

The status of commercial sea cucumbers from Egypt's northern Red Sea Coast

M.I.Ahmed¹ and A.J.Lawrence¹

Abstract

Following an initial study in which evidence indicated that commercial sea cucumber stocks in the Egyptian Red Sea had been significantly overexploited by the development of a commercial fishery, this study aimed to re-visit some of the sites of the original study to determine whether there was any evidence of stock recovery following the 2003 fishery ban adopted by the Red Sea Governorate and other authorities. Four sites were assessed using the belt transect method applied in the original study. The sites were selected based on their accessibility, initial stock levels, and degree of exploitation. A further six sites were assessed visually to determine the presence or absence of commercial species. Evidence from the current study indicates that four years after the ban on the fishery, there is evidence that some commercial species are returning to some of the sites, but there is no evidence of stock recovery.

Introduction

The sea cucumber fishery is characterized by boom and bust cycles, with biological overexploitation often occurring before economic overexploitation (Preston 1993; Conand 1997). Overharvesting is a worldwide phenomenon (Conand 2000) and recovery of depleted populations is slow and sporadic (Kinch 2002). In Torres Strait, for example, the *H. scabra* fishery has not recovered from heavy depletion in 1996, even though the fishery has been closed since 1998 (Skewes et al. 2000).

After the depletion of sea cucumber fisheries in other parts of the world (Kinch 2002; Lovatelli et al. 2004), a small-scale sea cucumber fishery began in Egypt in 1998 on the southern part of Red Sea coast. By 2000, the sea cucumber fishery in Egypt had increased greatly as a result of the high demand for beche-de-mer and the high prices paid for it (Lawrence et al. 2004).

In Egypt, two methods were used to harvest sea cucumbers. In the south, sea cucumber were harvested with a benthic trawl. Initially considered as bycatch, sea cucumbers were later specifically targeted and subjected to heavy trawling activity. In the central part of the Egyptian Red Sea and the Gulf of Aqaba, collecting was done by scuba diving. Some species were also harvested by hand at low tide on the reef flats (Lawrence et al. 2004).

In April 2000, the Red Sea Governorate banned sea cucumber fishing in the coastal area under its

jurisdiction. However, the neighbouring Suez Governorate continued with an open fishery. This led to further depletion of stocks in the Red Sea as a whole, and added to the difficulty of policing Red Sea Governorate coastal areas (Lawrence et al. 2004). Furthermore, the ban led to the development of a large illegal fishery in the region under the jurisdiction of the Red Sea Governorate. This illegal fishery continued unabated, both as a result of the low level of patrolling (and difficulty of policing such a large area) and the development of a conflict between the Egyptian Environmental Affairs Agency (EEAA), which wanted to limit the fishery, and the Ministry of Agriculture, Department of Fisheries, which aimed to exploit the resource to its maximum (Ahmed 2006).

Despite the efforts of the EEAA and other environmental agencies to retain the ban, the sea cucumber fishery was re-opened in 2002 and licenses to collect sea cucumbers were issued: 52 boat licenses and 100 individual fishermen licenses. Due to further depletion of commercial holothurians, a meeting was held in March 2003. This meeting was attended by representatives from the EEAA, Ministry of Agriculture, and the Red Sea Governorate. This resulted in a second ban on the fishery, which was implemented in December 2003. In this instance, however, the ban applied to the whole of Egypt and had the support of all relevant agencies (Ahmed 2006).

Since the original survey by Lawrence et al. (2004) and the 2003 ban on the fishery, there has been no follow-up monitoring of sea cucumber stocks to

