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CHANGES TO THE DATA AVAILABLE FOR STOCK ASSESSMENTS

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1.   INTRODUCTION

This paper provides background information on the major changes to the data available for stock assessments in the past year. It does not attempt to describe **all** changes to the data, rather it describes where substantial changes occurred, primarily as a result of improved estimates and/or the availability of new information where data had been lacking in the past. SC7 Working Paper ST WP-1 (Williams, 2011) describes the current gaps in scientific data provisions to the WCPFC. This paper will describe, in more detail, the progress made in the past year in addressing the most important gaps and in improving the data available for stock assessments.

At this stage, this paper concentrates on the work done in improving the aggregate catch/effort data for the Philippines and Indonesian domestic tuna fisheries, which has been acknowledged to be amongst the most important data gaps for stock assessments, and an important data issue that arose with the Chinese Taipei STLL (Pacific-Island based) longline fleet this year. For future SC meetings, this paper may be extended to cover other major changes in data available for stock assessments, where relevant.

2.   PHILIPPINES DOMESTIC FISHERIES DATA

2.1 Philippines fishery data - changes between SC6 and SC7

The following sections provide an update of work conducted over the past year in the Philippines for the purpose of improving Philippines domestic fishery data for potential use in stock assessments.

2.1.1 "Baby" purse seine versus "Large" purse seine

Last year's paper on changes to the data available for stock assessments noted that future work on Philippines fishery data could potentially look at the separation of the "baby" purse seine fleet, which appears to have a mode of operation and catch rates more aligned to the Philippines ring-net fleet (i.e. much lower CPUEs) than the larger purse seine vessels that fish beyond Philippine waters (Williams, 2010).

Review of the available Philippines tuna fishery data have shown that the differences in the fishing operations of the traditional "Baby" purse seine and large purse seine[2] components of the Philippines domestically-based fishery that are reflected in the level of catch that each of these types of vessel take (Anon, 2010b). Figure 1 shows the difference in catch rates between what are listed as traditional ("baby") purse seine vessels and larger purse seine vessels in the available logsheet data. Based on these data, there is a clear separation with monthly CPUE for the traditional "baby" purse seine vessels always below 5t/day and the monthly level for the 'larger' vessels generally above 10t/day.
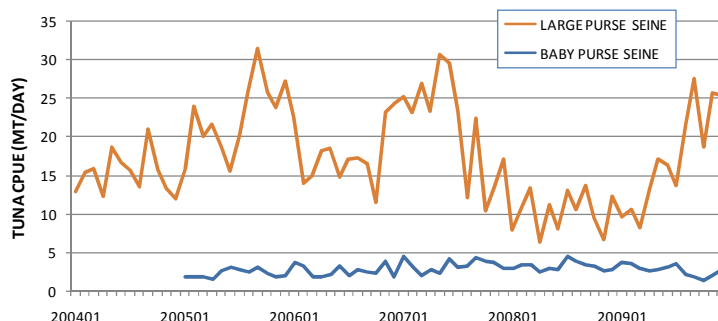

Figure 1. Monthly trends in Tuna CPUE by "baby" purse seine and Large purse seine vessels, based on logsheet data, 2004-2009

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[2] In this context, "Large" Purse seine is essentially vessels of similar size and operational characteristics that occur elsewhere in tropical WCPO. Appendix 5 in Anon (2010) provides a comparison of the characteristics of what is termed "Large" and "Baby" purse seine

Preliminary work was conducted on available Philippines logsheet and port sampling data to assign a "sub-fleet" code to distinguish between these categories of purse seine vessels, but this has not been carried through to the WCPFC annual catch estimates and aggregate catch/effort data for potential use stock assessments at this stage (see Anon, 2011). If this is deemed to be an important exercise for stock assessments, one of the issues to be resolved will be how to extend the separation by "sub-fleet" back in time, where data do not exist.

