

## Standardising sea cucumber resource assessments in the Pacific Islands

*Many Pacific Island countries and territories (PICTs) face challenges in assessing and managing their sea cucumber fisheries and have requested that SPC provide resource assessment training, advice on management measures and harvest strategies, and assistance with formulation of national fishery management plans and associated regulatory measures. Limitations in existing measures to effectively control sea cucumber fisheries are at the root of the challenge faced by many Pacific Island sea cucumber fisheries managers. They may also find it hard to decide on appropriate measures because information is not available or inadequate to understand the resource. This, however, has begun to change with improved information collection by countries and use of this information to develop advice on ways forward.*

### Assessment surveys and reporting

Training assistance offered to PICTs in the last three years has begun to bear fruit. Ten PICTs (Cook Islands, Federated States of Micronesia [Pohnpei], Fiji, Marshall Islands, Palau, Samoa, Solomon Islands, Tokelau, Tonga and Vanuatu) have adopted and used the improved invertebrate resource assessment protocols proposed by SPC to improve resource information gathering and use. Combining the use of transect surveys in shallow waters (0–3 m) (Fig. 1a) and manta tow surveys over shallow lagoons (2–10 m) (Fig. 1b) is proving to be an effective way of assessing invertebrate resources. The simplicity

and cost effectiveness of these methods make them a better option for resource-limited fisheries agencies as well as non-governmental organisation (NGO) partners in the Pacific Islands. Details of the sampling methodologies are provided in an invertebrate manual that will be soon published by SPC (SPC in press).

Bringing officers to Noumea for further training has been helpful in allowing trainees to focus on their reports during their two or three weeks at SPC. So far more than 20 fisheries officers and two officers from NGO partners have benefitted from attachment training and a further 88 people have been trained



Figure 1. A: Reef transect surveys and B: manta tow surveys.  
(Illustrations by Youngmi Choi, pictures by Kalo Pakoa.)

in-country. In Noumea, trainees learn to use the reef fisheries integrated database (RFID) to process their data and extract summaries required for reporting and preparing advisory sheets. The database has been provided to fisheries departments and is being used to process new survey information. Through these attachments, trainees were able to understand species diversity, densities and population structure in an area and determine how healthy their resources are based on the existing reference densities for healthy abundances (SPC in press) and regional mean sizes of species (Purcell et al. 2008). Where available, catch and export information is cross-examined with resource information to better visualise resources' behaviour to fishing pressure or management interventions.

While stock estimates are the ultimate aim of these assessments, it is more meaningful to provide this information for a healthy stock (high species abundance and high proportion of mature fishable stocks). The final results of the assessments and recommended management measures are presented in national sea cucumber reports. The first five of these reports — for Cook Islands, Fiji, Samoa, Tokelau and Tonga — have been completed. These reports can be downloaded from the SPC website (<http://www.spc.int/fame/en/projects/scicofish/activities/202-the-status-of-sea-cucumber-resources-in-cook-islands-fiji-and-samoa>). The report for Vanuatu will be posted to the same website soon, and reports for Solomon Islands, Palau and Pohnpei are expected to be released during the second quarter of 2014.

The use of the improved sea cucumber resource survey protocols has increased. Between August 2010 and December 2013, new surveys were completed in 10 PICTs covering 42 islands, 63 sites (Table 1) and over 1,727 sample stations. The majority of these surveys (76%) were conducted by the countries themselves with their own funding sources. SPC provided coordination for in-country assessment surveys and provided

funding for surveys, which were conducted as part of the in-country field training. A summary of assessments undertaken and state of management actions is provided in Table 1.

### Future outlook

The progress in monitoring of sea cucumbers in the Pacific Islands was recognised at the 8<sup>th</sup> Heads of Fisheries Meeting held in Noumea in 2013. The Heads of Fisheries of the PICTs called for the continuation of SPC assistance to countries with emphasis on promoting the use of the standard assessment methodologies to collect appropriate data and development of species density reference points for management use. While several invertebrate in-water sampling protocols are available, PICTs have not had the opportunity to work together and benefit from each other's experiences and lessons learned. This would allow member PICTs to improve their in-house capacities in effective resource assessment and build on the progress made to accumulate resource information over the last decade.

