



**The Recovery of the *Holothuria scabra* (sandfish)
population on Warrior Reef, Torres Strait.
Milestone Report**

CSIRO Marine and Atmospheric Research

A report for the Australian Fish Management Authority

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1. INTRODUCTION

Holothuria scabra (sandfish) is an important fishery species in the Indo-west Pacific. In recent years the value of bêche-de-mer product has increased markedly and many fisheries in the region have been overexploited. Depleted stocks have been shown to have variable but generally slow recovery rates. The main problem for the sustainable utilisation of these fisheries has been the lack of scientific and/or fisheries information with which to formulate sustainable management strategies. The population dynamics of sea cucumbers and sandfish in particular, is of strong interest given the variable recovery rates and poorly defined recruitment dynamics for sea cucumber fisheries in Australia and overseas. Long term datasets that can be linked to exploitation and recovery are essential for exploring the mechanisms that control population densities for these potentially valuable fisheries.

The sandfish fishery of Torres Strait provides an opportunity for Islanders to gain significant income at the community level. The sandfish fishery on the Australian side of Torres Strait began around 1992, and was heavily exploited over a three-year period from 1994 to 1996, with 1400 tonnes (wet weight) conservatively estimated being caught in 1995 - equivalent to AU\$9.4M at today's market price.

The first fishery independent survey of the sandfish population was carried out, by CMAR, in late 1995 and found that the density of the breeding year-class (2+ yr old) was relatively low. A second survey in January 1998 found that the population density was lower than in 1995 and that both recruiting (1 yr old) and breeding year-classes (2 yr old) were depleted. Because of this finding, the fishery was closed in January 1998. The sandfish population was surveyed again in January 2000 (Skewes et al., 2000) and 2002 (Skewes et al., 2006), which showed a small recovery. It was hoped that this might provide the basis for a strong recruitment to the fishery by early 2004, however, another survey in 2004 (Skewes et al., 2006) showed that sandfish density actually decreased to similar levels as in 1998, when the fishery was closed. There was some evidence that poaching was occurring on the Australian side of the border by PNG Nationals, and the conclusion was that this was the primary reason for the lack of a recovery in the sandfish population; so AFMA instigated a major operation to maintain surveillance on the PNG-Australian border and apprehend and deter poachers. This operation has now been active for three years and during that time there have been significant apprehensions. By all accounts, the operation has been considered to be successful.

The sandfish population on Warrior Reef has not been surveyed since 2004. Given the apparent success of the surveillance operation that may have reduced illegal poaching of the population, and the subsequent closure of the PNG fisher, there is some possibility of a recovery in the Warrior Reef sandfish population.

This project would carry out a relative density survey of the sandfish population of Warrior Reef in early 2010. The continued monitoring of the density and dynamics of the depleted sandfish population is essential to developing an understanding of the

recovery dynamics of this, and other sea cucumber populations. This survey will also help determine recovery targets for renewed fishing of this species.

The outputs from the project will include a survey report and analysis of the relative density of sandfish. This information will be used to further develop poorly understood population parameters for input into developing population models and a basis for formulating robust sustainable management strategies. We will also gather information on gross environmental parameters, not only for assessing the effects of fishing, but for mapping and monitoring the environment in general. The information will also be input into developing co-management frameworks being developed for the Torres Strait Hand Collectables fishery, and the Decision Support Tool being developed by CMAR for management strategy development for Torre Strait fisheries.

2. ISLANDER CONSULTATION

This project has been the focus of discussions at TSHCWG meetings since 2006, and also directly with CFG representatives from the central Islands over the past two years. There has been a strong desire for this survey from the Torres Strait Islander representatives for some time.

The projects overall design has been ratified by the TSHCWG, and the detailed survey design will be discussed and ratified during targeted consultations with islander representatives, including CFG, Prescribed Body Corporates and Island Councillors before the survey.

The history, status and previous research carried out on the Warrior Reef sandfish fishery has been communicated to Torres Strait islanders through TSHCWG meetings, dedicated Island workshops in 2005 and before the 2009 East Torres Strait survey. Our belief is that there is a high level of awareness for the fishery status among traditional owners. We will carry out community visits and supply appropriate communication material for conveying the outcomes of the research to Islander communities.

The outputs of the research will also be input into developing community based co-management harvest strategies being developed for the hand collectable fisheries in 2010.

