ANNEX 10

REPORT OF THE BLUEFIN TUNA WORKING GROUP WORKSHOP

International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean

(July 19-21, 2007, Busan, Korea)

1.0 OPENING, ADOPTION OF AGENDA AND MEETING ARRANGEMENTS

The ISC Pacific Bluefin Tuna Working Group (PBFWG) Workshop was held in Busan, Korea during 19-21 July 2007. This was the sixth meeting of this Working Group since its inception in 2000. Scientists from Japan, Korea, Mexico and the U.S.A. participated in the meeting (Appendix 1). Five working documents (Appendix 2) were presented and reviewed by the participants.

1.1 Adoption of Agenda

The draft agenda was reviewed and adopted with minor modification (Appendix 3).

1.2 Selection of Chair

Mr. Yukio Takeuchi (Japan) was appointed to chair the meeting.

1.3 Appointment of rapporteurs

The following were appointed as rapporteurs for the different sections of the Workshop report:

Section 1 Yukio Takeuchi
Section 2 Harumi Yamada
Section 3 Kazuhiro Oshima
Section 4 Ray Conser, Yukio Takeuchi
Section 5 Kevin Piner, and Mikihiko Kai
Section 6, 7, 8,9,10 Yukio Takeuchi

2.0 UPDATES OF FISHERIES INDICATORS

Since the April PBFWG Workshop, Korean scientists submitted updated catch data and U.S. scientists submitted minor changes to U.S. catch data. The Chair contacted the WCPFC, SPC and New Zealand colleagues about availability of PBF catch data in their files for non-ISC members. No response was received from the SPC, and WCPFC indicated that it had no data on PBF.   S. Harley of New Zealand provided official New

Zealand catches but for only commercial catches and not sport fishing catches. The revised catches are shown in Table 1.

It was pointed out that there are large differences in Japanese catches from different sources. Japanese scientists explained that ISC Category 1 data were tentative and that the differences are due to various technical difficulties among Japanese scientists.. Catches estimated for Table 1 were compiled from best available sources and were developed for stock assessment purposes. The WG concluded that Table 1 should be used for its work. The WG recommended making both catch tables consistent in the near future.

3.0 REVIEW OF PROGRESS OF WORK ASSIGNMENTS ON CATEGORY 1 FROM APRIL WORKSHOP

3.1 Re-examination of estimation of the catches of small-sized fish of PBF by Japanese small pelagic fish purse seine fisheries in the East China Sea (ISC-PBF07/02/01) Presented by H. Yamada

The catches of PBF caught by the small pelagic fish purse seine fishery in the East China Sea for 1991 – 2006 were estimated using landing data from previous report presented to the PBFWG meeting in April 2007 (Yamada, 2007). Estimates of landing weight for the San'in area, southwest of Honshu, are generally accurate, although there is still room to improve the procedure that the Japan Fisheries Information Center (JAFIC) uses to estimate landing weight for Kyusyu landings. The detailed method in estimating catch of PBF was reviewed, as was the conversion factor (number of fish per box to mean weight of fish in each box) used by JAFIC. JAFIC estimates landing weight in Kyusyu based on the sales slip. As a result, JAFIC probably significantly under-estimates PBF catches because the conversion factor was underestimated. Therefore, if relatively larger catches are unloaded in Kyusyu (most of them are fish smaller than 5 kg), the underestimation of catches would be significant. A new conversion factor (weight/box) was developed to correct the underestimation.

Discussion

It was pointed out that this fishery has a logbook reporting system that might be used to accurately estimate catches. However, the WG learned that the characteristics of this small pelagic fish purse seine fishery complicate accurate estimation of the catch from the logbooks as well as port sampling of the catch. That is, (1) the small pelagic fish purse seine fishery for PBF is a recent development with a short history, and (2) the introduction of a tuna purse seine fishery logbook system is relatively new and confusing to the fishermen who have traditionally used a mackerel purse seine data reporting system. It was concluded that logbooks not be used to estimate catches and instead, the current method of using landing data be used.

The Working Group agreed that the catch from 1997 forward be estimated using the new fish/box conversion factor. Also, because the JAFIC summary report for years prior to

1996 is not available, a procedure for improving the landing estimates for those years should be developed before the next meeting.

