Towards producing a standard grade identification guide for beche-de-mer in Solomon Islands

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In early 2018, beche-de-mer (BDM) from six exporting companies based in Honiara, Solomon Islands were photographed by staff of the Ministry of Fisheries and Marine Resources (MFMR) in order to compile a photographic identification guide. The guide aims to help fisheries officers and customs inspectors identify various BDM grades set by the market. Once BDM species and grade can be readily identified, then standard minimum buying prices can be set per species and grade for buyers and/or exporters.

Establishing a standard grade guide is required in order to set and enforce standard minimum prices. There are indications that the market can sustain moderate increases in buying prices but that this will not result in benefits to fishers unless emphasis is placed on ensuring that fishers are provided with the information on minimum prices and empowered or supported in ensuring that buyers adhere to the prices.

In countries where levies and taxes are imposed on exporters, a standard grade guide will be vital to ensure that the value of products are not underdeclared, thereby reducing revenue to government. However, these efforts require each country to carry out their own assessment of fishing and trader expenses to appropriately set minimum prices (James, in prep.).

For this research, MFMR staff relied on traders and companies to provide specimens and identify the species and grade of the specimens being photographed. Photography followed a guide and standard template previously provided by the Pacific Community (SPC).

The photographs were shared with SPC, which organised them by species and grade. Specimens were re-identified and graded, and then compared with the identification and grading provided by MFMR staff. Details are provided in Table 1. The general findings were:

- 201 specimens of BDM were photographed, representing 22 of the 32 species of sea cucumber present in Solomon Islands (Pakoa et al. 2014); 14 of the 22 species that were photographed had fewer than 3 specimens of grades A and B (highlighted in yellow, Table 1).
- Of the 201 specimens photographed, 8 could not be identified to species level, and 11 were misidentified.
- 11 specimens were misidentified as: *Bohadschia vitiensis, Holothuria atra*, *H. scabra* or *H. edulis*. These were re-identified as follows:
    - 3 specimens of *B. vitiensis* (medium value species) were in fact *H. fuscogilva* (high value), *Actinopyga lecanora* (high value) and *Pearsonothuria graeffei* (low value);
    - 5 specimens of *H. atra* (low value) were in fact *P. graeffei* (low value), *H. fuscogilva* (high value), *H. fuscopunctata* (2) (medium value), and 1 specimen could not be re-identified;
    - 2 specimens of *H. scabra* (high value) were in fact *A. miliaris* (high value), and 1 specimen could not be re-identified;
    - 1 specimen of *H. edulis* (low value) was in fact *H. fuscopunctata* (high value).
- 6 out of 11 misidentified specimens were originally identified as lower value species, 2 were identified as species of similar value, 1 was identified as a higher value species, and the remaining 2 could not be re-identified.

These findings highlight the need for fisheries and customs staff – in all countries with sea cucumber fisheries – to be adept at identifying dried sea cucumbers (BDM) in order to reduce the risk that traders mislabel or misidentify species, thereby reducing the amount they pay fishers or tax authorities.

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The main issues encountered in the preparation of this photographic guide were: i) the correct identification of processed sea cucumbers; ii) irregularities and variations in grading criteria; and iii) labelling and sorting of photographs. In order to avoid some of these difficulties in future studies, guidelines for photographing BDM are proposed in Annex 1.

To create a comprehensive guide, it is estimated that three different specimens should be photographed for each grade and for each species (hence, 384 photographs would be needed for all 32 species present in Solomon Islands). At this stage, only *H. fuscogilva* meets the required minimum for all grades (see Fig. 1), while *B. vitiensis, H. atra, H. fuscogilva, H. whitmaei, Stichopus herrmanni, S. horrens, Thelenota ananas,* and *A. lecanora* meet the required minimum for grades A and B. Further studies are required to photograph the remaining under-represented species (see yellow cells, Table 1).

Figure 1. *Holothuria fuscogilva* (white teatfish) grades according to the photoset provided by the Ministry of Fisheries and Marine Resources - Solomon Islands. (A) Grade A - cut is straight and well placed, there is no flaring (separation of body wall) along the cut, animal shape is straight and texture is relatively smooth. (D) Grade D - cut extends too far to both ends of the animal, there is some flaring along the cut and the top end is damaged, body shape appears twisted and curves slightly. Admittedly the Grade D specimen is in relatively good shape.
Figure 5 of Ram et al., 2014 shows more obvious/drastic differences between grades.