This project will include a high level of interaction with Torres Strait Islanders, both in the design and carrying out of the survey, and interpretation of results. Torres Strait Islander representatives from the sea country of Warrior Reef (Iama Island) will be collaborated with during the lead up to the survey and two community researchers will participate on the field survey.

- Consultation through TS BDM working group.
- Letters and communication to Islander representatives.
- Survey information flyer posted on Island notice boards.

- Visit to Iama Island before survey by Tim Skewes. This included a presentation of scientific knowledge of Torres Strait sea cucumber fisheries to a community meeting, in conjunction with AFMA staff, and an extensive Q and A session.
- Involvement in survey by Iama traditional owner, Francis Filewood. Charles David assisted with the Iama Reef survey.

3. FIELD SAMPLING

The survey was carried out over a 6 day period from the 22 to 28 February 2010. Rapid marine assessment techniques developed, improved and applied by CSIRO for reef resource and habitat surveys in several areas of Australia, Papua New Guinea and the Seychelles were used (Skewes et al., 1998, Skewes et al., 2000, Skewes et al., 2006). As during previous surveys, the reefs of the study area were divided into two habitat strata; the reef edge and the reef top and sampled accordingly.

Density counts at repeated survey sites will be used to calculate high precision population trends information for the sandfish population on Warrior Reef. The analysis will include an assessment of recruitment from site counts and size frequency data, a technique that has been shown to be viable from previous surveys.

Field work was undertaken by a small team of divers operating from a dinghy and locating sample sites using hand-held GPS. On the reef-top, divers swam or walked along a 40m-100m transect, and recorded resource and habitat information 1-2m either side of the transect line. Sea cucumbers, trochus and other benthic fauna of commercial or ecological interest were counted and where possible, returned to the dinghy and measured as total length and then returned to the water.

At each site, substrate was described in terms of the percentage of sand, rubble, consolidated rubble, pavement and live coral. The growth forms and dominant taxa of the live coral component and the percentage cover of all other conspicuous biota, such as seagrass and algae were also recorded. Estimates of gross environmental parameters collected during the survey, will be used to assess the effects of fishing and to map and monitor the environment in general.



Figure 3-1 Iama Islander Francis Filewood measures a sandfish during the Warrior Reef survey.

3.1 Iama Island

Twenty walking and snorkel transects were undertaken at Iama Island. No sandfish were seen on transects, with four sandfish counted off transect in the seagrass dominated reef flat on the northern side of the island. This suggests that the reef area is suitable habitat for sandfish and could be a possible reseeding site.

3.2 Warrior Reef

Fifty seven walking and snorkel transects were undertaken on the southern section of Warrior Reef. A handful of sites were also re-sampled at different times of the day, to allow for comparison of sandfish behaviour at different tidal changes. A total of 223 sandfish were counted and measured.

3.3 Dungeness Reef

Thirty snorkel sites were undertaken on Dungeness Reef. No sandfish were seen on or off survey transects.

