

## Trochus production in Solomon Islands from 1953 to 2006

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### Introduction

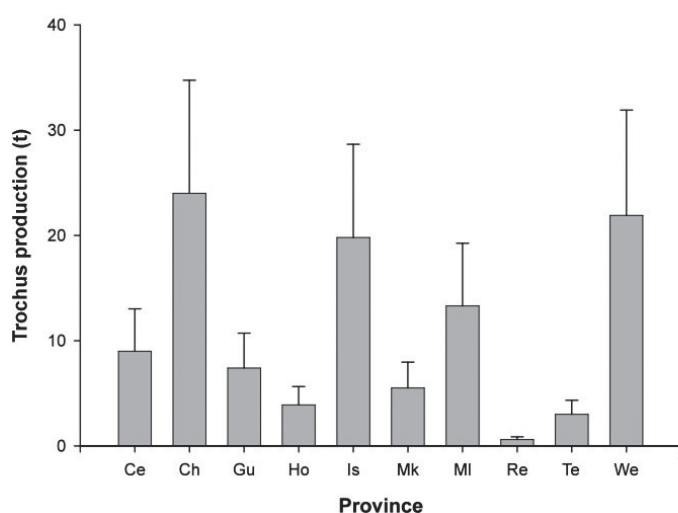
Trochus (*Trochus niloticus*) is an important resource for coastal communities in the Solomon Islands because it is easy to harvest, and is non-perishable, which is essential in rural areas where storage facilities and transportation services are poor or irregular. Trochus is commercially exploited mainly for the nacre (shell), which is processed into high-quality buttons for the fashion industry. In addition, the meat is highly regarded as a food by the locals.

In the 1950s, prior to the establishment of the commercial tuna industry in Solomon Islands, trochus was ranked second after copra as an export commodity (Pel 1956). However, with the emergence of tuna and other industries, such as oil palm and mining in the 1970s and 1990s, its rank as an export commodity dropped. Nevertheless, trochus accounted for >50% of the value of all non-fish marine exports between 1985 and 1990

(Richards et al. 1994), and still remains an important source of income for coastal rural communities that do not have alternative means of income generation. Between 2001 and 2006, national catches averaged  $108 \pm 73$  t and were taken mainly from Choiseul, Western, Isabel and Malaita provinces (Fig. 1). In 2006, the catch was 132 t worth SBD 5.5 million (USD 785,000).

### Historical production

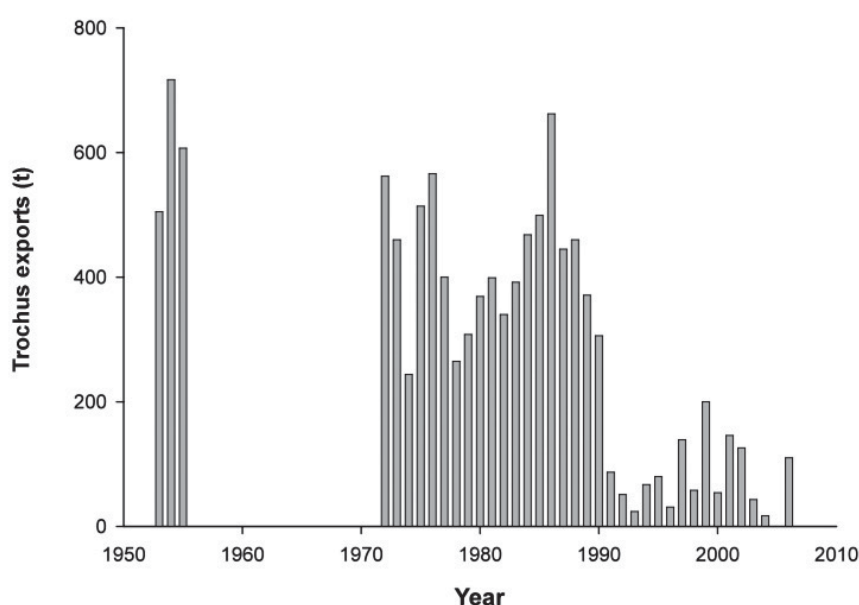
Evidence from the 1990s shows that recent harvests of trochus are well below potential production due to overexploitation. Adams et al. (1992) found that average trochus densities around Gizo and Rendova in the Western Province were  $< 20$  shells  $\text{ha}^{-1}$ , well below the density of around 100–300 shells  $\text{ha}^{-1}$ , which is typical of optimally fished stocks (Adams et al. 1992; Foale 1998). Extensive trochus surveys in West Gela by Foale (1998) also found relatively low densities of trochus (i.e. a maximum of 40–75 shells  $\text{ha}^{-1}$ ). The extent of overexploitation elsewhere in Solomon Islands could not be gauged because no dedicated studies were done in other parts of the country. However, in this paper, I use historical export data to determine exploitation patterns of trochus back to 1953.



