THE CSIRO/RIMF MONITORING SYSTEMS USED TO DETERMINE THE CATCH OF SBT BY THE INDONESIAN LONGLINE FISHERY

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Prepared for the CCSBT Indonesian Catch Monitoring Review

10-11 April 2003, Queenstown, New Zealand. CCSBT-ICM/0304/6

ABSTRACT

This paper describes the procedures used by CSIRO/RIMF to monitor the catch of SBT caught by longline fisheries operating out of Benoa, Bali from 1993 to the present time. CSIRO/RIMF enumerators record the weight of individual tuna species as they are weighed by buyers operating at export processing sites at the Port of Benoa. For SBT, the individual weights and matching lengths, where measured, were also recorded. The individual tuna weights are sub-totaled by species and export status for each landing, and then entered on the RIMF database in Jakarta. The raising factor used to estimate the total catch is determined from the Dinas of Fisheries for the Province of Bali (Dinas) monthly aggregated whole tuna exports determined from packing lists provided by exporters, and the corresponding monthly aggregated whole export tuna monitored at processors by CSIRO/RIMF. Catches by the PSB fishing company, which targets bigeye tuna unlike most of the fleet, is separated from the other components of the catch, and added after the landings of other companies are raised to provide a estimated total monthly catch.

1. Introduction

A collaborative research program between the CSIRO Division of Marine Research and the Research Institute of Marine Fisheries of Indonesia (RIMF) was set up in August 1992 to monitor the catch of southern bluefin (SBT) caught by longline fisheries operating out of Indonesia. SBT spawn in the north-east Indian Ocean, and are caught by Indonesian-based longline boats targeting yellowfin and bigeye tuna south of Java and the Lesser Sunda Islands.

Monitoring was initially set up at Port Muara Baru, Jakarta and Port Benoa, Bali. Benoa is closer to the SBT spawning grounds than Jakarta and the larger fleet operating out of there caught significant amounts of SBT. While some SBT was landed at Muara Baru, most was frozen and remained on board, destined for other ports. It did not appear that the frozen SBT were caught on the spawning grounds but were from the southern Indian Ocean. Because of the importance of Bali, all SBT monitoring efforts were concentrated there from 1993 onwards.

Monitoring was first established at P.T. Perikanan Samodra Besar (PSB) in October 1992. At this time it was the major processor of tuna and processed tuna caught by its company boats and many others. The company was situated on the Eastern side of the port in the general port area. Two PSB staff were employed part-time to provide landings data from tuna processed at PSB. A history of monitored landings is presented in Table 1. PSB company boats landed only a small proportion of the landings (0.19-0.35) that were processed at PSB in the first few years of sampling (Table 2). Many of the non-PSB companies moved to new processors as they were formed on the Western side of the port which was developed for fishing boats. In response, a fulltime enumerator (Kiroan Siregar) was employed to monitor the landings at one of the processing rooms at the P.T. Sari Segara Utama (SSU) site in 1994. SSU was operating when monitoring began, but created a number of new processing rooms on its site which were operated by other companies. Further expansion of the Western side of the port enabled new processing companies to build processing rooms and many fishing companies relocated to these new sites. This

caused further problems in monitoring as an enumerator could only monitor one site at a time. An additional enumerator was employed to monitor the landings at some of these new sites in 1996. This proved successful until the enumerator left. He was subsequently replaced in 1999, but the new enumerator proved ineffective in not managing to establish fulltime access to new processors. This was one of the major constraints in monitoring – establishing unrestricted access to processors. There was no clear authority for enumerators to go into processing sites despite letters of introduction from Dinas, and successful monitoring depended on establishing a good relationship with the processing company or using one of their employees part-time to obtain the information (such as at PSB).

The coverage of the Benoa longline fishery began to run down in 1999. Many of the companies processing at SSU either moved to new processors, shifted fishing operations to other areas (such as Sri Lanka), or the companies failed. This meant that there were progressively fewer landings to monitor at SSU and lack of staff to expand monitoring to other sites. Note that the apparent increase in landings monitored in 1999 was due to more frequent landings due to the introduction of carrier boats rather than an increase in the number of boats monitored. It was decided that a new approach was required, rather than stop-gap measures to marginally improve monitoring coverage. As a consequence of the March 2000 Meeting in Bali on Indonesia Australia Cooperation on shark and tuna, a new monitoring program was proposed and funding sought. A project was started in 2002 with support from ACIAR, AFFA and IOTC (through OFCF). The objective was to obtain 30% coverage of landings processed at all processors. At about the same time the fishing industry recognised the need to cooperate in providing full access to all processing sites. This enabled the IOTC model of monitoring to be introduced in August 2002.

