



**SCIENTIFIC COMMITTEE
EIGHTH REGULAR SESSION**

7-15 August 2012
Busan, Republic of Korea

Plan for Improvement of the Availability and Use of Purse-Seine Catch Composition Data

WCPFC-SC8-2012/ SC8-WCPFC8--08

SPC-OFP



**COMMISSION
EIGHTH REGULAR SESSION**
Tumon, Guam, USA
26-30 March 2012

**PLAN FOR IMPROVEMENT OF THE AVAILABILITY AND USE OF
PURSE-SEINE CATCH COMPOSITION DATA**

**WCPFC8- 2011-IP/06
November 2011**

Paper prepared by SPC-OFP

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Oceanic Fisheries Programme
Secretariat of the Pacific Community
Noumea, New Caledonia

November 2011

Introduction

A consultancy agreement was established between the Western and Central Pacific Fisheries Commission and the Secretariat of the Pacific Community in April 2009 for Project 60, Collection and Evaluation of Purse-Seine Species Composition Data. The objective of the project is to improve the collection and representative nature of species composition data for tuna (skipjack, yellowfin and bigeye) caught by purse-seine fisheries in the WCPO in order to improve the stock assessments of these key target species in the WCPO. The initial duration of the project was from 1 April 2009 to 31 January 2010. The project was extended to the period from 1 April 2010 to 31 January 2011 and again to the period from 1 February 2011 to 31 January 2012.

The scope of work under the current agreement includes the following:

- a. Identify key sources of sampling bias in the manner in which species composition data are currently collected from WCPO purse seine fisheries and investigate how such biases can be reduced.
- b. Review a broad range of sampling schemes at sea as well as onshore, and develop appropriate sampling designs to obtain unbiased species composition data by evaluating the selected sampling procedures.
- c. Review current stock assessment input data in relation to purse-seine species composition and investigate any other areas to be improved in species composition data, including collaboration with other RFMOs.

At its seventh meeting in August 2011, the WCPFC Scientific Committee “*requested that the scope of work for Project 60 be amended to include the provision of a plan for improvement of the availability and use of purse seine catch composition data applying the results from the Project. This plan should form the basis for the recommended review of the future of the Project to be conducted at SC8. This plan should be available for consideration by the Commission at WCPFC8.*”

Since 2009, under scope item (c), stock assessment input data have been adjusted with grab samples collected by observers that have been corrected for size selectivity bias. The size selectivity bias was estimated from paired grab and spill samples collected under scope item (a). A model-based approach to estimating the species composition of catches for strata of year, quarter, area and school association for which species composition data are missing was applied. The methodology and results were reported to the Scientific Committee in the following papers:

- [Selectivity bias in grab samples and other factors affecting the analysis of species composition data collected by observers on purse seiners in the Western and Central Pacific Ocean](#). Working Paper SC5–ST–WP–3. Fifth Regular Session of the Scientific Committee of the Western and Central Pacific Fisheries Commission, 10–21 August 2009, Port Vila, Vanuatu.

- [Update on the estimation of selectivity bias based on paired spill and grab samples collected by observers on purse seiners in the Western and Central Pacific Ocean](#). Working Paper SC6–ST–WP–2. Sixth Regular Session of the WCPFC Scientific Committee, 10–19 August 2010, Nuku’alofa, Tonga.

The adjustments to the input data have been applied to data stratified by the two principal purse-seine areas used in the MULTIFAN-CL stock assessments, year-quarter and school association (associated and unassociated). However, as noted by the Scientific Committee, there is a need to improve the availability and use of purse-seine catch data, so that adjusted catch data are available at finer levels of resolution of time period and geographic area.

Activities to Improve Estimates of Purse-Seine Catches: the “Plan”

Estimates of purse-seine catches will be improved through the following activities.

1. Continued collection of data from paired grab and spill samples

The target number of trips determined at the Fifth Meeting of the WCPFC Scientific Committee in August 2009 and the number of trips successfully completed are presented in Table 1. The data collected from paired samples to date cover primarily small to medium sized fish caught from anchored FADs in the waters of Papua New Guinea and Solomon Islands. Negotiations are currently underway to conduct paired sampling onboard vessels of Chinese Taipei, Japan, Kiribati, Korea, United States and Vanuatu, and negotiations with other flag states may be forthcoming. Paired sampling on these vessels should cover geographic areas not yet covered and hopefully will include larger fish. Greater coverage of areas and school associations, and hence broader coverage of species compositions and sizes of fish, will improve our understanding of selectivity bias in grab samples.

