SCIENTIFIC COMMITTEE
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Continued use of longline operational-level data provided by fishing nations to support WCPFC stock assessments

WCPFC-SC11-2015/SA WP-07

Oceanic Fisheries Programme, SPC

AT SC10, an Agreement was reached with China, Japan, Korea, Chinese Taipei and the United States to provide their full history of longline operational level data for the Pacific Ocean in support of the Pacific-wide bigeye tuna modelling work that has been undertaken and presented at this SC. The Agreement that governed this arrangement is appended as Appendix A. Data were provided in late 2014 and early 2015, and SPC invested considerable resources in setting up secure data transfer arrangements, developing an internal data storage and access facility that safeguarded the data, integrating the data with complementary data held by SPC and grooming the data in preparation for analysis. These are extra steps that would not be required if the data were submitted as part of routine WCPFC data submission.

The data provision Agreement stipulates, *inter alia*, that the data were to be used exclusively for the Pacific-wide bigeye tuna modelling work, and that:

"*All data, including intermediate products which can restore the data, shall be deleted by the end of the last day of SC11, unless agreed otherwise by the Parties.*"

The purpose of this paper is to request consideration of the Parties to NOT require that the data be deleted, as stipulated in the Agreement, that the data be updated annually, and that the usage of the data be extended to allow it to be used for other relevant WCPFC stock assessments, as appropriate. The rationale for this request is as follows:

1. Considerable work was invested by SPC and the Parties to send, receive, store and prepare the data for detailed analysis, including reconciliation and integration with data already held by SPC. It is estimated that the additional cost of this work to SPC was <u>at least</u> 36 person days at a cost of approximately USD 22,000. No doubt, staff of the fisheries agencies providing the data also invested considerable staff time which would add to this figure. If the data are deleted at the end of SC11, as per the Agreement, these resources will need to be expended all over again to re-compile the data to support future stock assessments for WPCFC, should that be agreed.
2. The Report of the Operational Longline CPUE Workshop (SPC-OFP 2015) and the bigeye CPUE paper (McKechnie et al. 2015) noted that considerable follow-up analytical work on the data was required to reap full value for future WCPFC stock assessments. This work includes:
    - Targeting and cluster analyses, which is arguably the most critical area for future investigation, particularly an in-depth consideration of deliberate changes in targeting strategies and how these can be inferred from operational records;
    - Use of oceanographic covariates to improve the estimation of relative abundance from operational level data. For example, the inclusion of a variable such as thermocline depth in association with hooks-between-floats data for the fishery could be critical for the "regional-weight" analyses that help inform relative abundance among assessment regions;
    - Alternative statistical models could improve the estimates of relative abundance. Such models include those incorporating possibly more appropriate error assumptions for spatial data, and more explicit geostatistical models that utilise spatial smoothing techniques to impute estimates where spatial coverage of data is incomplete;
    - Construction of an operating model to test the appropriateness of current methods used to standardize CPUE and calculate relative CVs (within the time series)

- There is also scope for considerable "data rescue" to improve the existing data set, e.g., correction of outliers, imputation of missing values in key fields, and improvements to the data reconciliation (e.g., linking with vessel identifiers). Such work would be a considerable investment which would greatly improve the quality and value of the data set, but it is of little value if the data are to be deleted.

It would therefore be greatly beneficial if the integrated data that has been compiled could be retained under the same security arrangements as currently in place to allow collaborative research on these and other issues to continue intersessionally. The experience of the current exercise is clearly that full value from these data cannot be obtained if the data are available temporarily and in particular if they need to be re-sent, re-compiled and re-processed just a few months before work on a stock assessment needs to begin. Improvement of estimates of abundance from these data requires very complicated analyses, which require considerable time to carry out, to diagnose problems and check assumptions. Ideally these analyses would begin soon after the SC each year so that finalised indices are ready to be input to stock assessment models well before the modelling begins. Receiving the raw data well into the calendar year of the stock assessments precludes this.

3. The experience of using this data to support the Pacific-wide bigeye tuna modelling work has indicated the potential value of the data in supporting routine WCPFC stock assessments generally. The use of the non-Japanese components of the data (as agreed at the Workshop) in the 2015 South Pacific albacore assessment was also valuable, but could have been much more so had the Japanese data also been available, particularly in providing information on relative abundance for the early years of the fishery.

For these reasons, SPC is proposing to the Parties to the Agreement that the data that have been provided be maintained, updated as new information becomes available and not deleted at the conclusion of SC11, so that the work noted above can proceed. We are additionally proposing that the potential usage of the data be extended to supporting any stock assessment being conducted by SPC for WCPFC.

SPC would very much encourage that further work on the operational longline data be undertaken collaboratively with scientists from the fishing countries concerned, and we are open to suggestions regarding the mechanisms for such collaboration.

