

# An update on sea cucumber diversity in Malaysia: Resurveying the reefs of Perhentian Island after two decades

Zaidnuddin Ilias,<sup>1\*</sup> Md Nizam Ismail<sup>1</sup> and Mohamad Saupi Ismail<sup>1</sup>

## Introduction

The importance of sea cucumbers as a lucrative marine product has made them the focus of various studies to date. Earlier studies in Malaysia focused on the presence and distribution of sea cucumbers in different habitats. The studies were conducted by various researchers and mainly took place in Sabah (see for example, Kamarudin et al. 2009).

From 1996–1999, the Heriot-Watt University in the United Kingdom and the Fisheries Research Institute of Malaysia undertook sea cucumber research as part of the Darwin Initiative for the Survival of Species (Baine and Choo 1999). One of the study sites was Pulau Perhentian Marine Park.

We resurveyed sea cucumber diversity on the coral reefs of Perhentian Island Marine Park in 2020, two decades later. Previously, 12 species of sea cucumbers were reported (Zaidnuddin and Forbes 2001), and included *Actinopyga lecanora*, *A. miliaris*, *Bohadschia argus*, *B. marmorata*, *Holothuria atra*, *H. edulis*, *Pearsonothuria graeffei*, *Stichopus chloronotus*, *S. herrmanni*, *S. ocellata*, *S. vastus* and *Synaptula lamperti* (Zaidnuddin and Forbes 2001).

Perhentian Island Marine Park consists of three main islands, and all were declared a marine park in early 1985. This more recent survey was conducted in order to look at the diversity of sea cucumbers found in several locations as a follow-up to the previous study.

## Methodology

The survey employed belt transects (60 m length x 5 m width) and a roving diver at six sites, three each at Perhentian Kecil Island and Perhentian Besar Island (Table 1)

(English et al. 1994). Transect sites were on fringing reefs paralleling the shore in depths of 5 m.

After the transect, a free-roaming dive search was made to areas beyond the laid transect (Schmitt et al. 2002). The underwater search for sea cucumbers was carried out for approximately 30 minutes. Sea cucumber species were determined using *A taxonomic key and field guide to the sea cucumbers of Malaysia* (Forbes et al. 1999; Forbes and Zainuddin 1999). Species, number and length were recorded. The sites were dominated by boulder corals (*Porites* spp.) that formed small patches of fringing reef.

## Results and discussion

The eight sea cucumber species observed during the 2020 survey were *Stichopus chloronotus*, *S. vastus*, *Holothuria atra*, *H. edulis*, *Bohadschia marmorata*, *B. argus*, *Synaptula lamperti* and *Pearsonothuria graeffei* (Fig. 2). Other large and common sea cucumbers that had been previously reported (in 2001) – such as *Actinopyga lecanora*, *A. miliaris*, *Stichopus ocellata* and *S. herrmanni* – were not found in all six study sites. The Alunan Reef site had the highest number of species (6) followed by Light House (4), Pasir Petani and Pasir Tiga Ruang (3 each), Tanjung Tukas (2) and Shark Point (1) (Table 2). Sea cucumber densities were 0.21 individual/m<sup>2</sup> at Alunan Reef, 0.14 individuals/m<sup>2</sup> at Pasir Petani, 0.11 individuals/m<sup>2</sup> at Pasir Tiga Ruang, 0.09 individuals/m<sup>2</sup> at Light House, 0.03 individuals/m<sup>2</sup> at Shark Point and 0.1 individuals/m<sup>2</sup> at Tanjung Tukas.

