

**Working Paper 9**

**Original: English**

**The need for standardisation of underwater resources assessment  
in the Pacific Island sea cucumber fisheries**

**Kalo Pakoa, Franck Magron and Ian Bertram  
Coastal Fisheries Science and Management Section, SPC**





# **The need for standardisation of underwater resources assessment in the Pacific Island sea cucumber fisheries**

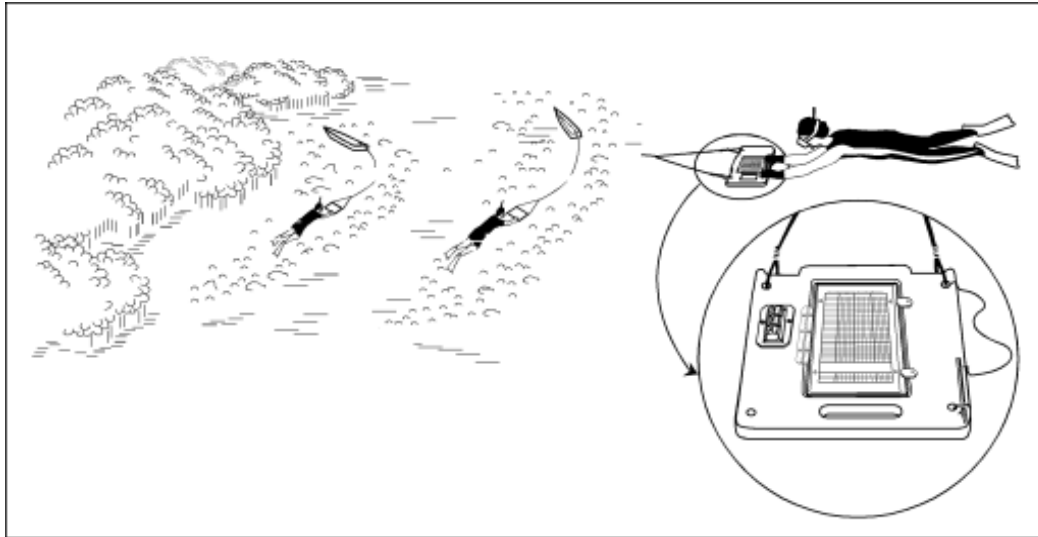
**Kalo Pakoa, Franck Magron and Ian Bertram**  
**Coastal Fisheries Science and Management Section, SPC**

## **Introduction**

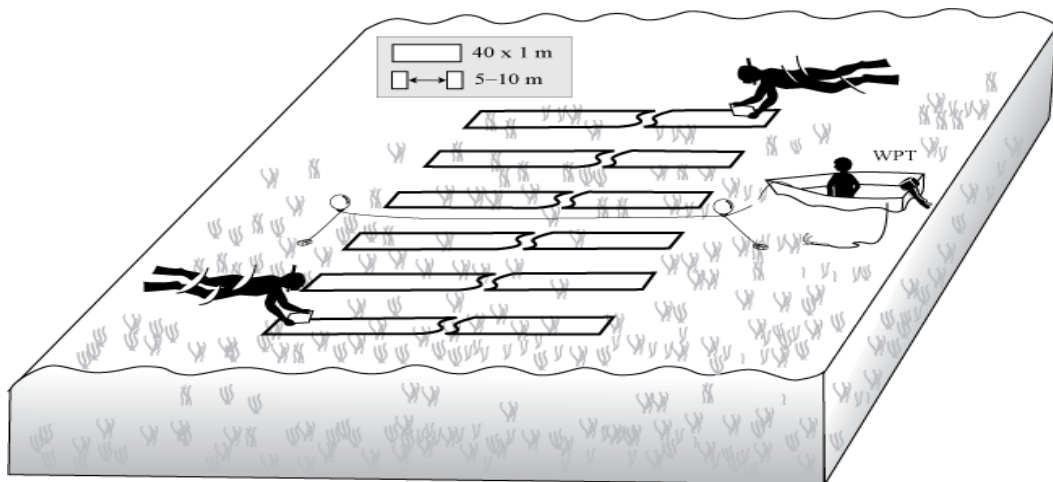
1. The current poor state of sea cucumber fisheries in many Pacific Island countries and territories (PICTs) comes about, in part, because of inadequate and inconsistent information on the status of this resource. To evaluate the impact of fishing activities or the efficiency of management measures on a resource, good information on the natural stock (e.g. underwater census data) and good information on the fishing and trading activities (e.g. catch and export data) are equally important. Available data on sea cucumber fisheries in the Pacific region are fragmented and do not provide enough information on species present, their density or their population size structure. This is primarily due to national fisheries agencies' budgetary constraints, lack of capacity, the random intervals between assessments, inadequate geographical coverage and the fact that some assessments have been designed to answer specific scientific questions rather than to improve the understanding of the status of a country's sea cucumber fishery.
2. These short-term or inconsistent survey methods and objectives can cause difficulties when comparing results over time and across sites, and they do not encourage the development of national sustainable monitoring programmes. Fisheries officers at the receiving end are often left confused as to which method to use for collecting information useful for fisheries management. Fisheries statistics can be complicated, daunting and require considerable training on how to make effective use of resource information. Many PICTs have limited data processing systems or limited skills to manage the information and make meaningful use of it.
3. This paper proposes that, for countries to be able to carry out assessments and analyse the information collected, they need to use simple, inexpensive and safe underwater survey methods. Standardising the type of assessment and reporting across countries is useful in terms of sharing information, learning from each other's experiences and, ultimately, improving sea cucumber fisheries management in the Pacific.