3.2 Reviews of weight-length relationship on PBF (ISC07/PBF/02/2)
Presented by Mikihiko Kai

Weight-length relationships of Pacific bluefin tuna from samples collected in 1964 to 2007 were reviewed in order to understand the characterstics of the samples and to determine a means for integrating the different estimated W-L relationships.   A total of 74 W-L relationships for PBF and three W-L relationships for Atlantic and Mediterranean bluefin tuna were summarized and compared.   Most of the relations were similar and fall within a narrow range; consequently, the weight-length relationship by Shingu *et al* (1974), which has been identified as preferred by the PBFWG, appears to be a representative relationship for PBF. However, because small differences in weight-length relationships among season, fishing area, and sampling port are reported in the literature, it is recommended that when a weight-length relationship that corresponds to the conditions, such as fishing season, is available, it be used to convert weight to length.

Discussion

The WG discussed differences in error statistics in the relationships, $W=aL^b$ and $L=\alpha W^\beta$, estimated from a common set of data and used for conversion.   It was agreed that the preferred equation for converting weight frequency to length frequency is $L=\alpha W^\beta$.

The WG noted that variations of the weight at length among the compared W-L relationships were very small.

The WG noted the need for a single, best W-L equation for use in the SS2 model. Because the Shingu et al. equation was estimated with data for only large-sized fish, the WG recommended that further W-L analyses be carried out that included available data that represent the full length range of PBF.   This new relationship should then be compared to the Shingu et al. W-L relationship. The Working Group also agreed with the author that where specific W-L relationships are available, they be used for conversion of the specific weight frequency to length frequency.

3.3 Estimate of the age-length relationship of Pacific bluefin tuna with descriptive analysis on uncertainties remained (ISC07/PBF/02/03)
Toshiyuki Tanabe and Mikihiko Kai

Age and length data for 158 individual Pacific bluefin tuna were analyzed in this study. The age readings of otolith samples were conducted by a single scientist. The 158 samples were collected from fish caught in four areas, Ohma (Tsugaru Strait), Shiogama (off Tohoku), Sakaiminato (Sea of Japan) in Japan and Tungkang (off Taiwan).   In

addition, a group of samples were collected from the Amami farming station in Japan. Growth curves were estimated for four groupings of the data: (a) all data included, (b) data for wild fish only (c) data for wild fish and Taiwan samples excluded, and (d) data for wild fish with Ohma samples excluded. The results indicated that the ages of large fish in the sample influenced the growth curve and that few large fish were represented in the sample. The need, therefore, is for further data collection to acquire a sufficient sample of fish larger than 200 cm FL.

Discussion

The Working Group pointed out that there appears to be a large variance in length-at-age among years or areas, and that future studies should pay special attention to the experimental design, particularly the quality and quantity of samples collected. The Working Group suggested that for future studies they take into account the possibility of differences in growth among years or areas.

4.0 REVIEW OF STOCK CONDITION IN RELATION TO THE STRENGTH OF 2001 YEAR CLASS

4.1 Review of stock condition in relation to the strength of 2001 year class
(ISC07/PBF-2/04)
Presented by K. Oshima

A previous stock assessment using VPA indicated that the 2001 year class was a strong cohort and larger than the 1994 year class, which was also a strong cohort. This document re-examined the strength of the 2001 year class using information available since the last assessment. The author examined the catch-at-age data used in the VPA, and reviewed catch and CPUE of fisheries targeting PBF before they are recruited to the Japanese longline fishery. Published documents were used in the study and nominal length-frequency data of Japanese purse seine and longline fisheries were analyzed (see Figs. 1 and 2). The CPUE for the troll fishery indicates a strong 1994 cohort but does not clearly indicate a strong 2001 cohort. In addition, the 1994 cohort appears clearly in the longline catches beginning at age 5, whereas the 2001 cohort has not yet appeared in the longline size-frequency data in 2006 or 2007, though the current data sets are not yet complete. The results suggest that the 2001 cohort was not as strong as the 1994 cohort, although its strength was above average.. The author recommends that a final determination of the strength of this cohort can not be made until 2008, when it is expected to fully recruit to the longline and compilation of recent years' data is completed.

Discussion
The WG expressed appreciation for the thoroughness of the work described in ISC/07/PBFWG-2/4. It greatly contributed to the WG's effort to come to terms with this important issue. Three technical points were raised in discussion of this paper.

1.	It was noted that when combining size-frequency data from different fisheries, the individual size frequencies were not weighted by the catches from the respective fisheries. Consequently, the resulting composite size frequencies displayed in ISC/07/PBFWG-2/4 may not be representative of the total catch. In the future, individual size frequencies should be weighted (by the catch) whenever composite size frequencies are developed.