1. Department of Biological Sciences, University of Hull, Hull HU6 7RX.

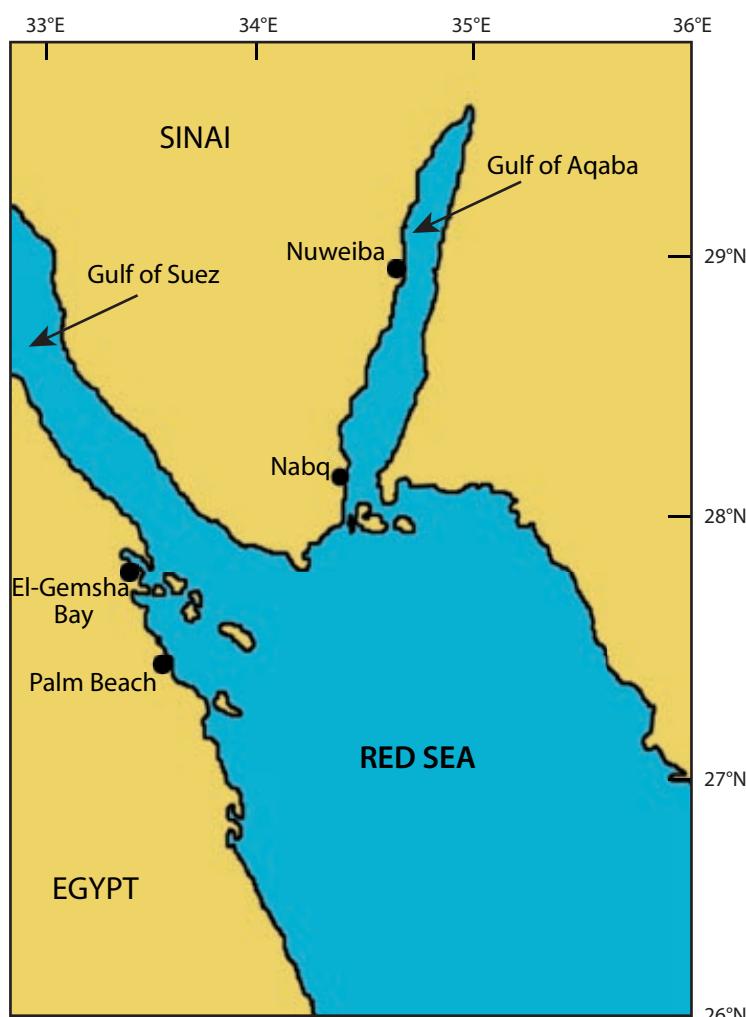


Figure 1. The four sites selected for re-survey of commercial sea cucumber stocks along the Red Sea coast and Gulf of Aqaba.

determine whether there has been any recovery, particularly of commercial species. The aim of this small study was, therefore, to re-visit some of the sites surveyed in the original stock assessment to assess whether there has been any recovery in stocks since the 2003 ban.

Materials and methods

Four sites were selected to be re-surveyed for signs of sea cucumber recovery. Two sites were in the Gulf of Aqaba (Nabq protected area and Nuweiba) and two (El-Gemsha Bay and Palm Beach) were on the Red Sea coast (Fig. 1). These sites were characterized by a relatively high density of certain commercial sea cucumber species in 2002, followed by later overexploitation.

A belt transect method — described in the original survey by Lawrence et al. 2004 — was repeated in the current study to determine the composition, density and abundance of holothurians at each site.

A 50-m line was laid parallel to the shore at depths of 5–10 m, 10–20 m and 20–30 m. All sea cucumber species occurring within the 50-m belt transect were counted and identified whenever possible.

In addition, six other sites were re-visited in order to collect samples for a separate study. These six sites were on the islands offshore from Hurghada on the Egypt's Red Sea coast, south of Palm Beach. While quantitative data were not collected at these sites, the species of sea cucumber found were noted and compared with those observed in the original survey.

Data collected in the current study are compared with data collected from each site in the original survey.

Results

Results from the current study indicate that at the four empirically surveyed sites, there has been very