## **Standardizing survey design and methods across the region**

4. While there are slightly different methods and reasons for collecting resource information in the Pacific, agreeing on methods and using them across the Pacific is what SPC has been promoting in the last decade. Two methods are proposed here, both of which allow the collection of good quality information. They are also simple to use, cost-effective, comfortable and safe – important considerations in their choice. Standardisation enables comparison of the status of resources over time and over different areas; and sharing concerns and experiences of success and failure are useful to instigate changing views of the fisheries and management.
5. Over the past decade, SPC has primarily used manta tow (Fig. 1) and belt transects (Fig. 2) to conduct broad scale and fine scale resource assessment for sea cucumbers. These relatively simple and cost effective in-water resource assessment methods, along with available biological information, can provide sufficient data to inform management. However, implementing these methods requires careful planning so that all habitats of interest are captured in field surveys. Both methods are used together in a site to maximise coverage of important habitats.



**Figure 1.** Manta tow survey.



**Figure 2.** Belt transect survey.

6. *Manta tow* assessments cover large areas but are limited in obtaining size information of specimens encountered. The method involves towing an observer on a manta board behind a boat travelling at a speed around half the normal pace of a pedestrian walking. Sea cucumbers observed within 300 x 2 metre transects are identified as to species, counted and recorded. It takes around ten minutes to complete a single manta tow and six replicate manta tows constitute one station. Manta tows are done in clear water in depths of between one and ten metres.
7. *Belt transect* assessments use a 40 x 1 metre transect size laid across back reef, reef crest and sea grass zones where it is not possible to run manta tows. Each observed sea cucumber is identified as to species, measured and recorded. It takes a single skilled officer five to ten minutes to assess and record size information for sea cucumbers in one transect. Six transects constitute one station.

8. The number of stations needed for each method varies and is dependent on the complexity of the area to be assessed, the level of accuracy required in assessments and the time and cost allocated for the assessment. Generally, the more complex the habitat, the more replicate stations are required. This can increase the time and cost of completing an assessment. Within countries, sites of interest for assessment vary in complexity, and there are also budgetary and capacity issues to be considered when determining the number of stations needed for an assessment. SPC is able to provide member countries with advice on a case-by-case basis regarding these issues.
9. Where possible, assessments for sea cucumbers involving the use of underwater breathing apparatus (UBA: this includes scuba or hookah) are discouraged due to the high cost, the logistical issues of transporting UBA gear, and the health risks involved in using such equipment. In addition, sea cucumber assessments across 17 PICTs (the EU-funded SPC-PROCFish project) determined that the highest densities of 32 of the 35 commonly recorded sea cucumber species were observed in the upper 15 metres of water. Therefore, underwater surveys within the upper ten metres should provide sufficient information to understand the status of resources.

### **Data processing and analysis of indicators**

10. SPC has developed a Reef Fisheries Integrated Database (RFID) for countries or NGOs working on coastal fisheries to input and store invertebrate in-water assessment information. Data collected by the two methods promoted here are compatible with RFID and have been used by many countries to date. In-country training and short term attachments in Noumea are being carried out to develop country capacity in using the database. Resources information collected in PICTs is housed and maintained by SPC-Noumea on behalf of countries and information is delivered on request.
11. When using RFID, it is important to validate the information during data entry. The common problems are species misidentification, missing data and typos. Validation queries have been designed to detect the most obvious mistakes. This prevents incorrect data going into the database and the database providing incorrect summaries.
12. RFID has pre-set questions to extract summaries of information on species composition, density and population size. The above information is required to assess the status of the stock and manage the fishery. SPC maintains links with counterparts in countries to support their data processing, interpretation and reporting progress.
13. *Species composition* An RFID query of species presence by site is able to generate a list of all species recorded by the methods described above to determine how many species were observed at a particular site and time. For a multispecies fishery, species composition information is important to understand the condition of commercial species and species that are under threat, which may deserve management intervention.
14. *Density* RFID is able to provide summaries of abundance indices at the species level; this is generally expressed as individuals per hectare, either by method employed for assessment or by the habitat type examined. Densities can also be extrapolated to estimate stock abundance and harvest levels if habitat areas are known. During the PROCFish project, reference densities were derived from assessments across the Pacific for some sea cucumber species as indicative densities for healthy stock levels. If countries do not have sea cucumber reference densities for healthy stocks or they do not have sites with healthy or un-fished stocks of some sea cucumber species for density comparisons, then densities derived from in-country assessment can be compared with the indicative reference densities determined through the PROCFish project to gain an insight into the stock status for some species of sea cucumbers.

15. *Population size structure* RFID is able to provide information to determine population size structure, which can be extrapolated to biomass if size and weight information are collected during in-water assessment. Population size structure provides an indication of the condition of stocks, which enables an understanding of the proportion of stocks at different life stages and what proportion may be fished.

### **Progress of standardising assessments in countries and delivery of advices**

16. Progress has been made in the last three years in the standardisation of methods used to assess sea cucumber resources in the Pacific. Training has been delivered in Tonga, Fiji, Vanuatu, Solomon Islands, Cook Islands, Marshall Islands, Tokelau, Federated States of Micronesia and Palau. Some of these countries now conduct their own national assessment surveys of sea cucumber resources using these methods. Participants from some of these countries have also gone through training (normally as short term attachments to SPC) on data entry and analytical approaches to extract resource information. Based on these results, management advice has been delivered to Tonga, Vanuatu, Solomon Islands, Cook Islands, Samoa, Marshall Islands and Tokelau.

### **Conclusion**

- SPC welcomes the opportunity to work with member countries to improve in-house capacity to conduct sea cucumber assessments to inform fisheries management.
- SPC encourages national fisheries agencies to take a more proactive leading role in carrying out assessments to monitor sea cucumber stock status.