Annex 9

REPORT OF THE ALBACORE WORKING GROUP WORKSHOP

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

July 15-16, 2008
Takamatsu, Japan

1.0. INTRODUCTION

A brief, two-day meeting of the International Scientific Committee – Albacore Working Group (ISC-ALBWG) was held in conjunction with the 8th Meeting of the ISC Plenary, Takamatsu-shi, Kagawa, Japan during 15-16 July 2008.

Nineteen (19) participants from Canada, Chinese Taipei, Japan, Korea, and United States attended in the meeting (Appendix 1). Ray Conser served as chairperson. A provisional agenda that was circulated prior to the meeting received minor revisions and was adopted (Appendix 2). Five working documents and one information paper were presented (Appendix 3). John Childers, Paul Crone, John Holmes, Momoko Ichinokawa, Kevin Piner, Yukio Takeuchi, Koji Uosaki and Kyuji Watanabe served as rapporteurs.

2.0 MEETING OBJECTIVES

The meeting objectives were:

1. Update fisheries statistics (through 2007)
2. Provide a qualitative update on stock status since the last assessment
3. Develop a biological research plan designed to improve albacore stock assessment
4. Plan for the next North Pacific albacore stock assessment (March 2010)

2.1 Update Fisheries Statistics

Under Agenda Item **2.1**, the Sub-items **2.1.1** Total catch; **2.1.2** Size frequency data; and **2.1.3** CPUE indices were discussed jointly.

Status of the ISC-ALBWG Database

John Childers presented **ISC/08-2/ALBWG/01** on the ISC-ALBWG database. The albacore working group database is also undergoing revision to centralize the data submitted by ALBWG members and standardize data elements and incorporate metadata. The data catalog that describes the available data in the ALBWG database has been updated and expanded to include descriptions of available data from category I, category II, and category III. Descriptions include country, gear, units, and resolution of time and area (e.g. month, 5 degree square). Total annual catches were provided from each country at the February 2008 ALBWG meeting. Several updates have been received since the last meeting. Issues that were presented at the previous working group meeting (February 2008) but have yet to be resolved are examined.

Discussion
Chinese-Taipei revisions to category I, II, and III data sets were discussed. Category I data for 1997 to 2000 were revised in 2006 and the revisions were accepted by the working group. Category II data were revised as a result of the receipt of additional data. Category III data were not revised. The 'Other longline' catches were obtained from flag of convenience vessels associated with Chinese-Taipei. It was clarified that those vessels have gradually re-registered to Vanuatu since 2001 when Chinese-Taipei started to promote FOC vessels re-registration program. The vessels re-registered to Vanuatu have not reported their catches to Chinese Taipei but presumably have reported to Vanuatu government. Therefore the 'Other longline' catches are not duplicated in the Chinese-Taipei catch estimates (category I). It was also noted that this issue had been clarified in the 2004 ISC plenary meeting (Section 5 of the meeting report). It was suggested that the catches from Vanuatu might be available from IATTC and SPC. The Chinese-Taipei Category III data were made available to the working group, but were not used in the assessment due to concerns regarding the representativeness of the data. These data will be included in the database and the data catalog with a footnote that the data are not currently being included in assessment work, pending further review.

Korean total catch estimates were submitted to the ISC data administrator but not to the ALBWG data manager. As a result the ALBWG data manager did not update catch values for Korea. Metadata describing the sources of Korean catch data and the methods used to summarize the catch data, as well as catch/effort data, were supplied to the ALBWG data manager at this meeting for inclusion in the ALBWG database (Table 1 includes these updates). Additional statistics such as coverage rates and sample sizes were also included in the database.

Finally, it was noted that for purposes of the North Pacific albacore database, as well as for the stock assessments, the Pacific Ocean north of the equator is used as the spatial extent of the stock.

Updates to Japan fishery statistics
Koji Uosaki presented the updates for Japan. Total catches by gear and vessel size classification were presented for Japanese longline and pole and line fisheries. Catches that were previously listed under 'Other longline' will be moved to the 'Other' category under Japanese catches. An additional category was added for set net gear (also known as trap net). Catches were re-distributed under gear classifications so the total catches for Japan remain the same. Updates were made to the 2006 longline catch data. The Japanese large (distant water) pole and line fleet has been reduced in recent years. Low prices for skipjack tuna caused a reduction in effort several years ago, but the price has recovered somewhat. The total number of large and medium-sized (distant water and offshore, respectively) longline vessels and large pole and line vessels has continued to decrease but the number of medium-sized (offshore) pole and line vessels has not decreased.

Discussion
It was noted that the set net catches are small (young) albacore.