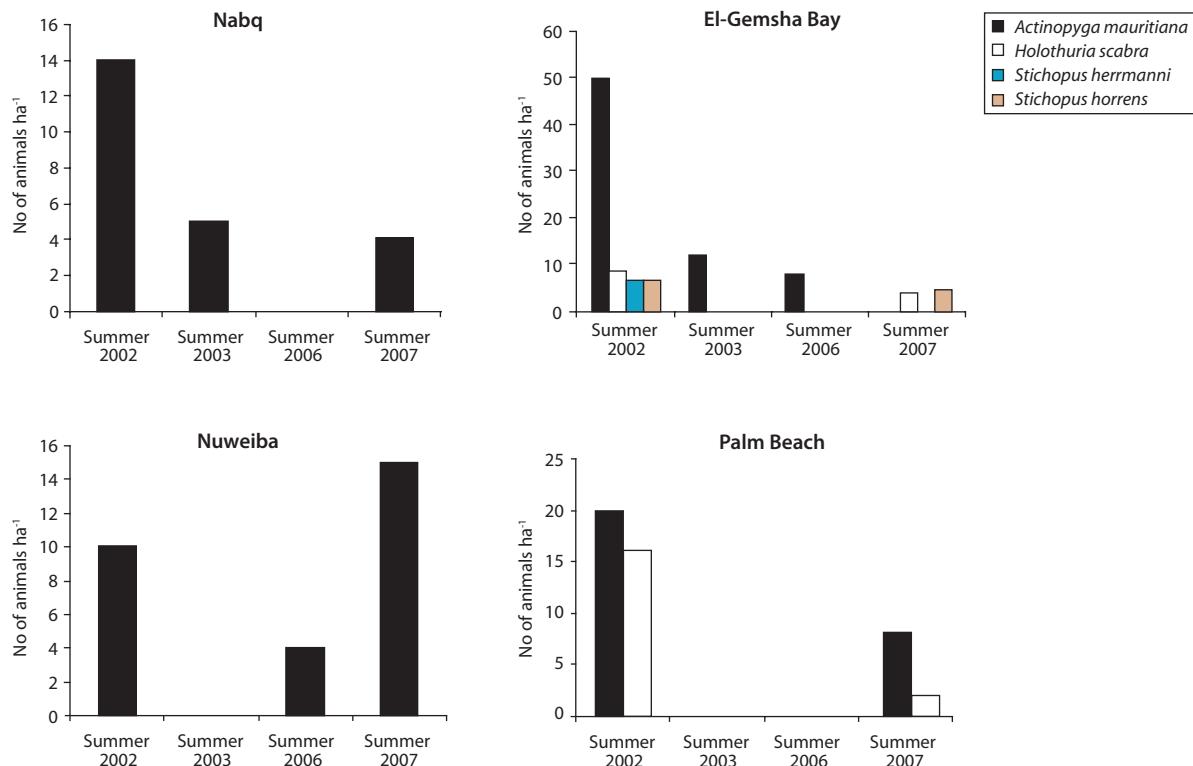


Figure 2. Density (i.e. number of animals ha^{-1}) of commercial holothurian species found at four sites along Egypt's Red Sea coast.

limited recovery of commercial species (Fig. 2). At Nabq in the Gulf of Aqaba, *A. mauritiana* is still the only commercial species present. Its numbers were reduced from 14 ha^{-1} in 2002 to 0 in 2006. Animals have again been found in 2007 but only at a density of 3 ha^{-1} . Therefore, at this stage it is not possible to confirm that *A. mauritiana* is showing real recovery from its 2002 status. However, at Nuweiba there may be some recovery of *A. mauritiana*. Numbers there fell from 10 ha^{-1} in 2002 to 0 by 2003 but appear to have recovered to 2002 figures by 2007. However, no other commercial species were found at the site.

There were also mixed results at the Red Sea coast sites. At El-Gemsha Bay there appears to have been no recovery in *A. mauritiana* numbers. However, *S. herrmanni* and *S. horrens*, which appeared to have been lost from the area by 2003, seem to have returned to the site by 2007. A similar trend is apparent at Palm Beach. Both *A. mauritiana* and *H. scabra* appeared to have been fished from the site by 2003 but have returned by 2007 although their numbers are much lower than those recorded in 2002.

Given the limited nature of the data from the four sites, only El-Gemsha Bay has shown a significant difference in the number of commercial spe-

cies present between years ($\chi^2 = 21.88$, $P < 0.05$). This is most likely due to the loss and subsequent return of *S. herrmanni* and *S. horrens* between 2002 and 2007. In addition, *A. mauritiana* was the only species to show a significant difference in numbers between years within sites ($\chi^2 = 43.35$, $P < 0.001$).

While there some species have returned to some sites, their densities remain low and on the whole show little evidence of recovery. Densities reported at the four sites are lower than those reported for the whole of Egypt in 2002 (Table 1).

For the additional six sites visually surveyed there are again mixed observations. These indicate that *H. atra* has returned to Fanadier and *H. nobilis* to Small Magawish. *A. mauritiana* was also found to have returned to Ben-Elgebal and Big Giftun, but appears to have disappeared from Small Giftun (Table 2).

Discussion

Lawrence et al. (2004) found that Egypt's sea cucumber fishery had followed a similar pattern found elsewhere: a boom in the fishery followed by a collapse of most stocks. There were no sites in

Egypt that had not been fished. However, the comparison between sites with some protection, such as El-Gemsha Bay, with those heavily exploited showed a significant difference, with the most valuable species completely absent at the heavily fished sites (Lawrence et al. 2004).

Based on the current survey, a ban on the fishery in late 2003 appears to have had a positive but limited impact on the fishery. However, a comparison of species densities in the current study with densities in 2002 (and with some published in the Indo-Pacific region) indicate that while some species have returned to some sites, their populations have not recovered to previously reported levels or to the highest levels reported elsewhere (Shelley 1981; Preston 1993; Lawrence et al. 2004). However, pop-

ulation densities still remain above those reported in the Torres Strait, Great Barrier Reef or Warrior Reef (Long et al. 1996; Skewes et al. 2000; Uthicke and Benzie 2001; Kinch 2002).