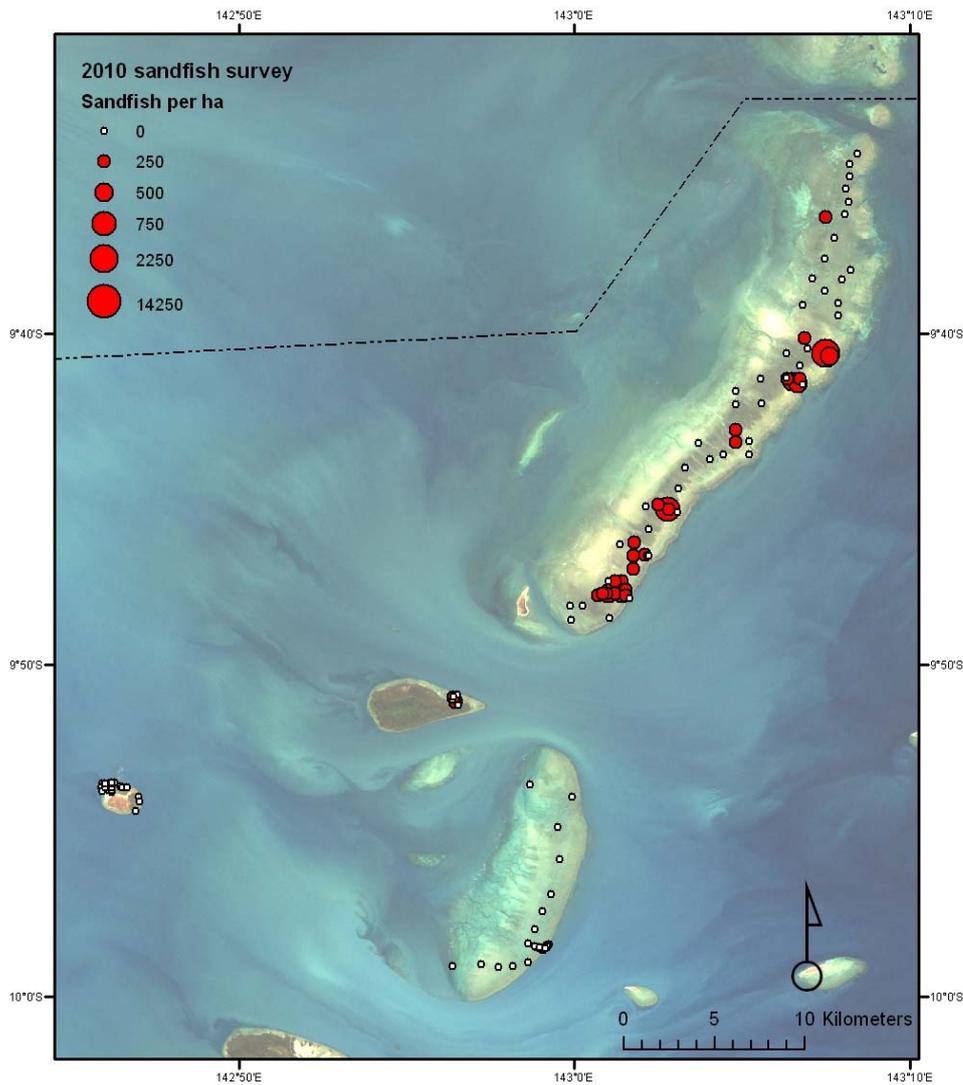


Figure 3-2 Locations of sample sites on lama, Dungeness and Warrior Reef with preliminary densities of sandfish observed

4. MEDIA RELEASES

Torres Strait News: Sandfish surveyed after 12 years, 25 May - 1st June, 2010 (see APPENDIX B).

5. FUTURE WORK

5.1 Entry and data checking

Transect and sample data collected during the field survey is being entered into an Access database. Once complete, the database will be imported into a centralised

Oracle database for analysis and long term storage. This data will then be input into statistical and GIS software for analysis.

5.2 Project outputs

The outputs from the project will include a survey report and analysis of the relative density of sandfish. This information will be used to further develop poorly understood population parameters for input into developing population models and a basis for formulating robust sustainable management strategies. We will also gather information on gross environmental parameters, not only for assessing the effects of fishing, but for mapping and monitoring the environment in general. The information will also be input into developing co-management frameworks being developed for the Torres Strait Hand Collectables fishery, and the Decision Support Tool being developed by CMAR for management strategy development for Torres Strait fisheries.

Information from the project will be provided to AFMA and Torres Strait Island stakeholders in the form of a plain English summary document. CSIRO staff will be available for Island visits to explain the outcomes of research to Islander communities.

6. REFERENCES

Skewes, T.D., C.M. Burridge, B.J. Hill (1998) Survey of *Holothuria scabra* on Warrior Reef, Torres Strait. Report to Queensland Fisheries Management Authority. CSIRO Division of Marine Research Report, 12 pp.

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Skewes, T.D., Taylor, S., Dennis, D.M., Haywood, M.E.D. Donovan, A. (2006) Sustainability Assessment of the Torres Strait Sea Cucumber Fishery, CRC-TS Project Task Number: T1.4, 50pp.

APPENDIX A - SURVEY INFORMATION FLYER POSTED ON ISLAND NOTICE BOARDS



Background

The sandfish fishery in Torres Strait is potentially an important source of income for Islander communities. Sandfish were heavily overfished during the mid 1990's, and the fishery was subsequently closed in 1998. Overfished sandfish stocks are generally slow to recover. The slow recovery may have been hampered by poaching, however, AFMA have recently increased their surveillance and the operation has been considered to be successful.

Surveys of the sandfish population on Warrior Reef have been carried out by CSIRO since 1995. The last survey in 2004 showed that sandfish numbers had not recovered. A new survey of sandfish on Warrior Reef and surrounding areas, will be undertaken to show if the population has recovered from its depleted state. This information is essential for management of the Torres Straits Beche-de-Mer fishery, including the move to adaptive co-management in line with aspirations for Torres Strait traditional communities.



