

## Research Notes

### High density of *Tridacna crocea* in exposed massive corals proximate the Ranger Station of Tubbataha Reefs Natural Park, Cagayancillo, Palawan, Philippines

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The crocus clam *Tridacna crocea*, one of the seven known giant clam species in the Philippines (Poutiers 1998), is widely distributed in the Indo-Pacific Region but is possibly extinct in Guam and Northern Mariana Islands (IUCN 2014). In the Philippines, the exploitation of all giant clam species is prohibited under Fisheries Administrative Order No. 208, series of 2001 (DA 2001). However, illegal exploitation of giant clams in many parts of the country has greatly reduced natural stock populations (Gomez and Mingoa-Licuanan 2006; Gonzales et al. 2014; Picardal and Dolorosa 2014), and only in marine protected areas such as Tubbataha Reefs Natural Park (TRNP) where high densities (100-220 ind.100 m<sup>-2</sup>) of *T. crocea* (Calumpong and Cadiz 1993; Ozoa 1995; Dolorosa and Schoppe 2005) have been reported. Methods to quantify the abundance of this species involved the use of either belt transect with 1 x 1 m quadrat placed every 10 m or 2 x 100 m belt transect. No data are so far available on the density of *T. crocea* embedded in coral rocks exposed at low tide.

To quantify the abundance of *T. crocea* in massive corals with heads exposed at low tide, some exposed corals near the vicinity of the Ranger Station of TRNP were randomly sampled in June 2010. The area of coral heads was measured by using a quadrat and then by measuring the shell lengths of *T. crocea* with calipers (Figure 1).

Among the ten coral heads surveyed (area =40.75 m<sup>2</sup>), a total of 236 *T. crocea* was noted. The densities of *T. crocea* ranged from 200-2,200 ind.100 m<sup>-2</sup> with an average ( $\pm$ sd) of 767 ( $\pm$ 559) ind.100 m<sup>-2</sup> (Table 1). The sizes of *T. crocea* varied between 10-135 mm with an average ( $\pm$ sd) shell length of 67.67 ( $\pm$ 32.26) mm (Figure 2). *Tridacna crocea* can attain 150 mm maximum shell length but commonly 110 mm (Poutiers 1998). There is no available literature on the size at which *T. crocea* becomes sexually mature, however, if *T. crocea* begins to reproduce after attaining nearly 40% (60 mm) of its maximum shell length (150 mm) as recorded for *Tridacna maxima* by Jameson (1976), then at least more than half (57%) are sexually mature.

About 14% of samples were very small (10-29 mm) and such may indicate a self seeding reef.



Figure 1. Measuring the shell lengths of *T. crocea* with the use of calipers (left) and a close-up view of several individuals embedded in exposed coral rock in Tubtataha Reefs Natural Park (right).

Table 1. Density of *Tridacna crocea* in coral heads near the Ranger Station of Tubtataha Reefs Natural Park (TRNP), Palawan, Philippines.

Area (m <sup>2</sup> ) of coral head	Number of <i>T. crocea</i>	Density (ind.m <sup>-2</sup> )	Density (ind.100 m <sup>-2</sup> )
3.75	17	4.53	453
5.00	18	3.60	360
7.50	15	2.00	200
4.00	21	5.25	525
4.50	31	6.89	689
1.00	10	10.00	1,000
8.00	49	6.13	613
4.00	28	7.00	700
1.50	14	9.33	933
1.50	33	22.00	2,200
<b>Average</b>		<b>7.67</b>	<b>767</b>
<b>SD</b>		<b>5.59</b>	<b>559</b>

These high densities of *T. crocea* could be due to the manner of survey which only accounted for the coral heads exposed at low tides. In 2009, a survey involving 40 transects (20 x 2 m) in the surrounding reefs within the Ranger Station of TRNP recorded an average density of 39.25 ind.100 m<sup>-2</sup> (range: 3.13-126.25 ind.100 m<sup>-2</sup>) (Dolorosa unpublished data). Previous densities obtained along the transect lines at intertidal (13 ind.100<sup>-2</sup> m) and 5 m deep (3 ind. 100<sup>-2</sup> m) areas of the park (Dolorosa and Schoppe

2005) were lower than the present data. Lower densities (31 ind.100<sup>-2</sup> m) were also recorded using transect surveys in Apulit Island, Taytay, Palawan (Gonzales et al. 2014) and many other areas of the Philippines (see bin Othman et al. 2010). Much lower were the densities in Seribu Island (2.80 ind. 100 m<sup>-2</sup>) and Manado Waters, Indonesia (0.85 ind. 100 m<sup>-2</sup>) (Yusuf et al. 2009), and in intertidal (0.037 ind. 100 m<sup>-2</sup>) and subtidal (0.027 ind. 100 m<sup>-2</sup>) reefs of Singapore (Neo and Todd 2012).

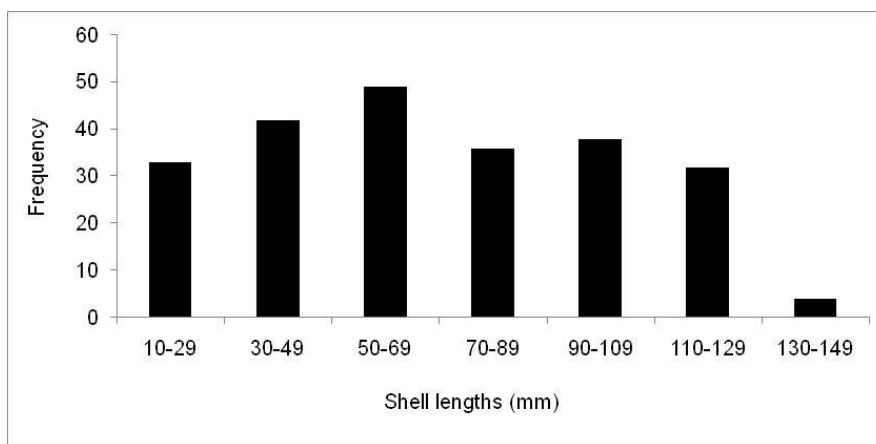


Figure 2. Size structure of *T. crocea* (n=236) embedded in coral rocks at the intertidal area proximate to the Ranger Station of Tubbataha Reefs Natural Park, Palawan, Philippines.

Giant clams are important component of the reef ecosystems. Their ecological roles have recently been reviewed and quantified which include their capacity to promote a balanced reef ecosystem (Neo et al. 2015). Any reef restoration project should therefore at least include the revival of giant clam populations. The current higher abundance of *T. crocea* within the Ranger Station of TRNP therefore requires effective protection, as the park represents an important natural genetic bank and seed source for clam-depleted reefs within its vicinity and other reefs in the Sulu Sea.

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