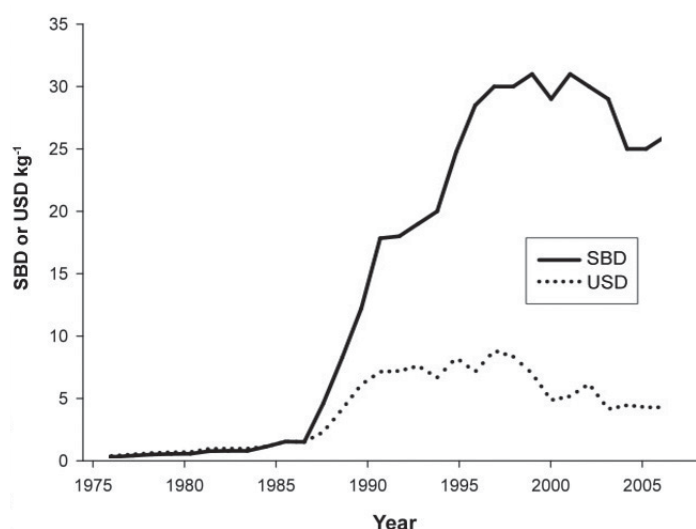
**Figure 1.** Average annual production of trochus for each province from 2000–2006. Ce = Central, Ch = Choiseul, Gu = Guadalcanal, Ho = Honiara, Is = Isabel, Mk = Makira, MI = Malaita, Re = Renbel, Te = Temotu and We = Western. Vertical bars represent standard errors.

The various sources of data included: 1) an early marine resources survey of Solomon Islands by Pel (1956), covering the period 1953–1955; 2) a country report to a regional trochus workshop held in the early 1990s by Leqata (1997), covering the period between 1972 and 1989; 3) publications by Richards et al. (1994); 4) a WorldFish Center database (unpublished) for exports between 1990 and 2004; and 5) data from Solomon Islands Department of Fisheries and Marine Resources

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**Figure 2.** Annual trochus production for Solomon Islands from 1953–2006.



**Figure 3.** Buying price of trochus in Solomon Islands between 1976 and 2006.

(DFMR) licensing section for 2006. Data from 1955–1971 proved difficult to obtain.

### Economic value of trochus

In 1954, 717 t of trochus were exported (Fig. 2), representing the highest annual production ever recorded from Solomon Islands (worth ~USD 300,000). Annual catches of trochus in the 1970s were variable, but averaged 410 t for the period 1972–1979 (Fig. 2). However, the price was low at SBD 0.60 per kg (~USD 0.60 per kg) (Fig. 3). From

1980–1989, catches were less variable except for 1986, when ~700 t were exported (Fig. 2).

From 1987 onwards, there was a rapid increase in the price paid for trochus (Fig. 3). By 1990, it was SBD 15 per kg, and by 1996 it rose to SBD 28 per kg. During this period, substantial proportions of the catch were sold to a number of local button factories. Despite the high and steady price for trochus, production leveled off and fell to its lowest level in the fishery's history (< 100 t yr<sup>-1</sup>). From the late 1990s to the early part of 2000, average annual production

increased only slightly to  $>150 \text{ t yr}^{-1}$ . This indicates that stocks suffered serial depletions in many parts of the country and had been overfished during the 1980s and early 1990s. Serial depletion refers to the process when fishers exploit the closest productive reefs and move on to other reefs as resources from nearby reefs become depleted. In so doing, national production remains fairly constant for a protracted period of time. However, it then declines rapidly once all available reefs have been heavily fished.

The slight peak in production in 1999 corresponded with the period of ethnic tension when many people lost their sources of income and fished for trochus. This is evidenced by a huge consignment of under-sized trochus ( $\leq 6 \text{ cm}$  basal diameter) intercepted and confiscated by the Fisheries Department during this period (Ben Buga,<sup>2</sup> pers. comm.).

### Comparison with other Pacific Island countries and territories

It is now imperative that remaining trochus stocks in Solomon Islands are properly assessed and protected from excessive fishing. A survey of invertebrates at four sites in Solomon Islands in 2006 by SPC's PROCFISH/C project found that the density of trochus averaged only  $11 \text{ shells ha}^{-1}$  in what were once leading trochus fishing areas (Sandfly, Marau, Chumbikopi and Rarumana). The mean densities of

trochus at these four sites were low compared with mean densities at other sites in the Pacific (Fig. 4).