The participation of partners in Fiji (Wildlife Conservation Society, University of the South Pacific and Partners in Community Development Fiji), Solomon Islands (The Nature Conservancy), Pohnpei State in FSM (Pohnpei Conservation Society) and Palau (Palau Coral Reef Centre) opened an initiative for closer cooperation between governments, NGOs and SPC in effective monitoring of reef resources.

Decision-makers in the Pacific have begun to understand sea cucumber fisheries and the importance of sea cucumber as a valuable commodity for community livelihoods. Several PICTs are now taking steps to put in place measures for sustainable fishing and protection of resources from collapse. But this is only the beginning; most PICTs have yet to fully translate existing information into



Figure 2.  
Palau trainees on  
attachment in Noumea.

Table 1. Summary of sea cucumber (SC) assessments undertaken and management advice delivered.

Country	Sites assessed	Reports and advice	Management action
Cook Islands	Aitutaki, Palmerston, Rarotonga, Mangaia	Preliminary results presented to the Ministry of Marine Resources (MMR); Preliminary report provided, national SC report completed (Raumea et al. 2013)	Commercial fishing remains closed as MMR puts in place new regulations to control harvesting activities and management arrangements
Fiji	Kubulau, Bua, Naweni, Wailevu, Dakuibeqa, Muani, Ravitaki, Batiki, Oneata, Yako, plus 10 sites in Lau Province	Results presented to Permanent Secretary, Ministry of Fisheries 2012; Advisory report delivered to Director, Fiji Fisheries Dept. – Jan. 2013; Lau Province SC resource report (Jupiter et al. 2013) National SC Report (Pakoa, Saladrau et al. 2013)	Cabinet to decide the future of underwater breathing apparatus in the fishery; draft SC fishery management plan provided to Fiji Fisheries Dept for consultations
FSM	Pohnpei proper, Pingelap atoll, previous surveys at Yap proper	Preliminary results presented to stakeholders in 2013; final SC report (in press); Previous surveys at Yap proper (Tardy and Pakoa 2009)	Fishery remains closed in Pohnpei; further assessments at Pingelap Atoll and further training needed
Marshall Islands	Majuro Atoll East and West (Laura)	Advice provided in 2011	Fishery management plan finalised and new sea cucumber regulation finalised
Palau	Ngarchelong State, Ngatpang State, Ngardmau State, Peleliu State	Preliminary results presented to stakeholders, advisory report delivered to Bureau of Marine Resources (BMR); Final report to be completed in the 2 <sup>nd</sup> quarter of 2014	Fishery remains closed; draft management plan delivered to BMR for in-country consultation
Samoa	Vaisala, Salelavalu, Faala, Manono, Aleipata, Faleula, Falealili	Preliminary report delivered to Samoa Fisheries Division in 2012; National SC report (Sapatu and Pakoa 2013)	Considerations are being made on protecting resources for food security
Solomon Islands	7 provinces covered with 2 sites each; 1 province (Malaita) with 1 site. Marau, West Guadalcanal, Sandfly, Russell Is., Central Malaita, Taro, Tapazaka, Kia, Tatamba, Star Harbour, Ugi, Reef Island, Santa Cruz, Rarumana, Chupikopi	Results and advice delivered to Ministry of Fisheries and Marine Resources 2012; National SC report (Pakoa et al. in prep).	Fishing pressure a challenge for effective control of the ban; 4 months open season in 2013; fishery currently closed. Draft SC fishery management plan provided to MFMR; in-country consultations underway
Tokelau	Nukunonu, Atafu, Fakaofu	Preliminary advice delivered to Tokelau Fisheries, SC report completed (Pasilio et al. 2013)	Fishing remains closed in Nukunonu; fishing at Atafu and Fakaofu to be considered when there is an interest
Tonga	Vava'u group, Tongatapu	Preliminary results and advice delivered in 2011; Tonga SC national report (Pakoa, Ngaluafu et al. 2013)	Advice presented to cabinet, Quota reduced by half (from 200 t to 100 t) for 2011; fishery closed in 2012 pending further assessments
Vanuatu	Maskelyne Islands, Paunangisu	Preliminary advice delivered in 2012; national SC report (Pakoa et al. in prep).	Extension of the 5-year ban in Dec 2012; the ban was repealed in Sept 2013 and replaced with a new harvest regulation, no fishing as yet



management actions. SPC will continue to support PICTs in these areas in 2014 and beyond. Countries and partners who would like to use these assessment protocols and be part of the regional effort are welcome to contact the Coastal Fisheries Science and Management Section for more information or visit the SPC website to view the published reports. This effort is supported under the EU-funded SciCOFish project.