The number sea cucumber species found during the 2020 survey was lower than the number observed in the 2001 survey (Table 3). Some large, high-value species, which could be easily found on the reefs, such as *Stichopus ocellatus* and

**Table 1.** Sampling locations at Perhentian Kecil and Perhentian Besar islands, northeastern Malaysian peninsula.

No	Location	GPS position	Abbreviation
<b>Perhentian Kecil Island</b>			
1	Lighthouse	5°54'35.92"N 102°42'35.18"E	LH
2	Pasir Petani	5°53'42.08"N 102°43'70.24"E	PP
3	Alunan Reef	5°53'36.06"N 102°43'23.21"E	AR
<b>Perhentian Besar Island</b>			
4	Pasir Tiga Ruang	5°54'47.19"N 102°45'11.07"E	PTR
5	Shark Point	5°53'03.58"N 102°44'48.03"E	SP
6	Tanjung Tukas	5°53'16.70"N 102°46'14.46"E	TT

<sup>1</sup> Fisheries Research Institute Batu Maung, 11960 Batu Maung, Penang, Malaysia

\* Author for correspondence: zaiali71@gmail.com

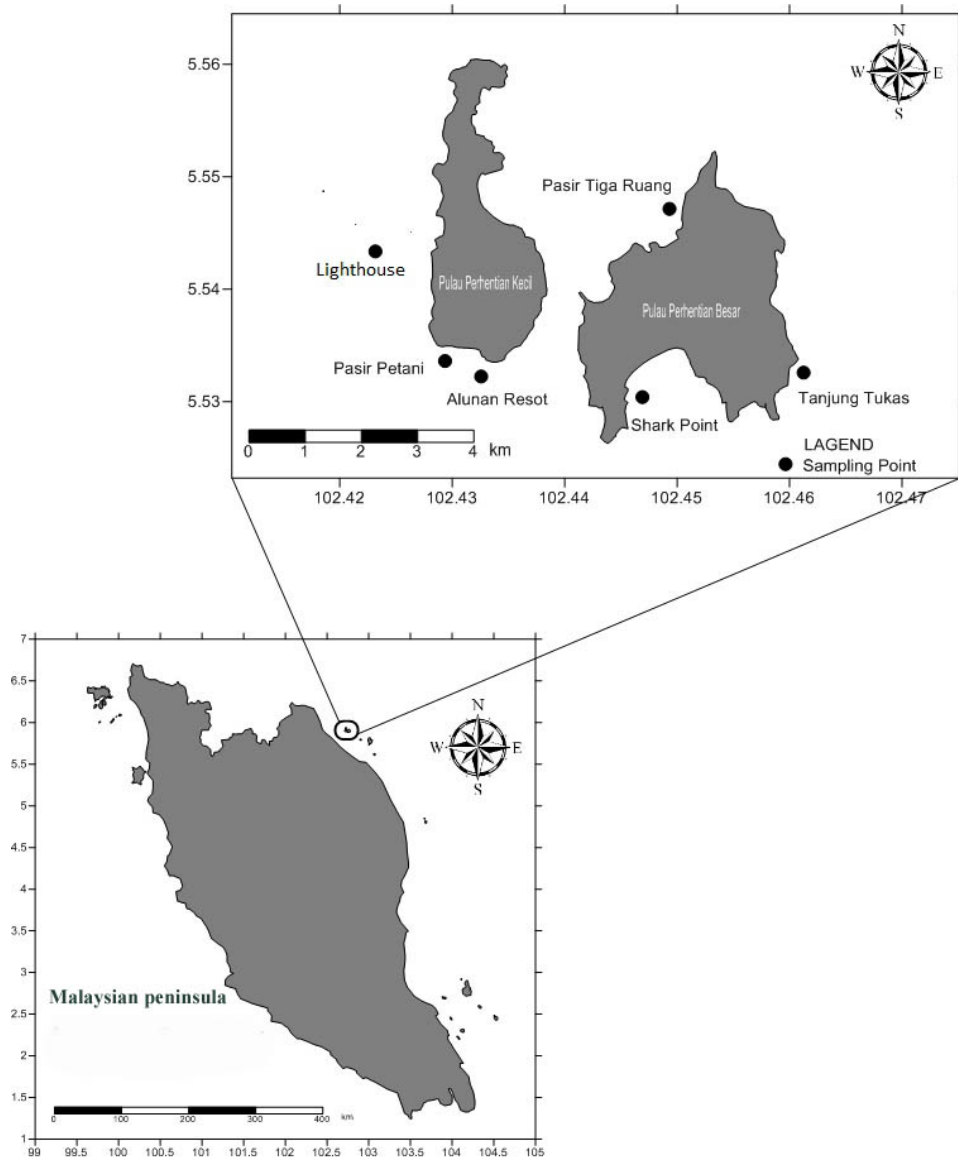


Figure 1. Perhentian Island Marine Park, Malaysia.