Table 1. Beche-de-mer photographed by staff of the Solomon Island Ministry of Fisheries and Marine Resources. Letters correspond to re-assigned grades, numbers under the grade column correspond to the number of specimens of that particular species and grade that were photographed. Yellow highlight indicates species that have fewer than three images of specimens for each grade, red highlight indicates species that were not photographed. ** Species included in Solomon Islands Fisheries (Beche-de-mer) regulations 2014 – Schedule 5: Minimum harvest sizes and minimum purchase and export size. Y = included, N = not included

FAO code	Common name	**	Genus	species	A	B	C	D	Total
KUE	Deepwater redfish	Y	*Actinopyga*	*echinites*	0	1	1	0	**2**
YVV	Stonefish	Y	*Actinopyga*	*lecanora*	5	11	2	0	**18**
KUY	Surf redfish	Y	*Actinopyga*	*mauritiana*	1	4	0	0	**5**
KUQ	Hairy blackfish	Y	*Actinopyga*	*miliaris*	1	1	0	0	**2**
YGP	Deepwater blackfish	N	*Actinopyga*	*palauensis*	0	0	0	0	**0**
KUW	Tigerfish	Y	*Bohadschia*	*argus*	0	3	1	0	**4**
BDX	Chalkfish	N	*Bohadschia*	*marmorata*	2	4	3	0	**9**
BDV	Brown sandfish	Y	*Bohadschia*	*vitiensis*	5	4	2	1	**12**
HFA	Lollyfish	Y	*Holothuria*	*atra*	3	4	0	2	**9**
HHW	Snakefish	Y	*Holothuria*	*coluber*	2	1	3	2	**8**
HFE	Pinkfish	Y	*Holothuria*	*edulis*	1	0	1	0	**2**
JCI	Red snakefish	Y	*Holothuria*	*flavomaculata*	0	1	0	0	**1**
HFF	White teatfish	Y	*Holothuria*	*fuscogilva*	11	11	9	6	**37**
HOZ	Elephant trunkfish	Y	*Holothuria*	*fuscopunctata*	0	6	1	0	**7**
JCK	Tigertail fish	N	*Holothuria*	*hilla*	0	0	0	0	**0**
JCO	Golden sandfish	Y	*Holothuria*	*lessoni*	0	0	0	0	**0**
HFQ	White snakefish	Y	*Holothuria*	*leucospilota*	0	0	0	0	**0**
HFC	Sandfish	Y	*Holothuria*	*scabra*	1	7	1	0	**9**
JDG	Black teatfish	Y	*Holothuria*	*whitmaei*	6	3	1	0	**10**
EHV	Flowerfish/Ripplefish	Y	*Pearsonothuria*	*graeffei*	1	1	1	0	**3**
JCC	Greenfish	Y	*Stichopus*	*chloronotus*	2	1	1	0	**4**
JNG	Curryfish	Y	*Stichopus*	*herrmanni*	5	5	1	0	**11**
KUN	Peanutfish	Y	*Stichopus*	*horrens*	5	5	2	0	**12**
JPW	Brown curryfish	N	*Stichopus*	*vastus*	0	3	0	0	**3**
TFQ	Prickly redfish	Y	*Thelenota*	*ananas*	10	4	0	0	**14**
HLX	Amberfish	Y	*Thelenota*	*anax*	0	1	1	0	**2**
JDZ	Lemonfish/Candyfish	Y	*Thelenota*	*rubralineata*	0	0	0	0	**0**
	Blue sea cucumber	N	*Actinopyga*	*caerulea*	0	0	0	0	**0**
	Hongpai fish	N	*Holothuria*	sp.	0	0	0	0	**0**
	Peanutfish	N	*Stichopus*	*monotuberculatus*	0	0	0	0	**0**
	Dragonfish/Peanutfish	N	*Stichopus*	*pseudohorrens*	0	0	0	0	**0**
	Kingfish	N	*Synapta*	*maculata*	0	0	0	0	**0**
				TOTAL	**61**	**81**	**31**	**11**	**184**

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References

James P. In preparation. Government intervention in the sea cucumber value chain: The case for minimum prices. Noumea, New Caledonia: the Pacific Community.