## References

- Jupiter S.D., Saladrau W., Vave R. 2013. Assessment of sea cucumber fisheries through targeted surveys of Lau Province, Fiji. Wildlife Conservation Society/University of the South Pacific/Fiji Department of Fisheries/Khaled bin Sultan Living Oceans Foundation, Suva, Fiji. 22 p.
- Pakoa, K., Saladrau, W., Lalavanua, W., Valotu, D., Tuinasavusavu, I., Sharp, M. and Bertram, I. 2013. The status of sea cucumber resources and fisheries management in Fiji. Noumea, New Caledonia: Secretariat of the Pacific Community. 49 p. [[http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Pakoa\\_13\\_Fiji\\_Sea\\_Cucumbers.pdf](http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Pakoa_13_Fiji_Sea_Cucumbers.pdf)]
- Pakoa, K.M., Ngaluafé, P.V., Lotoahea, T., Matoto, S.V. and Bertram, I. 2013. The status of Tonga's sea cucumber fishery, including an update on Vava'u and Tongatapu. Noumea, New Caledonia: Secretariat of the Pacific Community. 46 p. [[http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Pakoa\\_13\\_Tonga\\_Sea\\_Cucumbers.pdf](http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Pakoa_13_Tonga_Sea_Cucumbers.pdf)]
- Pasilio, T., Pereira, F., Rikim, K., Pakoa, K. and Bertram, I. 2013. The status of reef invertebrate resources and recommendations for management at Tokelau. Noumea, New Caledonia: Secretariat of the Pacific Community. 32 p. [[http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Pasilio\\_13\\_Tokelau\\_Invertebrate\\_Resources.pdf](http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Pasilio_13_Tokelau_Invertebrate_Resources.pdf)]
- Purcell S.W., Tardy E., Desurmont A., Friedman K.J. 2008. Commercial holothurians of the tropical Pacific [Poster]. Noumea, New Caledonia: Secretariat of the Pacific Community.
- Raumea, K., George, N., Pakoa, K., Bertram, I. and Sharp, M. 2013. The status of sea cucumber resources at Aitutaki, Mangaia, Palmerston and Rarotonga, Cook Islands: June 2013. Noumea, New Caledonia: Secretariat of the Pacific Community. 32 p. [[http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Raumea\\_13\\_Cooks\\_Sea\\_Cucumbers.pdf](http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Raumea_13_Cooks_Sea_Cucumbers.pdf)]
- Sapatu, M.F. and Pakoa, K. 2013. The status of sea cucumber resources and recommendations for management in Samoa. Noumea, New Caledonia: Secretariat of the Pacific Community. 23 p. [[http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Sapatu\\_13\\_Samoa\\_Sea\\_Cucumbers.pdf](http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Sapatu_13_Samoa_Sea_Cucumbers.pdf)]
- Secretariat of the Pacific Community. (In press). Assessing tropical marine invertebrates: a manual for Pacific Islands resources managers. Noumea, New Caledonia: Coastal Fisheries Science and Management Section, Secretariat of the Pacific Community.
- Tardy, E. and Pakoa, K. 2009. The status of sea cucumbers in Yap State, Federated States of Micronesia. Noumea, New Caledonia: Secretariat of the Pacific Community (SPC). 68 p. [[http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Tardy\\_09\\_Yap\\_Sea\\_cucumber\\_Survey.pdf](http://www.spc.int/DigitalLibrary/Doc/FAME/Reports/Tardy_09_Yap_Sea_cucumber_Survey.pdf)]

### For more information:

**Kalo Pakoa**  
Fisheries Scientist (Invertebrates), SPC  
[KaloP@spc.int](mailto:KaloP@spc.int)