2.	The WG requested that Figures 9-12 be modified to display age on the x-axis (as well as length) using the age-length relationship from ISC/07/PBFWG-2/3 (Figure 5b, therein). This was done during the WG meeting and proved to be quite helpful in the WG's discussions.

3.	It was suggested that updating the full catch-at-age matrix would be helpful when reviewing the strength of the 2001 year class. However, it was not possible to carry out this work in the course of this WG meeting. Further, the WG felt that its review could be completed without the additional year of catch-at-age that would have been provided by updating the catch-at-age matrix.

It was noted that during the last meeting of the PBFWG (April 2007; see Annex 6), the WG planned to review recent trends in stock abundance at this meeting in addition to reviewing the strength of the 2001 year class. While the two topics are interrelated, the more general review of recent trends could not be undertaken using the data available to the WG at this meeting. A thorough review of recent trends will be undertaken in conjunction with the next stock assessment.

Nonetheless, the WG noted that the last PBF stock assessment (Jan 2006) estimated an exceptionally strong 2001 year class. Based largely on the estimated size of this year class, the stock projections indicated that the current level of SSB (Spawning Stock Biomass) could be maintained at the current F level. Based on this assessment, the ISC6 Plenary recommended that F should not be increased from current level.

The WG agreed that preliminary analysis of the Japanese catch and size-frequency data that has become available since the last assessment (2005-2007) indicates that the 2001 year-class was not as strong as previously thought, but may have indeed been larger than the average year class

More importantly, however, the survivorship of this year class in 2007 is unclear and cannot be well estimated until the next stock assessment (2008). While the last well-estimated strong year-class (1994) appeared clearly in the Japanese longline size frequency data in 2000 (i.e. at age 6), the 2001 year-class does not appear in the 2007 Japanese longline size frequency (see Fig. 2). Consequently, the conclusion of the last stock assessment regarding the likelihood that the 2001 year-class would maintain the bluefin SSB level now appears to have been optimistic in light of the new data that have become available since the last assessment.

The WG has no conservation advice at this time. However the findings (above) do not contradict the recommendation made in ISC6 Plenary ("fishing mortality should not be increased"). But if the Plenary wishes to be more precautionary, these findings would not contradict that action either.

5.0 FURTHER SPECIFICATION OF SS2 MODELING AND GENERAL ISSUES FOR NEXT STOCK ASSESSMENT

The Working Group continued the discussion begun in the April 2007 workshop on data needs and specification for SS2 for the upcoming stock assessment.

Discussion

New age and growth information presented at this meeting suggested that there may be regional differences in length-at-age. The WG suggested that the hypothesis explaining this spatial variability should include ageing error and regional size-selectivity patterns. Between-reader precision estimates could be used to investigate one of these hypotheses. The working group also noted that if fishery selectivity is the cause of the length-at-age differences, estimating regional selectivity patterns in the stock assessment model should be considered.

The WG discussed data availability and suitability for use in the stock assessment. Although the starting year of the model has been discussed at previous meetings, the terminal year/quarter of the model had not yet been considered. The terminal year/quarter will be determined by data availability and model specification. It was suggested that if the stock assessment model uses fishing year, the terminal year could be the second quarter of 2007. However if calendar year is used, the terminal year/quarter would be the end of 2006. The WG also discussed the W-L relationships to be used in the assessment model. It was suggested that the W-L relationships be derived from the spawning season and estimated using whole body weight. The WG suggested that further discussion on the use of the EPO data will be necessary at the next PBF WG meeting because two types of fisheries exist and may have different selectivity patterns. It was also noted that at the next PBF WG meeting some prioritization of data sources regarding their reliability will be needed because of the large number of data sources available.

The methodology of stock projections and stock assessment modeling was also discussed. It was noted that projections inside SS2 were designed to meet the management needs of the U.S. West Coast groundfish stocks. Investigation of the applicability of the projection component of SS2 to Pacific bluefin tuna needs to be investigated. Other projection software could also be considered if the SS2 application is not satisfactory. The WG agreed to revisit - at the next WG meeting - the selection of the most appropriate version of SS2 to use in the stock assessment.