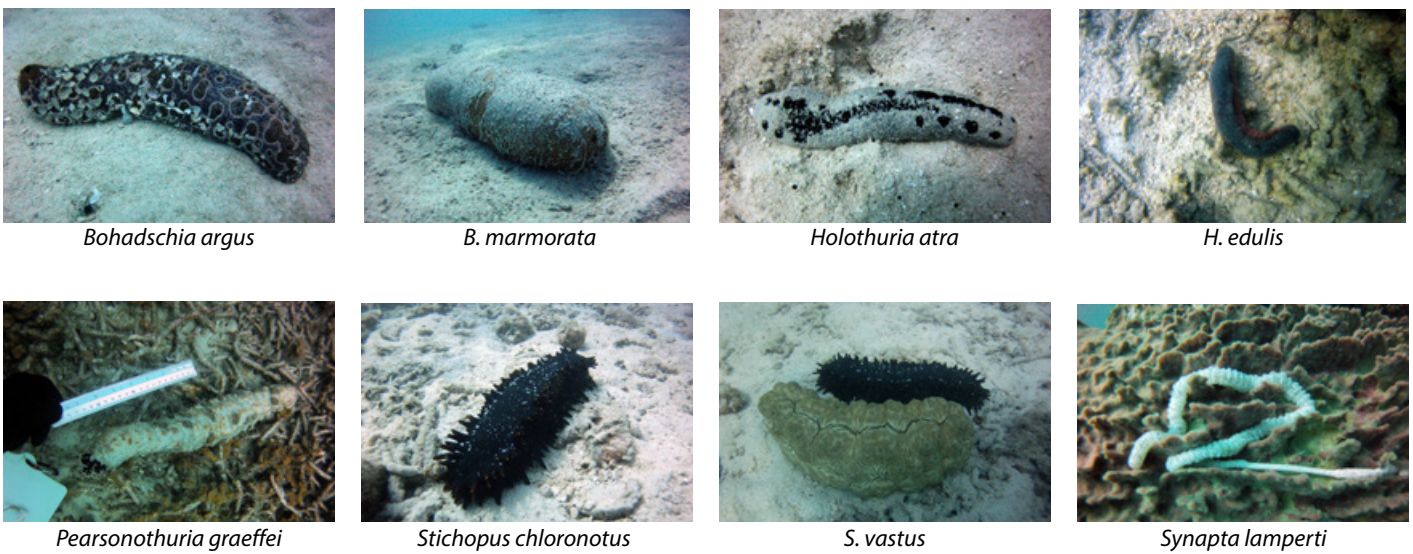


Figure 2. The eight sea cucumber species observed during the 2020 survey.

**Table 2.** The number of sea cucumbers of each species encountered at each survey site.

Species	Site*						Total no/ species
	PP	AR	PTR	SP	LH	TT	
<i>Holothuria edulis</i>	2	10	28	0	10	20	70
<i>Holothuria atra</i>	29	7	2	10	5	0	53
<i>Bohadschia marmorata</i>	0	20	0	0	0	0	20
<i>Bohadschia argus</i>	0	3	0	0	0	0	3
<i>Synaptula lamperti</i>	0	0	0	0	10	0	10
<i>Stichopus chloronotus</i>	12	23	3	0	0	10	48
<i>Stichopus vastus</i>	0	1	0	0	0	0	1
<i>Pearsonothuria graeffei</i>	0	0	0	0	3	0	3
<b>No of species found at each site</b>	<b>3</b>	<b>6</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>2</b>	

\* See Table 1 for the full names of these sites.

**Table 3.** The presence or absence of sea cucumber species as reported in 2001 and 2020 from the northeastern Malaysian peninsula.