Based on the evidence from this study, it appears that there may have been a slight recovery of some commercial stocks in some sites, but there has been no real overall recovery of sea cucumber stocks.

Acknowledgements

This study forms part of a large follow-up project that has been supported by the Darwin Initiative (Project Reference: EIDPO8/10-027). We wish to thank Mr Mohammed Yosri who helped with the survey work and the EEAA for logistical support.

Table 1. Density of commercial sea cucumbers per hectare in Egypt.

Species	Northern Red Sea (Gulf of Aqaba)		Egyptian Red Sea coast	
	Previous study	Current study	Previous study	Current study
<i>Holothuria scabra</i>	0.0	0.0	158.0	2.0
<i>Stichopus herrmanni</i>	28.0	0.0	46.0	5.0
<i>Stichopus horrens</i>	4.0	0.0	19.6	4.0
<i>Actinopyga mauritiana</i>	70.0	14.0	204.0	15.0
<i>Holothuria atra</i>	950.0	285.2	1002.4	394.3

Table 2. Occurrence of commercial holothurian species at six sites on the islands off the Hurghada coast in 2002 and 2007.

Sites	<i>H. atra</i>		<i>A. mauritiana</i>		<i>P. graeffei</i>		<i>H. nobilis</i>	
	2002	2007	2002	2007	2002	2007	2002	2007
Ben-Elgebal	P	P	A	P	A	A	A	A
Small Magawish	P	P	P	A	P	P	A	P
Big Magawish	P	P	A	P	A	A	A	A
Big Giftun	P	P	P	P	A	A	A	A
El-Ghona	P	P	P	P	A	A	A	A
Fanadier	A	P	P	P	A	A	A	A

P = present, A = absent

References

- Ahmed M.I. 2006. Taxonomic and fishery stock status of sea cucumber in the Egyptian Red Sea. MPhil Thesis, University of Hull.
- Conand C. 1997. Are holothurian fisheries for export sustainable? International Congress on Reefs, Panama, 2:2021–2026.
- Conand C. 2000. Editorial. SPC Beche-de-Mer Information Bulletin 13:1–2.
- Kinch J. 2002. The beche-de-mer fishery in the Milne Bay Province of Papua New Guinea. A report to the National Fisheries Authority, Port Moresby, PNG & CSIRO, Queensland, Australia.
- Lawrence A.J., Ahmed M., Hanafy M., Gabr H., Ibrahim A. and Gab-Alla A. 2004. Status of the sea cucumber fishery in the Red Sea – The Egyptian experience. In: Lovatelli A., Conand C., Purcell S., Uthicke S., Hamel J.-F. and Mercier A. (eds). Advances in sea cucumber aquaculture and management. FAO Fisheries Technical Paper. No. 463. Rome, FAO. 2004. 457 p.
- Long B.G., Skewes T.D., Dennis D.M., Poiner I.R., Pitcher C.R., Taranto T., Manson F., Polon F., Karre B., Evans C. and Milton D. 1996. Distribution and abundance of beche-de-mer on Torres Strait reefs. CSIRO Division of Fisheries Final Report, March 1996. 99 p.
- Lovatelli A., Conand C., Purcell S., Uthicke S., Hamel J.-F. and Mercier A. (eds.). 2004. Advances in sea cucumber aquaculture and management. FAO Fisheries Technical Paper. No. 463. Rome, FAO. 2004. 457p
- Preston G.L. 1993. Beche-de-mer. p. 371–407. In: Wright A. and Hill L. (eds). Nearshore marine resources of the Southern Pacific: Information for fisheries development and management. Institute of Pacific Studies, Fiji; Forum Fisheries Agency, Solomon Islands; International Centre for Ocean Development, Canada.
- Shelly C. 1981. Aspects of the distribution, reproduction, growth and 'fishery' potential of holothurians (beche-de-mer) in the Papuan coastal lagoon. Msc. University of Papua New Guinea 165 p.
- Skewes, T.D., Dennis D.M., and Burridge. 2000. Survey of *Holothuria scabra* (sandfish) on Warrior Reef, Torres Strait, January 2000, CSIRO Division of Marine Research.
- Uthicke S. and Benzie J.A.H. 2001. Allozyme electrophoresis indicates high gene flow between populations of *Holothuria (Microthele) nobilis* (Holothuroidea:Aspidochirotida) on the Great Barrier Reef. Marine Biology 137(5–6):819–825.