2.1.2 Tuna size by Area

An analysis using a General Linear Model (GLM) to determine what variable has the most effect on size of fish caught in the Philippines domestic fisheries showed that the dominant effect on length varied by species (Simon Hoyle, pers. comm.). For bigeye tuna, the GEAR had the strongest effect on size, followed by YEAR, FISHING GROUND, MONTH, REGION, and SCHOOL TYPE. For skipjack tuna, FISHING GROUND had the strongest effect, then REGION, MONTH, GEAR, YEAR and SCHOOL TYPE. For yellowfin tuna, GEAR had the strongest effect, then FISHING GROUND, REGION, SCHOOL TYPE, YEAR and MONTH.

Gears catching adult yellowfin and bigeye tuna were included in the analysis and accounted for the GEAR effect being the dominant effect for these species. Excluding GEAR, then BROAD AREA (inferred by Fishing ground) has a significant effect on the size of tuna in the Philippines fisheries.

Figure 2 shows the distribution of effort for the domestically based Philippines purse seine fleet, based on available logsheets, with broad areas arbitrarily assigned to represent "archipelagic" (inshore) and "oceanic" (offshore) fisheries.
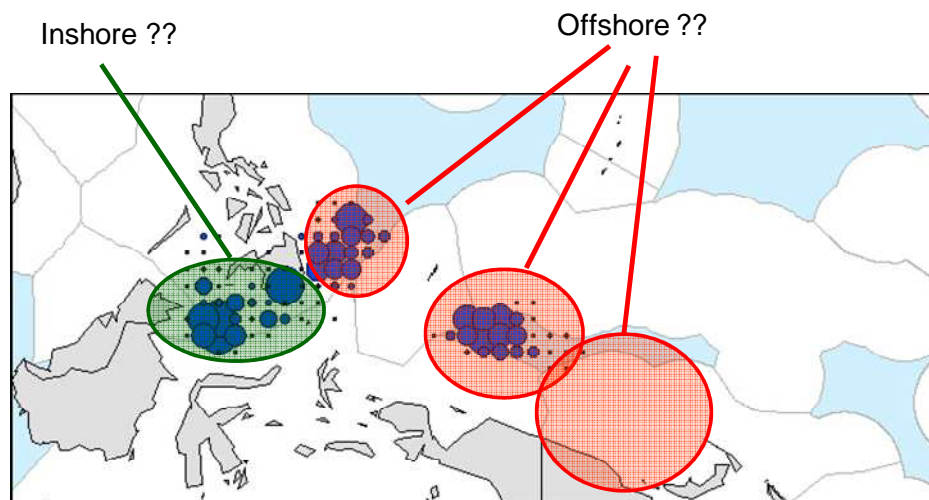

Figure 2. Distribution of effort by purse seine vessels based in the Philippines 2004-2009, showing the broad areas assigned for consideration in separating the catch and size data. (Source logsheet data)