Updates to Canada fishery statistics
John Holmes presented **ISC/08-2/ALBWG/05** an update on the 2007 Canadian troll fishery. This working paper summarizes revisions to the 2007 Canadian catch and effort statistics and was prepared using the most recent version of the Canadian catch database, which was released after the National report to the ISC 8 plenary was submitted. The new estimates of catch and effort differ from estimates provided at the February 2008 meeting in La Jolla, CA, by less than 1%. Total catch by the Canadian troll fishery in 2007 is estimated at 6,075 t, an increase from 5,832 t in 2006. Most of the catch by Canadian troll vessels occurs within the Exclusive Economic Zone (EEZ) of Canada and the U.S. The CPUE from the Canadian troll fleet in 2007 is 854 kg/day, down slightly from 934 kg/day in 2006, the highest CPUE in

the time series. Two size modes, centered at 64 cm and 75 cm, are evident in the size frequency data from the Canadian troll fleet in 2007, corresponding to three and four year old fish, respectively.

Discussion
The size composition of the Canadian troll catch is identical to that of the US troll catch, as expected since both fleets operate in the same waters and the length-frequency data are collected by the U.S. port sampling program. The sample size of five hundred fish is low because security and customs regulations discourage Canadian vessels from entering U.S. ports, so few Canadian vessels unload catches in U.S. ports and fewer vessel trips are available to be sampled. Nominal CPUE estimates for the Canadian troll fishery are in kilograms per day and cannot easily be compared to the standardized (stratified) CPUE estimates from the U.S. troll fishery, which are in numbers of fish per day. In the future, Canada can produce this kind of CPUE estimate for its fishery, as the number of fish caught per day per vessel are recorded in logbooks.

Updates to USA fishery statistics
John Childers presented **ISC/08-2/ALBWG/02**, an update on catch statistics from U.S. albacore fisheries. Very little has changed in the U.S. fisheries since 2005. No updates were made to catch data since the previous working group meeting. Catch and effort data are collected from logbooks (which were voluntarily submitted by fishermen prior to 2005) when a fisheries management program made the submission of logbook data mandatory for albacore troll fishermen. Logbook coverage increased from 20% to 70% and coverage rates continue to approach 100%.

Discussion
Recreational catch data and catch/effort data are available from U.S. vessels operating in southern California and off the coasts of Washington and Oregon. For the commercial fisheries, It was noted that size composition data are collected from three programs: (i) a port sampling program where fish are measured as they are unloaded from commercial troll vessels; (ii) a voluntary observer program (no longer operating) and (iii) an onboard sampling program where fishermen randomly measure fish at sea from their catch.

Updates to Korea fishery statistics
Sun-Do Hwang presented the updates for Korea. The historical catch by Korean longliners was revised based on new criteria for identifying the source of the catch. As such, no indication of recent trends is available. The total Korean longline catch of albacore in the North Pacific in 2007 was 91 metric tons (t). Albacore is an incidental catch in Korean longline fisheries so annual catch estimates are low.

Updates to Chinese-Taipei fishery statistics
Shui-Kai Chang presented the updates for Chinese-Taipei. The preliminary total catch estimate of albacore caught by Chinese-Taipei distant water longliners (DWLL) in 2007 is 2,465 t. This is a decrease from the estimated 3,848 t caught in 2006 and continues a downward trend that begun in 2000. The decline in catch is mainly owing to the decline of fishing effort by a fleet reduction program and by the compounding effects of high fuel prices worldwide and low fish market prices in U.S.. Catch estimates for offshore longline vessels were 453 t and 321 t for 2006 and 2007, respectively. These estimates also show a decreasing trend in total catches. The nominal CPUE of the last two years (2006-2007) have rebounded to previous levels after two years of substantial decline between 2004 and 2005. The albacore caught by DWLL between 2005 and 2007 ranged from 40 to 130 cm with a most fish occurring in the range of 80-90 cm. Smaller-sized fish were more notable in higher latitudes. A port sampling program in domestic fishing ports indicates the albacore size of offshore longliners range between 90-110 cm, which is a little larger than the size of DWLL. The trend in standardized CPUE time series does not show large fluctuation, as does the nominal CPUE time series.

Discussion
It was noted that targeting practices by Chinese-Taipei DWLL vessels influenced nominal CPUE trends. However, standardized CPUE – including a targeting effect – showed a relatively stable trend.

2.1.4 Discussion points for the ISC-Statistics Working Group
The ISC data submission procedures have caused confusion among some of the ALBWG participants. However, the ISC Chair reminded the ALBWG that the "rules" are described in the ISC operating procedures, and these procedures should be consulted when questions arise. After extended discussion, the group consensus was that the current ALBWG database management regime should continue and the ALBWG data manager would provide category I, II, and III data to the ISC STATWG as required. Further, the albacore working group will continue to collect and maintain ancillary and detailed data required for assessment purposes.

2.2 Provide a qualitative update on stock status since the last assessment
The ALBWG's review of recent fisheries information (since 2005 – the terminal year from the last stock assessment) indicate the following:

1. Total catch in 2006 was slightly greater than in 2005. However, in 2007, catch increased substantially – returning to a level more typical of the past decade.
2. Recent values of CPUE were also either stable or higher than in 2005.
3. Recent information regarding the magnitude of the 2003 year-class was mixed with some data sources appearing to be consistent with a strong 2003 year-class and other sources not.

The following sections provide more detailed descriptions of the recent data used to drawn the above conclusions on recent stock status. However, it should be noted that qualitative interpretation of two years of data should be viewed with caution until such time that another stock assessment can be completed to more fully understand recent stock trends.