2. Data Collected At Processing Rooms

Information on the composition of the tuna catch is obtained from the buyers who are set up in the processing room when the tuna are processed. They weigh each dressed fish and record the weight, species and export status of individual fish. In the case where the combined catch of a number of boats had been transhipped, the buyers record which fishing boat caught each fish. This information is obtained by the enumerator. In the case of the PSB processing rooms, the PSB staff employed part-time to obtain this information were not always present when the processing was carried out but accessed company records after the event. In the early years of monitoring they were present and also measured the lengths of SBT caught. In the case of the full-time enumerators (i.e at SSU), they would be in attendance for the majority of landings at a processor (the objective was to record all landings at a processor), and would measure the length of SBT that they had access to, and then match it with the corresponding weight measurement. Access to export quality SBT was sometimes limited because fish were submerged in ice slurry as soon as cleaning, grading and weighing was completed.

Enumerators would aggregate the data on individual fish provided by the buyer by species and export status, recording subtotals of weight and number of pieces on Formulir Pendaratan (Landing Form) in Figure 1. For SBT, the individual weights and matching lengths, where measured, were also recorded in the Data Biologi

(Biological Form) in Figure 1. This was linked to the landing table in the MS Access database by vessel name (Nama kapal) and landing date (Tanggal).

All data collected under the CSIRO/RIMF monitoring is sent to Jakarta and entered on a MS Access database at RIMF.

3. Bali Export Data Obtained From Dinas of Fisheries

Buyers exporting fish are required to obtain an export permit for each shipment from the Dinas of Fisheries for Province of Bali, Laboratorium Pembinaan dan Pengujian Mutu Hasil Perikanan (Laboratory of Quality Control for Fisheries Products). They submit a packing list itemizing the content of each carton, usually by species. A Certificate of Quality is issued by the department. Dinas aggregates the packing list data by month according to product category with tuna species all combined (Table 3). For the purposes of determining a raising factor, it has been assumed that the fresh and frozen whole tuna categories aggregated by Dinas, correspond to the export category of tunas recorded at the processing rooms by the enumerators. Categories such as tuna meat, loin, fillet and toro are assumed to be salvaged from fish not quite good enough to export as whole fish. This is based on observations at processing rooms where occasionally tuna are cut up and the best parts removed. This has only been observed in reject fish not export grade fish. These fillets are packed in cartons in the same manner as the rest of the export grade whole tuna.

4. Estimation Of Total Catch

Data from the RIMF database is extracted by species and export or reject status. This is aggregated by month. The proportion of the total Bali catch that was monitored by the CSIRO/RIMF program each month was estimated by dividing the monitored export tuna component by the corresponding monthly aggregate of Dinas export whole fresh tuna and whole frozen tuna. This proportion was used to raise all the monthly aggregated components of the monitored catch – export and reject for each species.

Because the PSB fishing company targeted bigeye tuna using deep longline methods, as apposed to the majority of the fleet which used shallow longline methods, the landings by PSB boats were separated from other components of the catch. After the monitored landings of other companies were raised to give an estimate of the total monthly catch, the PSB data were then added to the corresponding components.

The calculation is as follows:

A. Dinas monthly total fresh and frozen whole aggregated tuna exports minus monitored export tuna from PSB boats.
B. Monthly total export tuna in monitored landings minus export tuna from PSB boats.
C. Monthly total of monitored landing broken down by species and export components excluding that of the PSB boats.
D. Monthly total of monitored landing by PSB boats by species and export components.