Figures 3, 4 and 5 show the size frequencies for skipjack, yellowfin and bigeye tuna taken from "baby" purse seine and "large" purse seine, for all areas, and by broad areas (i.e. "archipelagic" and "oceanic"), according to port sampling data collected under the Bureau of Aquatic Resources (BFAR) National Stock Assessment Project. The broad areas correspond to those shown in Figure 2 based on the fishing grounds recorded in NSAP data. The key observation from these data is that the size composition appears more affected by area than by category of purse seine vessel, which doesn't appear to show significant differences. Also, it is important to note that the number of samples in the "archipelagic" area 'overwhelms' the number of samples for the "oceanic" area, but that the catch by area does not appear to reflect this imbalance in available size data. Review of observer data collected in the Philippines purse seine fishery (e.g. Ramiscal et al. 2010) also shows that smaller fish tend to be taken in what is defined here as the "archipelagic" waters.
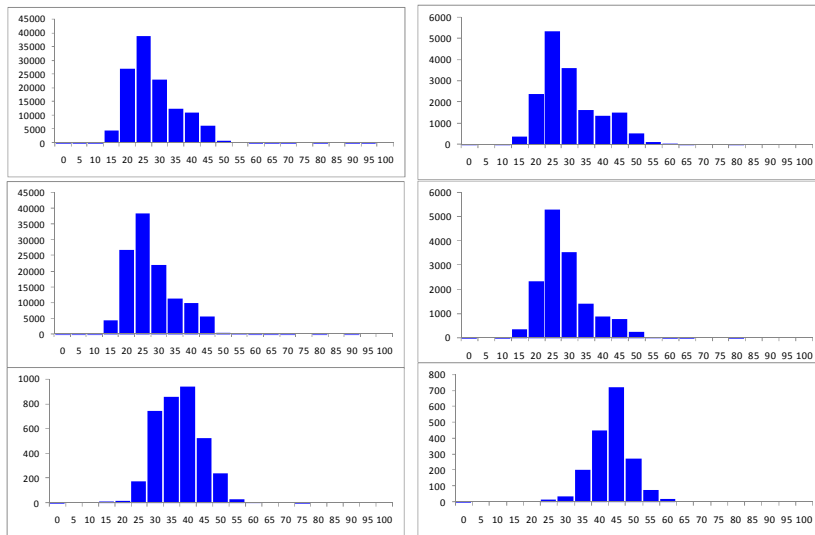
Figure 3. Skipjack size frequency from "baby" purse seine (left) and "large" purse seine (right), from NSAP data, 1997-2010. (Top – All areas; middle – "archipelagic" areas; bottom – "oceanic" areas)
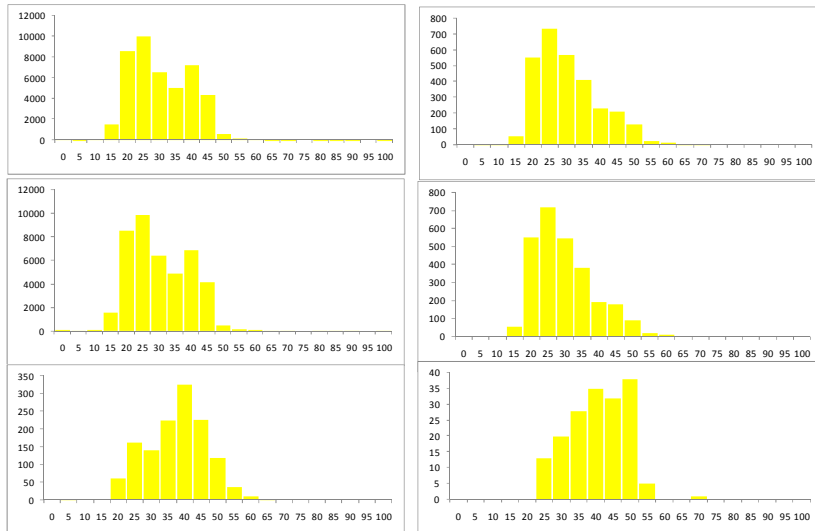

Figure 4. Yellowfin size frequency from "baby" purse seine (left) and "large" purse seine (right), from NSAP data, 1997-2010. (Top – All areas; middle – "archipelagic" areas; bottom – "oceanic" areas)
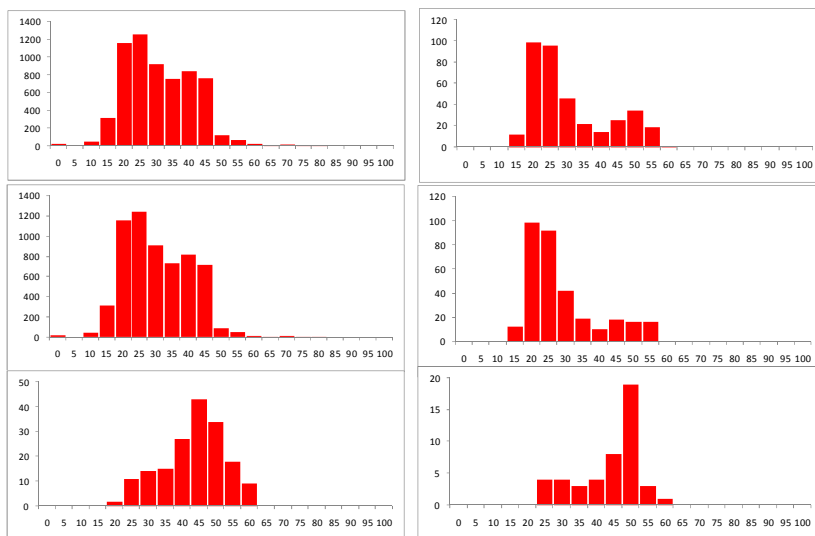