Pakoa K., Masu R., Teri J., Leqata J., Tua P., Fisk D. and Bertram I. 2014. Solomon Islands sea cucumber resource status and recommendations for management. Noumea, New Caledonia: Secretariat of the Pacific Community. 60 p.

Ram R., Chand R.V. and Southgate P.C. 2014. Effects of processing methods on the value of beche-de-mer from the Fiji Islands. Journal of Marine Science Research and Development 4:3.

Annex 1: Guidelines for photographing beche-de-mer

- Place beche-de-mer specimen on white graph paper (A3 or A4 size) to be photographed. Grid squares should be 1 cm x 1 cm, with markings made at the baseline (0 cm) and every subsequent 5 cm.
- Place animal at the 'baseline' = 0 cm mark. See example below (Fig. A)
- Photograph the side of the BDM with the cut. If possible, also take a photograph of the opposite side (i.e. top and bottom of the animal).
- If possible, use natural lighting, and a lot of it.
- Place a card with the species ID (identification) (FAO species code) and grade next to the BDM specimen being photographed (see Figure A). Ideally, each fisheries officer or inspector should have a set of these for all species and all grades (cut out cards provided in Figures B and C).
  If uncertain of the grade, place both grade cards next to the specimen in question.
  If uncertain of the species, place all ID cards that you suspect the specimen to be next to the animal, with the top ID card being what you suspect it is most likely to be.
- **Aim to get good photographs of at least three specimens of each species and each grade.**
- Question traders and/or companies on why a particular specimen is given a certain grade. Keep note of their response, and correlate this response to the BDM specimen that it was based on. **Aim to do this for at least three specimens of each grade, for each species.**
- Record the stated buying price for each species and each grade. If possible, record the stated buying price for each specimen (see Figure D for record table template).

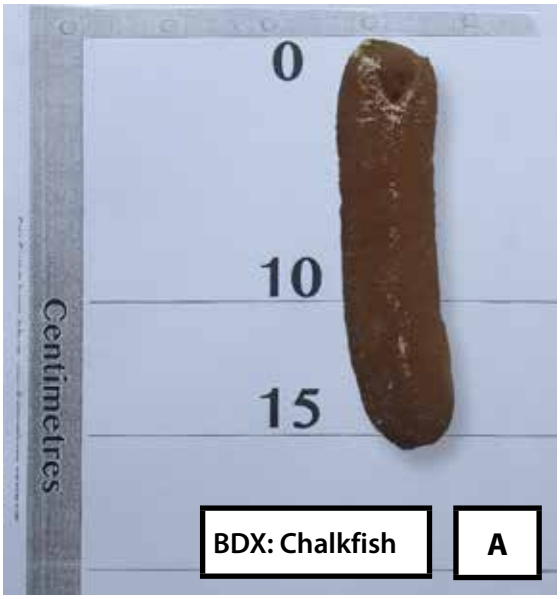

Figure A. Example of how BDM should be photographed with ID and grade cards. Note that the cut is visible and one end is placed on the baseline (0).

BDV : Brown sandfish	**JDG: Black teatfish**
BDX: Chalkfish	**JDZ: Lemonfish / Candyfish**

Figure B. Cut-out cards of sea cucumber/beche-de-mer FAO species codes with common names. These should be placed next to the BDM specimen being photographed.

A	**B**
C	**D**

Figure C. Cut-out cards of sea cucumber/beche-de-mer grades. These should be placed next to the BDM specimen being photographed. If unsure of which grade to assign (i.e. either A or B), both A and B cards should be placed next to the specimen being photographed.

Company/trader name	
Company/trader business licence	
Company/trader location	
Inspector name and signature	
Inspection date	

FAO code	Species/common name	Grade	Price (per kg)	Grading criteria

Figure D. Log sheet for recording grade, buying price, and grading criteria.