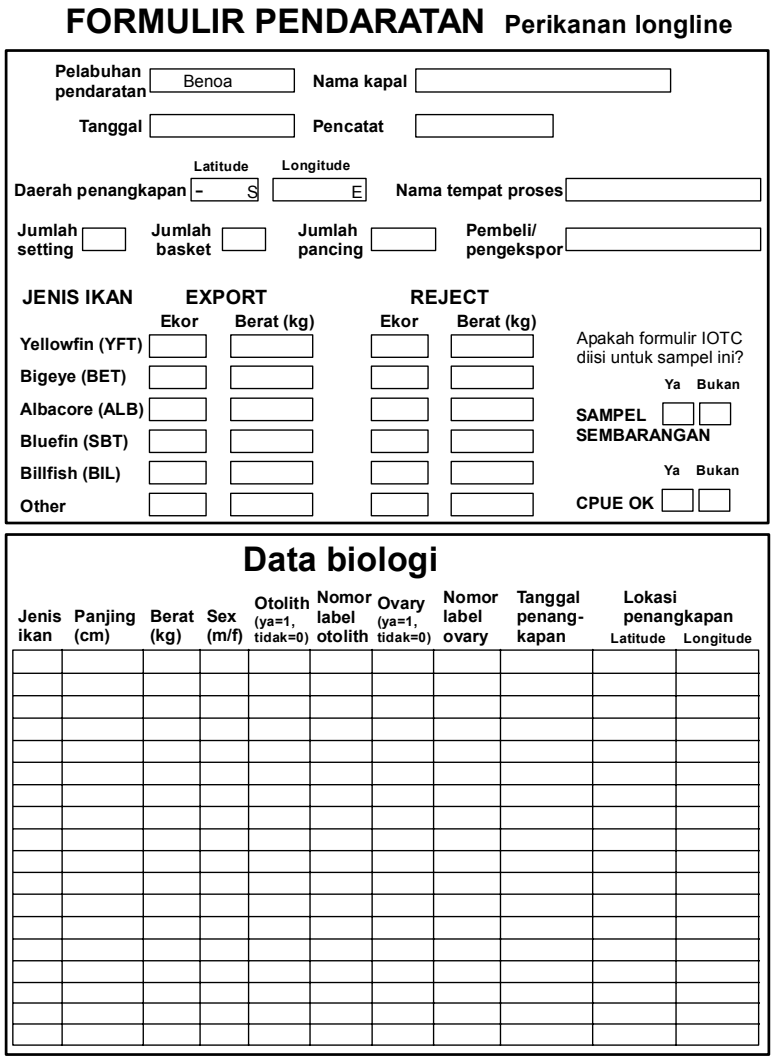
Estimated total monthly landing by species and export components = (A/B*C) + D. A schematic of the steps in estimating the total catch of SBT is shown in Figure 2.

5. Raising factors

We have used the Dinas export whole tuna as a raising factor because that is available aggregated by month and this is a useful time unit by which to judge what proportion of the catch is monitored. However there is another source of data that we have recently discovered during documentation of the various data collection systems in place in Benoa. These data are collected by Dinas of Agriculture and Marine Affairs for the Regency of Denpasar (Dinas Pertanian dan Keluatan Kota Denpasar (Dinas Kotamardya). It has 17 enumerators, four of which monitor the tuna going through the processing sites at Benoa each day (presumably the enumerators take it in turns to monitor). This information is use to estimate tax to be paid to the Regency, and the information is also used by Dinas at the Bali provincial level in reports to DGCF. The category of tuna (no species) is likely to includes billfish as there is no separate category for billfish. The total tuna (and billfish) processed in 2001 as monitored by Dinas Kotamardya was 16,542.9 tonnes. CSIRO/RIMF monitored 2064.1 tonnes of non-PSB tuna and billfish at processors. This would provide an estimate of processings monitored, averaged over the year, as 7.5%. If we use the Dinas export whole tuna total for 2001, averaged over the year, and the export category of tuna monitored by CSIRO/RIMF, we estimate 9.2% of processings were monitored. As the reciprocal is used as the raising factor, the current method used by CSIRO/RIMF to raise catches (*10.89) is of the right order of magnitude, but would give a smaller estimate of landings than using the method incorporating Dinas Kotamardya data (*13.32).

6. Catch Monitoring In 2002

The IOTC catch monitoring was implemented in 2002 and was fully operational in Benoa by August 2002. At this point in time the CSIRO/RIMF monitoring scheme was abandoned and all enumerators followed the IOTC protocols. The site that was continuously monitored at SSU by the “old” system became one of the fourteen processing sites that were monitored (by August 2002 this SSU site had run down and processed very few landings - it would have been necessary to move to new sites if the CSIRO/RIMF monitoring had continued as before). Thus 2002 is a transitional year. The first half of the year (the last half of the 2001-2002 spawning season) was monitored under the CSIRO/RIMF system and the second half (the first half of the 2002-2003 spawning season) was monitored under the IOTC system. In addition to the IOTC monitoring there was additional targeted monitoring of landings that were know to have SBT in them in order to boost the number of length measurements and opportunities to collect otoliths. These landings are not included in the IOTC WinTuna database but are added to the old CSIRO/RIMF database. Those landings monitored under the IOTC scheme that have biological data on SBT are also entered in the CSIRO/RIMF database but are identifiable as landings monitored under the IOTC system.