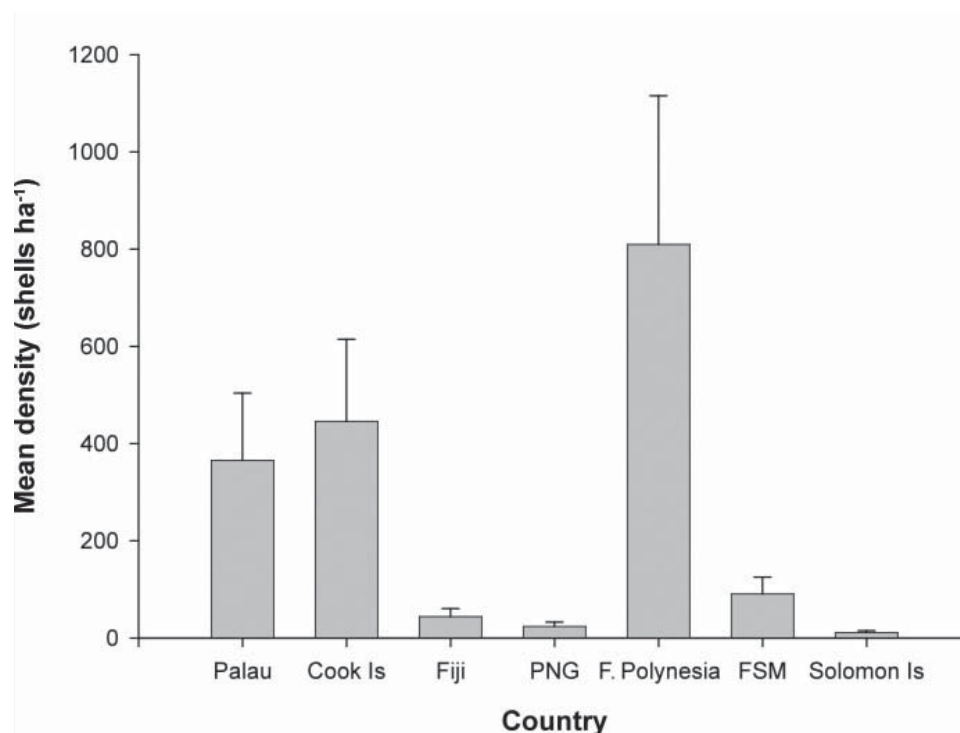
### Recommendations

In light of the significant decline in trochus catches over the last decade, the Solomon Islands Ministry of Fisheries and Marine Resources needs to take remedial measures to rebuild its trochus fishery to more productive levels.

Solomon Islands fisheries regulations include a prohibition on harvesting specimens smaller than  $8 \text{ cm}$  and larger than  $12 \text{ cm}$  basal diameter. It is apparent from the sharp fall in production since the mid-1990s that this regulation alone is insufficient to control overfishing. Instead, as evidenced from successfully managed trochus fisheries in Cook Islands and Palau — where densities exceed  $300$  shells per ha (Fig. 4) — tightly controlled open and closed seasons are required, in addition to imposing maximum and minimum size limits, in order for the fishery to be successful.

Given the critically low status of stocks in Solomon Islands, several other interventions are needed.

- 1) A moratorium on trochus exports should be implemented immediately, and maintained until stocks recover to more productive levels



**Figure 4.** Mean densities of trochus in countries surveyed by SPC between 1999 and 2007. Vertical bars represent standard errors.

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(i.e. 200–300 shells ha<sup>-1</sup>). While the moratorium is in place, a management plan should be prepared to properly address management of this resource in the future.

- 2) During the moratorium, selected stocks from the Arnavon Islands Marine Conservation Area should be transplanted to reefs elsewhere in the country (such as in Olevugha, Gela) that have been depleted of trochus, in order to fast-track the recovery of spawning populations.
- 3) Three to five years after imposing the moratorium, stock assessments should be conducted in representative areas of the country to determine if stocks have been restored to target levels. If not, surveys should be repeated every one to two years thereafter until it is evident that the fishery can be re-opened. (It is likely that the fisheries for some provinces will be re-opened before others.)
- 4) Before opening the fishery in any province, a sustainable total allowable catch (TAC) should be determined based on the densities of trochus per hectare, total area of trochus habitat, and sustainable harvest level (30–40% of harvestable stock). Practical management relating to administering provincial TACs may prove difficult in which case it may be necessary to revert to only one national TAC.
- 5) Identify the period for and duration of open season required to take the recommended TAC for each province. Arrangements for implementing and monitoring the open season should be well planned in consultation with local fishing communities.
- 6) Practical open seasons for each province should be sequential in order to provide exporters with a continuity of supply throughout much of the year.
- 7) The slot size limit for trochus with a basal diameter of 8–12 cm should be maintained and applied to each province's TAC.

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