Specific recommendations to be completed by the next PBF WG meeting:

1. Review the methods used to determine ages and estimate the between reader ageing error. (Japan)

2. Review the possible options to use the otolith data in the stock assessment. (Piner and Takeuchi)

3. Investigate the applicability of the SS2 software for PBF projections. (Japan and Conser)

4. Review of the methods used to standardize the EPO purse seine catch and data. (da Silva and Dreyfus)

6.0 ELECTION OF THE CHAIR OF THE WORKING GROUP

Election of Chairperson for the next three years, 2007-2010 was held following ISC procedures. Yukio Takeuchi was elected Chairperson of the Pacific bluefin tuna Working Group for the next term. Takeuchi thanked the members for having confidence in his ability to lead the WG. He assured the Group that he will dedicate himself to do his best in leading the group in completing its assignments.

7.0 REVIEW OF SCHEDULE AND ASSIGNMENTS

7.1 Schedule

The ISC Chairperson's proposed schedule for intercessional meetings was reviewed and discussed. It was agreed that a workshop for Data Preparation for Model development will be held December 11-18, 2007 in Shimizu, Japan. The full PBF assessment will be planned for May 28 – June 4, 2008. For this effort, it was agreed that the key stock assessment scientists of the WG would meet one week (May 21-27, 2008) before the assessment is conducted. In this way, there will be some assurance that the data and information preparation will be completed by the time the full WG meets to conduct the assessment. Japan tentatively offered to host this stock assessment meeting and the decision will be made at the December Working Group meeting. It was agreed that a location with good computer access is necessary for that meeting. Mexico offered to host a future intercessional meeting.

7.2 Work assignments to be completed by the next PBF WG meeting:

The WG noted that data preparation and the assignments identified in the April 2007 (see section 9 of Annex 6) workshop should be completed by the data preparatory meeting in December 2007. In addition, the WG identified the following four work assignments and persons responsible for them:

1. Review the methods used to determine ages and estimate the between reader ageing error. Japan agreed to complete this task.

2. Review the possible options to use the otolith data in the stock assessment.

Kevin Piner from the U.S. and Yukio Takeuchi from Japan will accomplish this task.

3. Investigate the applicability of the SS2 software for PBF projections.
Japan and Ray Conser from the U.S. agreed to complete this task.

4. Review of the methods used to standardize the EPO purse seine catch and data.
Alex Aires da Silva from IATTC and Michel Dreyfus from Mexico will complete this task.

8.0 OTHER MATTERS

8.1 Adoption of April meeting report

The draft report of the working group meeting held in April 2007 in Shizuoka, Japan was adopted with understanding that further editing of the text will be undertaken before general release of the report.

8.2 Consideration of effect of historical change of spatial effort distribution on standardized CPUE through simulation

The systematic error of standardized CPUE's trend by historical change in fishing area-coverage (ISC07-PBF02-05)
Presented by Minoru Kanaiwa

Area coverage of Japanese longline fisheries catching Pacific bluefin tuna has changed historically. This change may be contributing a systematic error to standardized CPUE computed from these fisheries data. Systematic error on trend in standardized CPUE was investigated with data of known characteristics and from set-by-set data (1 x 1 degree) of the Japanese distant water and offshore longline fisheries for 1952-2005. Using GLM analysis, the results indicate that if area effect is not included in CPUE standardization, a systematic error will likely affect the results, particularly in the interpretation of trends in the CPUE. Area effect is, therefore, recommended for inclusion in standardization models.

Discussion

In general, this type of study is encouraged because the geographic distribution of fisheries change with time.   For the Japanese longline fishery targeting Pacific bluefin tuna in coastal waters of Japan, it has experienced a shrinkage of fishing area historically; Hence, standardization models should include interaction terms such as year*area, month*area, etc., in future study

9.0 ADOPTION OF REPORTS AND CLOSURE

A draft report was developed and reviewed. Suggested changes were discussed. It was agreed that corrections to the report would be made and general "clean up" completed. The revised copy would be made available to members for final approval; however, the Group agreed that the Chairman should use the revised copy for reporting to the ISC7 Plenary.

The Chairman thanked all participants and the rapporteurs for their contribution in making this a successful meeting. The meeting was adjourned at 5:00 pm on 21 July 2007.