Table 1. Target number of paired sampling trips and trips successfully completed

Vessel Nationality / Arrangement	Target Number of Trips	Trips Completed
FSM Arrangement	8	15
China	2	
Japan	6	
Korea	8	
New Zealand	2	
Philippines	2	
Solomon Islands	2	4
Chinese Taipei	8	1
United States of America	8	2
Vanuatu	2	
EU and EPO-based fleets	2	
TOTAL	50	22

2. Development of time series of estimates of purse-seine catches, by species, based on grab samples corrected for sampling bias

This activity will have the following three sub-components.

i. Improved estimation of selectivity bias

The correction of grab samples for selectivity bias has so far been done with estimates of selectivity bias that were determined for 5-cm intervals of length. One example of a method that would result in more precision in the estimates of selectivity bias is to use cubic splines, rather than 5-cm intervals. The estimates of selectivity bias based on splines will, in turn, be used to obtain more precise corrections of grab samples. Estimates of selectivity bias will also be improved by better coverage of the school associations and sizes of fish, as discussed under activity #1 above.

ii. Examination of the use of grab samples corrected for selectivity bias in estimating species composition at finer levels of resolution

Under CMM 2008–01, coverage of purse seiners by observers has approached 100% since early 2010. With full coverage, it is no longer necessary to develop models to predict the species composition for strata of time period, geographic area and school association not covered by observer data. However, until such time as all observers collect spill samples, grab samples will still have to be corrected for selectivity bias.

The use of grab samples corrected for selectivity bias in estimating the species composition at the level of the set or trip therefore needs to be examined. This can be done by comparing the species composition determined from grab samples corrected for selectivity bias to those determined from spill samples, for trips during which paired sampling took place. If it can be shown that the species compositions determined from grab samples corrected for selectivity bias are accurate at the level of set or trip, then it may be possible to obtain accurate estimates of the species composition for all sets or trips, and, hence, accurate estimates of the catch at any degree of resolution.

iii. Further development of techniques for determining the species composition for strata for which observer data are missing

Even with 100% observer coverage since early 2010, it will still be necessary to estimate the species composition for catches taken prior to that period for which observer data were not collected. This has so far been done with statistical models for predicting the species composition that have been fitted to strata that are covered by observer data. However, due to the low observer coverage of certain time periods and geographic areas, the time-area resolution of the model predictions has so far been coarse, e.g., by two MFCL areas and quarter. Under this activity, the current models will be further developed to hopefully achieve predictions of the species composition at much finer resolutions, and new models may be developed. In this regard, a consultant statistician may be contracted to review the methods currently in use and to assist with the development of new methods.

3. Comparison of spill sampling with unloadings data from canneries corrected with port samples of landing categories

For trips for which the catch is delivered to a cannery, comparisons of species compositions determined spill samples to those determined from unloadings data, corrected with port samples of

landing categories, may provide useful information on the relative accuracy of both. To this end, a project is currently underway to conduct spill sampling on ten trips onboard purse seiners of the National Fisheries Development Company (NFD) of the Solomon Islands, together with sampling of landing categories of the fish that are delivered to the cannery in the port of Noro. The species compositions determined from the spill samples and the landings data, corrected with the port samples of landing categories, will be compared for each trip.

Similar comparisons for trips for which the catch is delivered to canneries of other ports will be conducted on an opportunistic basis. These ports may include Pago Pago, American Samoa and ports in Japan.

Conclusion

It is hoped that with (i) additional paired samples, (ii) improved estimates of selectivity bias, (iii) 100% observer coverage and (iv) better techniques for predicting the species composition for strata not covered by observer data, the availability and use of purse-seine catch data will improve. The primary goal is to make available accurate and reliable estimates of catches at all levels of time-area resolution, such that (a) estimates of annual catches for the WCPFC Statistical Area, (b) input data used for stock assessment and (c) catch estimates at much finer levels of resolution, including by fleet and EEZ, are all consistent with each other.

This goal, however, will ultimately depend on the ability of the observer data to support estimates of catches at much finer levels of resolutions, and this cannot be assumed in advance.

Since September 2011, the OFP has dedicated a full-time position to the organisation of paired sampling and to the comparison of spill sampling and port sampling in Noro. As a result, both activities have advanced considerably. However, the collection of additional paired samples, and hence better estimates of selectivity bias, will largely depend on the cooperation of the WCPFC flag states.