Figure 5. Bigeye size frequency from "baby" purse seine (left) and "large" purse seine (right), from NSAP data, 1997-2010. (Top – All areas; middle – "archipelagic" areas; bottom – "oceanic" areas)

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In past stock assessments, the Philippines purse seine size data were aggregated into one 'fishery' with the resulting size distribution shown in the top panels of figures 3–5 and were associated with total catch which was not broken down by "sub-fleet" (i.e. "baby" purse seine and "large" purse seine) and broad area (i.e. "archipelagic" and "oceanic").

For this year's assessments, the aggregated catch/effort and aggregate size data for Philippines domestic purse seine were split into what has been arbitrarily defined as "archipelagic" and "oceanic" areas (see Figure 6). However, at this stage. the separation of data into categories "baby" purse seine and "large" purse seine has not been undertaken.
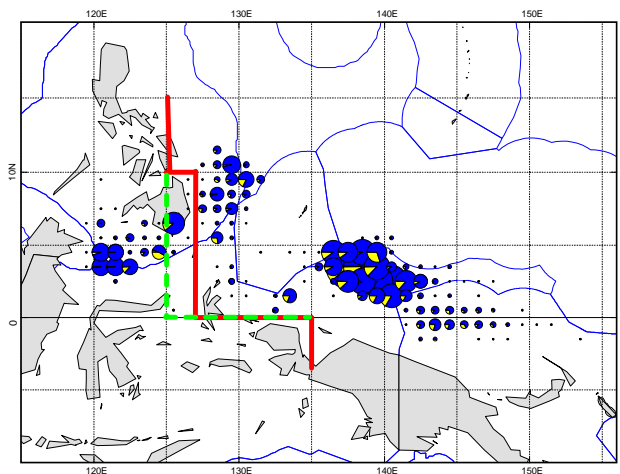

Figure 6. Arbitrary boundaries used to distinguish data collection for the 'oceanic' area and 'archipelagic' area. Red line is at 1°x1° resolution; dashed green-line at 5°x5° resolution

2.2 Philippines fishery data – Future work

In general, there remains a substantial amount of review of Philippines fishery data still to undertaken. For their purse seine fishery, the priority areas appear to be a more in-depth review of the domestic purse seine fleet to consider whether further separation in the available data should be undertaken; the availability of observer data will greatly assist in this review. Further investigation may be required to determine whether other factors are responsible for the difference in size of tunas by area (e.g. differences in mesh size). An area to consider in the future will be whether there is a need to separate "baby" purse seine and large purse seine in the annual catch estimates, aggregate catch/effort data and size data.

.   **INDONESIAN DOMESTIC FISHERIES DATA**

3.1 Indonesia fishery data - changes between SC5 and SC6

There were no significant changes to the Indonesian fishery data over the past year other than the provision of aggregate size data for the first time in more than a decade, the revision of estimates for 2008-2009 and the provision of 2010 annual catch estimates (refer to Anon, 2011).

The 2008 longline catch estimates were adjusted this year based on Directorate General of Capture Fisheries (DGCF) statistics and resulted in a higher catch of bigeye tuna than in previous years; unfortunately, there is no supporting information at this stage to confirm this level of catch. The target tuna species catches for the longline fishery for 2009 and 2010 were determined by applying species composition data collected through port sampling in Bitung, North Sulawesi, to total catch volume provided by DCGF (Anon, 2011).