FORMULIR PENDARATAN **Perikanan longline**

Pelabuhan pendaratan: Benoa
Nama kapal:
Tanggal:
Pencatat:
Daerah penangkapan: Latitude - S Longitude E
Nama tempat proses:
Jumlah setting:
Jumlah basket:
Jumlah pancing:
Pembeli/ pengekspor:

JENIS IKAN	EXPORT Ekor	EXPORT Berat (kg)	REJECT Ekor	REJECT Berat (kg)
Yellowfin (YFT)				
Bigeye (BET)				
Albacore (ALB)				
Bluefin (SBT)				
Billfish (BIL)				
Other				

Apakah formulir IOTC diisi untuk sampel ini?
Ya Bukan
SAMPEL SEMBARANGAN
Ya Bukan
CPUE OK

Data biologi

Jenis ikan	Panjing (cm)	Berat (kg)	Sex (m/f)	Otolith (ya=1, tidak=0)	Nomor label otolith	Ovary (ya=1, tidak=0)	Nomor label ovary	Tanggal penang-kapan	Lokasi penangkapan Latitude	Lokasi penangkapan Longitude

Figure 1. Copy of the enumerator landing form and biological form used by enumerators to record data obtained in the processing rooms.

Table 1. Number of landings monitored by processor for the years 1993-2001.

PROCESSOR NAME	1993	1994	1995	1996	1997	1998	1999	2000	2001
Not Specified						1	205	4	2
Bali Nusa Windu Mas									2
Bandar Nelayan				83		1			
Bandar Tuna				249	649	136			
Haslindo				2					
Intimas/Hiroyoshi				7					
PT Bali Ocean Ali				134					
PT Bali Tuna Segar									20
PT Perikanan Samodra Besar	950	824	832	586	402	681	677	598	435
PT Sari Segara Utama	9	543	529	642	759	1352	1958	1225	789
PT Sumbindo Perintis				2					
PT Trima Sula				27					
PT Wirasoenar Wicaksana					61	11			

Table 2. Total number of landings monitored at P.T. Perikanan Samodra Besar Processing Site and number of landings by PSB boats at this site for the years 1993-2001.

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total	950	824	832	586	402	681	677	598	435
PSB boats	184	237	289	324	309	356	338	317	184
Proportion of PSB boats	0.19	0.29	0.35	0.55	0.77	0.52	0.50	0.53	0.42

Table 3. Example of monthly aggregated export packing list data compiled by the Laboratory Quality Control and Fish Inspection Division, Bali.

DATA EKSPORT KOMODITAS PERIKANAN PROPINSI BALI PER BULAN TAHUN 2001

JANUARI 2001

No.	Jenis Komoditi	Volume (ton/ekor)	Nilai (FOB,US$)
1	Tuna Segar	1288.82	6217007.16
2	Tuna Beku	0.00	0.00
3	Lobster Hidup	1.16	2566.45
4	Lobster Beku	0.00	0.00
5	Kerapu Segar	153.08	417931.05
6	Kerapu Beku	0.00	0.00
7	Rumput Laut	41.00	16400.00
8	Swordfish (Segar)	86.74	202195.58
9	Tuna Meat (Beku)	0.00	0.00
10	Tuna Steak (Beku)	376.88	1298883.80
11	Tuna Marlin (Beku)	0.00	0.00
12	Tuna Loin (Segar)	0.00	0.00
13	Tuna Loin (Beku)	0.00	0.00
14	Sirip Hiu	4.00	20000.00
15	Sirip Hiu Beku	0.00	0.00
16	Kakap Segar	0.43	1174.30
17	Ikan Kaleng	0.00	0.00
18	Minyak Ikan	41.76	72279.60
19	Kepiting	0.00	0.00
20	Tongkol Beku	0.00	0.00
21	Lain-lain	14.47	62686.80
22	Ikan Hias Laut*)	294862.00	110327.50
23	Lobster Hidup*)	4350.00	19300.00
24	Kerapu Hidup*)	7995.00	36250.00
25	Kepiting Hidup*)	0.00	0.00
26	Bandeng*)	0.00	0.00
27	Nener*)	16155000.00	90610.00
28	Napoleon*)	0.00	0.00
29	Lainnya*)	0.00	0.00
	TON	2008.34	8311124.74
	Ekor *)	16462207.00	256487.50
	Total Nilai		8567612.24