To summarise, it is proposed that:

- The operational longline data provided by fishing states under the Agreement (Appendix 1) be retained at SPC under data security arrangements outlined in the Agreement.
- The data be updated annually, incorporating the most recent year and any other new data available, including those data categories identified during the Workshop as being high priority for data rescue.
- Collaborative research using the data be continued to address high priority areas including those identified above.
- That the potential usage of the data be extended to supporting any stock assessment being conducted by SPC for WCPFC.

References

McKechnie, S., Tremblay-Boyer, L., and Harley, S. J. 2015. CPUE indices for bigeye tuna based on the analysis of operational catch and effort data. WCPFC-SC11-2015/SA-WP-02.

SPC-OFP. 2015. Report of the workshop on operational longline data. WCPFC-SC11-2015/SA-IP-01

Appendix 1

The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

Scientific Committee
Tenth Regular Session

Majuro, Republic of the Marshall Islands
6–14 August 2014

REPORT TEXT CONCERNING COMMITMENTS TO SUPPORT THE PACIFIC-WIDE BIGEYE ASSESSMENT WITH PROVISION OF OPERATIONAL-LEVEL DATA

Representatives from Japan, Korea, Chinese Taipei and SPC (and subsequently China and United States) discussed outside the meeting the assembly and collaborative analysis of operational-level longline data for the 2015 Pacific-wide bigeye assessment, and agreed that the following process would be the most effective and efficient way forward.

1. Korea and SPC will consult to reconcile their respective operational-level data holdings, with a view to the creation of a common data set for this fleet that includes all available data. (Japan hold all available data for their fleet, and this task was largely completed with Chinese Taipei in 2014, so this reconciliation is not required for Japan or Chinese Taipei.) These consultations will take place initially electronically, with follow-up as required at SPC headquarters in Noumea, New Caledonia at a mutually convenient time to be decided.

2. China, Japan, Korea, Chinese Taipei, United States and SPC (hereafter referred to as the Parties) shall agree on a format for operational-level data to be provided and integrated into a common data set for subsequent collaborative analysis. The format shall include, *inter alia*:
    a. Set-by-set data for individual vessels, with vessel identity protected by a vessel code applied consistently through the time series;
    b. Effort in number of hooks;
    c. Hooks between floats (where available);
    d. Catch in number of bigeye, yellowfin, albacore tuna and swordfish;
    e. Date of set;
    f. Start time of set in local time (where available);
    g. Position specified to the nearest 1 degree square.

3. The scope of the data will be 1952 – 2013, and for the entire Pacific Ocean.

4. A data preparation and analysis workshop will be held at SPC headquarters involving the Parties at a time to be decided, but as early as possible in 2015. The objectives of the workshop will be to review the operational-level longline data held by the Parties and to make provisional analyses of CPUE standardization for the Pan-Pacific bigeye stock assessment, which will be conducted in 2015. The data prepared in the agreed format shall be integrated into a single data set which will be used for exploratory analyses of the data and preliminary estimation of standardized CPUE indices.

5. For the purpose of collaboration on tuna research, SPC can exceptionally use data under the following conditions. Each Party may monitor the analysis.
    i. SPC shall maintain the data in a secure fashion. The security arrangements include the following:
        - The data shall be held in a secure server location that is accessible via login credentials only to the SPC staff who are directly involved in the analysis. These staff are:
            - Dr John Hampton, Chief Scientist & Deputy Director FAME (Oceanic Fisheries Programme)
            - Dr Shelton Harley, Principal Fisheries Scientist, OFP

- Mr Peter Williams, Principal Fisheries Scientist, OFP
- Dr Sam McKechnie, Fisheries Scientist, OFP
- Dr Laura Tremblay-Boyer, Fisheries Scientist, OFP
- Mr Fabrice Bouyé, Fisheries IT Specialist, OFP
- Emmanuel Schneiter, Fisheries IT Specialist, OFP

➢ Once finalised, one single backup copy of the data will be made to another identically-restricted server location. The purpose of this backup copy is limited to allow the data to be restored in the event of data loss or corruption (e.g. through computer hardware failure).

➢ Apart from this single backup, the data shall not be copied or backed up to any other server location or to any portable file storage media.

➢ The data shall not be disseminated or uploaded to any internet or email address.

➢ All SPC staff have strict contractual obligations in their terms of employment to maintain the confidentiality of information. Severe disciplinary action shall be taken for any breaches of these contractual obligations.

ii. The usage of the data is strictly limited to the collaborative work for the purpose of the 2015 Pacific-wide bigeye assessment.

iii. Access to and use of the data is strictly limited to the SPC scientists named above.

iv. The data can be used only until the end of SC11. All data, including intermediate products which can restore the data, shall be deleted by the end of the last day of SC11, unless agree otherwise by the Parties.

v. Any report or presentation that documents the results of this collaborative work shall be provided to the Fishery Agency of each Party prior to release, allowing reasonable time for comments.

6. Other countries may be invited to join this collaboration, as appropriate, with the agreement of the Parties.