There remains significant work with data collection and data review to do in Indonesia (Williams, 2011). The highest priority remains the review of annual catch estimates for the period prior to 2000 to ensure they are consistent with the work done in the past two years (Anon, 2010a, Anon, 2011) which produced more reliable estimates for the period since 2000. The issues that currently prevent Indonesia from providing catch estimates that include archipelagic waters is also a high priority item since the WCFPC Statistical Area catches for the past three years have simply been carried over.

4.   CHINESE TAIPEI OFFSHORE (PACIFIC ISLAND-BASED) LONGLINE

As a part of their annual submission of scientific data, Chinese Taipei provides annual catch estimates for their distant-water and 'small offshore (STLL)' longline fleets to the WCFPC. Chinese Taipei also provide aggregate data for their distant-water longline fleet as a part of this submission and these data are consistent with the annual catch estimates for their distant-water longline fleet.

The 'small offshore' STLL longline fleet comprises two components, the Taiwan-based (domestic-based) fleet and the fleet based elsewhere (Palau, Guam, FSM, RMI, Solomon Islands, Vanuatu and Fiji). Chinese Taipei provide annual catch estimates for the 'small' STLL fleets combined but only provide aggregate data[3] for the domestically-based fleet; that is, the aggregate data provided do not cover the small offshore longline fleets based in Pacific-Island countries.

In order to account for the difference in the Chinese Taipei domestically-based and Pacific-Island based offshore sub-fleets, SPC/OFP (on behalf of the WCPFC) have been using the following process to produce annual catch estimates for the Pacific Islands-based offshore fleet which is then used to produce aggregate catch/effort data which are used in stock assessments:

- •   Separate out the annual catch estimate for these two sub-fleets (domestic offshore and Pacific Islands offshore) by subtracting the total annual catch by species obtained in the aggregate data for the domestic-based fleet;
- •   Apply the total target tuna catch to the distribution of catch by target tuna species according to available logsheet data provided by the Pacific Island countries (coastal states)

However, the logsheet data provided by SPC member countries for the Taiwanese small offshore vessels based in their countries often vary in coverage, so the distribution of catch and total catch by species in the aggregate data produced may be very different from the estimated catches provided by Chinese Taipei. This is particularly problematic when the coverage of data for vessels in this fleet that target albacore (e.g.

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[3] Aggregate data refer to estimates of total catch and effort aggregated by 5 degree squares and month.

those vessels based in Fiji and Vanuatu) is different from the coverage of data for those vessels targeting bigeye/yellowfin (those vessels based in Micronesia).

To avoid potential problems that arise in the most recent year's data when the coverage of available logsheet data differs between the vessels targeting bigeye/yellowfin in Micronesia to those targeting albacore in the south Pacific, logsheet data have been aggregated and raised to annual catch estimates using the yellowfin/bigeye stock assessment regions, as follows:

1. The methodology uses the average distribution of the catch by broad area [i.e. Micronesia as one area (Region 3+4) and Fiji/Solomons/Vanuatu/Fiji as the other area; Region 6] for the previous five years (Y-4 to Y, where 'Y' is the year) to produce an average distribution of the catch by species ;

2. Allocate part of the annual catch estimates by species to the Fiji/Solomons/Vanuatu area, considering that all of the ALB catch estimate should be allocated to this area (consistent with allocation of this catch to the South WCPFC Convention Area in the TW annual catch estimates);

3. Determine the corresponding yellowfin and bigeye catches in this area (Region 6) by applying the species composition in Region 6 from the data set produced in 2. to the ALB catch estimate ;

4. The estimated catches of YFT and BET in Region 6 should be subtracted from the WCPFC Area annual catch estimates for these species to produce the Region 3+4 estimates of catch for YFT and BET ;

5. Now apply the average distribution of catch by species determined from 2. to the annual catch estimates of ALB, BET and YFT for the two MFAN-CL Areas (Regions 3+4 and 6) for each year to produce the revised aggregate data for the Chinese-Taipei Pacific Island-based offshore longline fleet.

Ideally, the provision of logsheets from Chinese Taipei and coastal states for this fleet would more adequately resolve this problem.

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