CSIRO scientists and Mer Island co-researchers during a survey in 2009

Islander training and consultation component

- > The research project will include community consultation and involvement of Islanders.
- > Community consultation will be undertaken prior to the field survey on 21st February, 2010. A consultation visit will be conducted to lama Island to discuss the research with fishers.
- > A lama co-researcher will be employed by CSIRO to assist with the survey.

Methods

The survey will be conducted over 6 days from 23rd-28th February, 2010, using the "MV San Miguel". The sites selected for the Warrior Reef survey, will be chosen to provide the greatest power to detect changes in density of sandfish. We will also take advice from Torres Strait fishers as to likely high density areas for investigation.

Where: Warrior Reef, Dungeness Reef, lama home reef

Who



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MV San Miguel

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APPENDIX B - TORRES STRAIT NEWSPAPER ARTICLE

Sandfish surveyed after 12 years

Iama locals have been working with researchers from CSIRO's Wealth from Oceans Flagship counting sandfish at Warrior Reef to see if stocks have recovered from "overfishing" in the mid-1990s.

The results of this survey will be compared to previous surveys to estimate population trends; and the early results look promising.

"We found good numbers of larger sandfish at most sites on Warrior Reef indicating that the stocks are recovering," said Tim Skewes of CSIRO's Wealth from Oceans Flagship.

"We will need to look at the population densities compared to pre-fishing levels before making any recommendations for the fishery."

Once the data is analysed the results will be used to make recommendations for the sandfish fishery for consideration by the Protected Zone Joint Authority and fishery stakeholders.

This information will help develop community based harvest strategies that will focus on management of sea cucumbers and trochus in the future.

"AFMA would now like to work with communities to discuss management of sea cucumber and trochus fisheries and develop community harvest strategies," said AFMA's Hand Collectables Manager Paul Seden.

Sandfish is a highly valued sea cucumber (or trepang) species and was the target of a large fishery in Torres Strait in the 1990s.

Sandfish fishing was closed in 1998 due to overfishing and evidence of depleted sandfish stocks.

Surveys conducted in 2000 and 2005 did not show any recovery and the fishery has remained closed.

Warrior Reef is a favoured habitat for sandfish, however the proximity of Warrior Reef to Papua New Guinea (PNG) and the high value of the species has made it a prime target

for illegal fishing.

An increased focus by the Australian Fisheries Management Authority (AFMA) Foreign Compliance unit has resulted in a decrease in numbers of illegal fishers in the area over the past two years.

The local Iama community assisted the surveys by providing local knowledge about the current state of sandfish stocks and fishery habitats.

Iama resident Mr Francis Filewood worked alongside CSIRO researchers during the survey to both learn survey techniques and provide essential local knowledge.

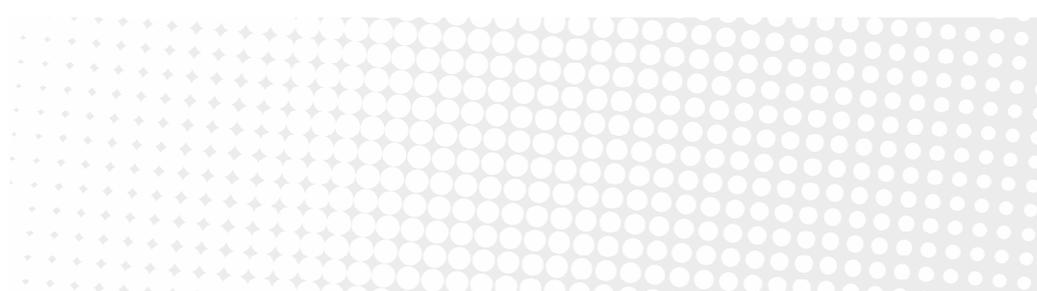
Mr Filewood has an important role in taking information from the surveys back to the community.

CSIRO also surveyed Tudu and Dungeness Reefs on advice from residents that these are areas with sandfish.

The researches also mapped the home reefs around Iama to identify areas that may be suitable for sandfish ranching. CSIRO and AFMA would like to thank Francis Filewood, Iama CFG representative Charles David and the Iama community for their assistance with the surveys.



Francis Filewood measuring Sandfish during surveys at Warrior Reef. (Photo courtesy Tim Skewes CSIRO).



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