Appendix 1

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Appendix 2
List of Documents

ISC/07/PBF-2/01   Re-examination of estimation of the catches of small-sized fish of PBF   by Japanese small pelagic purse seine fisheries in the East China Sea (H. Yamada [hymada@fra.affrc.go.jp] and Y. Takeuchi)

ISC/07/PBF-2/02   Reviews of weight-length relationships on PBF (M. Kai: kaim@fra.affrc.go.jp)

ISC/07/PBF-2/03   Estimates of the age-length relationship of Pacific bluefin tuna with description of problems to be resolved in further study (T. Tanabe [katsuwo@fra.affrc.go.jp] and M. Kai)

ISC/07/PBF-2/04   Review of stock condition in relation to the strength of 2001 year class (K. Oshima; oshimaka@fra.affrc.go.jp])

ISC/07/PBF-2/05   The systematic error of standardized CPUE's trend by historical change of fishing area coverage (M. Kanaiwa [m3ikanaiw@bioindustry.nodai.ac.jp], Y. Takeuchi and K. Yokawa)

Appendix 3

BLUEFIN WORKING GROUP
STOCK ASSESMENT REVIEW MEETING

Agenda

19-21 July 2007

1. Opening, adoption of the Agenda and meeting arrangements.
2. Updates of fisheries indicator
3. Review of progress of work assignments of category 1 in April workshop, and other assignments
4. Review of stock condition in relation to the strength of 2001 year class
5. Further specification of SS2 modeling and general issues for next stock assessment
6. Election of the chair of the working group
7. Review of schedule and assignments
8. Other matters
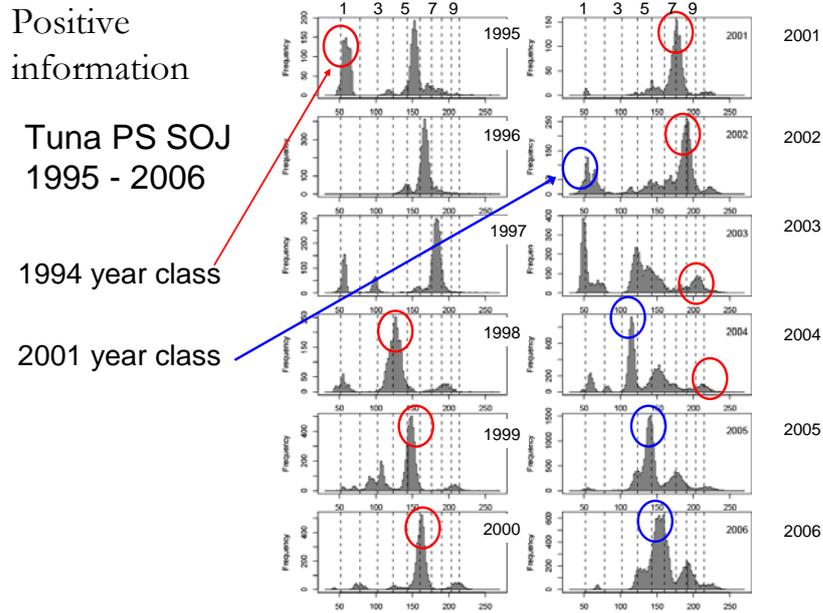9. Adoption of reports and closure

Figure 1 Tracks of 1994 year class and 2001 year class in nominal length frequency of tuna purse seine fishery operating in Sea of Japan. Red circles represent tracks of 1994 year class. Blue circles represent tracks of 2001 year circles

Longline
2000 - 2007

1994 year
class

2000

2001

2002

2003

No appearance of
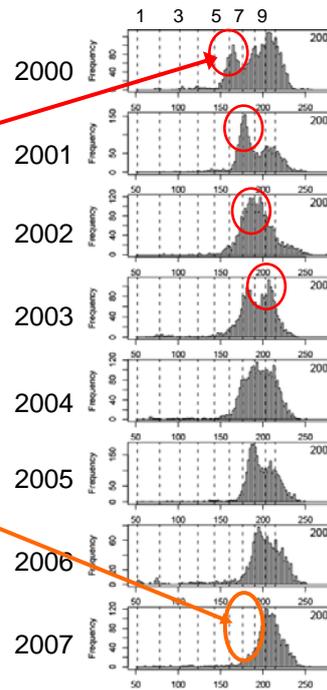2001 year class in
longline catch

2004

2005

2006

2007

Figure 2 Tracks of 1994 year class found in the nominal length frequency of Japanese longline. Red circles represent track of 1994 year class. In 2007 length frequency of Japanese longline 2001 year class should have appeared at about the same size where 1994 year class appeared in 2000.