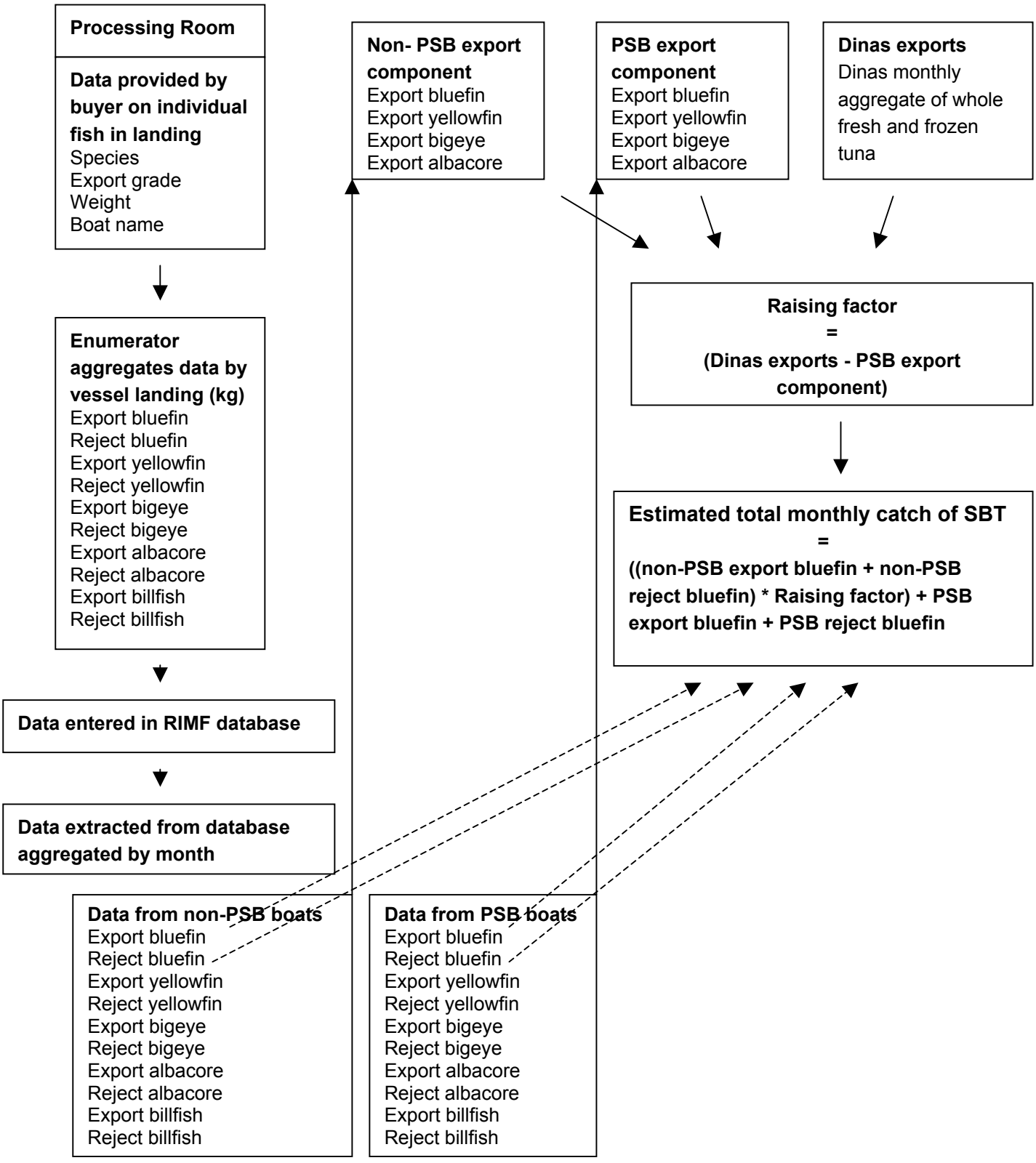


Figure 2. Schematic of steps in calculating monthly catch of SBT from monitored landings and Dinas export data.