No	Species	2001 survey (Zaidnuddin and Forbes 2001)	2020 survey (as reported in this article)
1	<i>Stichopus chloronotus</i>	+	+
2	<i>Stichopus herrmanni</i>	+	
3	<i>Stichopus vastus</i>	+	+
4	<i>Actinopyga lecanora</i>	+	
5	<i>Actinopyga miliaris</i>	+	
6	<i>Bohadschia marmorata</i>	+	+
7	<i>Bohadschia argus</i>	+	+
8	<i>Pearsonothuria graeffei</i>	+	+
9	<i>Holothuria coluber</i>	+	
10	<i>Holothuria atra</i>	+	+
11	<i>Holothuria edulis</i>	+	+
12	<i>Synaptula lamperti</i>	+	+
	<b>Total</b>	<b>12</b>	<b>8</b>

*S. herrmanni*, were not found during the 2020 survey. The possibility that these species have been overexploited cannot be ascertained, although there was a report of an incident of intrusion and fishing in Perhentian Island Marine Park (Rubiah 2019).

Kamaruddin et al. (2009) reported 19 sea cucumber species from their reviews of sea cucumber-related research papers. Eleven of the sea cucumber species were identified while eight were unidentified. The species observed are of low value in the sea cucumber trading world. Even though the roving diver technique covers a wider search area along the transect, only a few additional species were observed outside the belt transect.

## Conclusion

We observed fewer numbers of sea cucumber species during the 2020 survey. The *Stichopus* species that were not found are of concern, because these species are the most sought-after sea cucumbers for local traditional medicine. Further observations and communications with local people are needed to confirm the status of these resources.

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## References

- Baine M. and Choo P.-Z. 1999. Sea cucumber fisheries in Malaysia, towards a conservation strategy. SPC Beche-de-mer Information Bulletin 12:6–10. <https://purl.org/spc/digilib/doc/mzfw1>
- English S., Wilkinson C.R. and Baker V.J. 1994. Survey manual for tropical marine resources. Townsville, Australia: Australian Institute of Marine Science. 368 p.
- Forbes R. and Zainuddin I. 1999. The conservation of sea cucumbers in Malaysia- their taxonomy, ecology and trade. p. 49–63. In Baine M. (ed). Proceedings of an international conference. Department of Agriculture, Kuala Lumpur, Malaysia. Orkney, Scotland: Heriot-Watt University.
- Forbes R., Ilias Z., Baine M., Choo P.S. and Wallbank A. 1999. A taxonomic key and field guide to the sea cucumbers of Malaysia. Orkney, Scotland: Heriot-Watt University. 61 p.
- Kamarudin K.R., Rehan A.M., Lukman A.L., Ahmad H.F., Anua M.H., Nordin N.F.H., Hashim R., Hussin R. and Usup G. 2009. Coral reef sea cucumbers in Malaysia. *Malaysian Journal of Science* 28(2):171–186. <https://doi.org/10.22452/mjs.vol28 no2.6>
- Rubiah O. 2019. Nelayan Vietnam curi Gamat. *Sinar Harian* 15 Mac 2019 (<https://www.sinarharian.com.my/article/18249/EDISI/Terengganu/Nelayan-Vietnam-curi-gamat>)
- Schmitt E.F., Sluka R.D. and Sullivan-Sealey K.M. 2002. Evaluating the use of roving diver and transect surveys to assess the coral reef fish assemblage off southeastern Hispaniola. *Coral Reefs* 21(2):216–223. <https://doi.org/10.1007/s00338-002-0216-y>
- Zainuddin I. and Forbes R. 2001. Inventory of sea cucumber species of Perhentian Island and Bidong Island, Terengganu. p 97–105. In: Husain M.L., F. Shahrom, A.T. Law, K. Yunus and A.R.G.Yaman. Proceeding of the National Symposium on Marine Park and Terengganu Islands. 12–13 Feb 2001. Department of Fisheries, Kuala Lumpur and KUSTEM, Kuala Terengganu. Malaysia.