have been avoided if accurate measuring sticks were made available to everyone by the Island Council. Although MMR staff did check and reject illegal trochus while they were still alive, it is not certain that everyone could be bothered returning them to the reef in good condition.

Most of the harvesters that were interviewed indicated that there was a lot of work involved in the harvesting and cleaning process, and although they were pleased to receive the income at the end of the harvest, they were not sure they would do the same amount of work again for the same return. Quite a few of the older harvesters gave up before they had reached their quota due to the amount of work involved, and gave their

quota to others. Thus, it is in the interest of future harvests to try and find faster and more efficient methods, particularly in regard to cleaning the shells, and if possible adding value to the products, particularly the meat.

Before future harvests, it will be useful to experiment with a number of processing methods to determine the best method to facilitate easy extraction of the meat and cleaning of the shell, both inside and out. A number of ideas have already surfaced during the survey of processors. For example, it was reported that in at least one previous harvest in Rarotonga, a concrete mixer with some gravel and a small amount of water was used to “tumble” clean the outer layers of encrusting algae and other material from the surface of the shell. This would be less labour intensive than the commonly used method of scraping the shell with a knife. Some quality control would be needed to ensure that all shells were properly cleaned, and they may need to still be finished off by hand. It has also been reported that in French Polynesia, people use a metal device to extract the meat from the shells without the need for boiling. These and other ideas need to be investigated and, if possible, trialled prior to the next harvest.

MMR is interested in hearing from anyone who may have information on improved processing methods, as well as information on markets for trochus meat or opercula. In particular, information on how to fully extract the meat from the raw shell would be useful, as the meat may be more valuable as an uncooked product, leaving more options available for processing.

Aitutaki trochus harvests, 1981–2011

Year	Yield (tonnes)	Estimated value per tonne (NZD)	Estimated fishers total earnings (NZD)
1981	≈200.0	850	170,000
1983	35.7		
1984	45.7		
1985	27.0		
1987	45.1	2,000	90,200
1988	18.0	3,000	54,000
1990	26.2	7,000	183,400
1992	28.0	6,350	177,800
1995	34.0	6,000	204,000
1997	18.4	6,250	115,000
1998	34.0	6,500	221,000
1999	18.0	8,250	148,500
2001	37.0	8,500	314,500
2011	18.9	Average 4,405 (5,500 for A-grade)	82,953

Future harvests

It is expected that MMR will continue to survey the trochus population on an annual basis, and when a viable harvest quota is reached (the minimum often being one shipping container or 18 t) or the world price is favourable, this process will take place again. The history of trochus harvests in Aitutaki suggests that a population can sustain a harvest every two years, or possibly more often, if the price is favourable.

Despite the difficulties encountered, valuable lessons were learned. This was considered to be a very successful harvest by all concerned, and the buyer reports that the container is now on its way to Italy, where the shells will be processed and eventually end up as button on high-end Italian designer fashions.

Acknowledgements.

The authors would like to acknowledge the comments on the draft by Ben Ponia, Ngere George, Koroa Raumea, and Ian Bertram. Tuane Turua, Ngere George, Koroa Raumea James Mata and Joe Katangi conducted pre-and/or post harvest surveys, as well as the monitoring of

the harvest, buying and grading. Tangi Toko and Mama Ina assisted with the grading of shells, and Aitutaki's mayor John Baxter and his council, provided valuable assistance and advice. Raymond Newnham provided additional information on grading and marketing. Appreciation also goes to all of the harvesters for their cooperation during the study.

References.

- Powell R. 1957. The transfer of live trochus from Fiji to the Cook Islands; December 1956 and March 1957. Internal report to the Director of Agriculture, Rarotonga, Cook Islands, April 1957.
- Turua T., George N. and Raumea K. 2011. Aitutaki Trochus (*Tectus niloticus*) Resource Assessment. Internal report of a survey conducted in September 2011. Ministry of Marine Resources, Cook Islands.
- Marsters T.J and Wichman T.T. 1974. A report of a survey of *Trochus niloticus* in Aitutaki. Internal report. Department of Fisheries, Ministry of Economic Services, Cook Islands.