2.2.1 Catch and effort trends
Paul Crone presented information regarding fishery-related time series included in stock assessment modeling efforts conducted through the ISC-ALBWG (**ISC/08-02/ALBWG/03**). In particular, eastern North Pacific Ocean fisheries were addressed (i.e. fleets based in the United States, Canada, and Mexico). Pertinent time series included updates to catch, size distributions, and age-aggregated CPUE indices (1966-07) for both the USA troll and longline fisheries. Finally, the updated time series are applicable to both the current SS2-based alternative models, as well as the VPA model.

Discussion
In the course of discussion, other participants also described the recent trends from their respective national fisheries.

- USA Troll -Catches in 2006 and 2007 have increased relative to catches in 2005. The estimated number of trips (effort) has also increased above 2005 levels.
- USA Longline – 2006 and 2007 catches have modestly declined relative to 2005. The estimated effort has also declined since 2005. However it was noted that the total catch of this fishery is small.
- Canada Troll – Catches in 2006 and 2007 increased relative to 2005 catch levels. In contrast to catch, effort has declined since 2005.
- Japan Pole and Line - Catches in 2007 increased above levels recorded in 2005 and 2006.
- Chinese-Taipei Longline – catches in 2006 and 2007 have declined relative to 2005 due to a reduction of fishing effort.

2.2.2 Strength of recent year-classes

USA Troll – A peak in estimated CPUE in 2006 may be the result of a large number of 3 year-old fish entering the fishery. This is consistent with the large 2003 year-class that was estimated in the last stock assessment. Fishery size distribution, mean size, and mean estimated age during 2006-2007 are not easily interpreted with respect to year-class strength.

USA Longline – CPUE, fishery size distribution, mean size, and mean estimated age during 2006-2007 are not informative about year-class strength.

Canada Troll- The highest recorded CPUE occurred in 2006. This may reflect a large number of 3 year-old fish which is consistent with the large 2003 year-class estimated in the most recent stock assessment.

Japan Pole and Line – The size/age distribution from this fishery in 2006 did not show a large proportion of 3 year-old fish and therefore was not consistent with a large 2003 year-class. However, the size/age distribution in 2007 documented a large proportion of 4 year-olds which is consistent with a large 2003 year-class. CPUE derived from large vessels (> 300 tonnage; 28 vessels in total) in the pole and line fishery was not consistent with a large 2003 year-class.

Japan Small Longline – The estimated CPUE in 2006 and 2007 was consistent with a large 2003 year-class, however the data are limited both spatially and temporally.

2.2.3 CPUE trends

- USA Troll – CPUE in 2006 and 2007 was variable and not easily interpreted with respect to short-term abundance change.
- USA Longline – CPUE in 2006 and 2007 was similar to the 2005 estimate. It is noted that this fishery is small and does not target albacore, which may affect interpretation of this series.
- Canada Troll – CPUE increased in 2006 and 2007 above 2005 levels. It is noted that the increase in CPUE may be due to the loss of inexperience captains from the fishery.
- Japan Pole and Line – CPUE of large vessels increased in 2006 and 2007 above the 2005 estimate.
- Chinese Taipei longline – Nominal CPUE in 2006 and 2007 increased to 2003 level after two year substantial decline (2004 and 2005). However, standardized CPUE – a better measure of stock abundance – remained relatively stable during this period.

2.2.4 Other stock status indicators

Koji Uosaki presented **ISC/08-02/ALBWG/03.** Future projections for SSB were updated as a follow up to the 2006 stock assessment for North Pacific albacore; and the effect of the length of projection period was examined – particular with respect to the reference point "$F_{SSB\text{-}Min}$." Results of the updated projections (using the now know 2006 and 2007 catch) indicated the SSB estimates in the near future are greater than those estimated in the 2006 stock assessment. This difference is primarily due to the actual catch (in 2007) being less than that assumed in the projection work done in 2006. $F_{SSB\text{-}Min}$ estimates also became higher due to the larger SSB estimate in the near future. $F_{SSB\text{-}Min}$ estimates were also affected by the length of projection period, i.e. $F_{SSB\text{-}Min}$ were greater for short-term projections (only long-term projections were carried out in association with the last stock assessment). The working paper demonstrates that guidance resulting from future projections may differ depending on the projection horizon (i.e. short-term vs. long-term).

Discussion

It was noted that the estimated probabilities of the SSB remaining above the SSB reference points – as calculated in the last stock assessment (2006) – were modestly underestimated. Further, because the realized catch in 2007 was less than that assumed in the projections, the F in 2007 may have been less than "current F" (0.75 yr^{-1}). More generally, it was recognized that the assumed catches in recent years can have a large influence on short term projection results – particularly when the assumed and realized catches differ appreciably.

2.3 Develop a biological research plan to improve albacore stock assessment

Paul Crone presented an adaptive sampling framework for collecting maturity-related data regarding albacore of the North and South Pacific Oceans (ISC-ALB/08-2/ALBWG/INFO/01). The sampling plan was first introduced in 2005, i.e., it was revisited, given the recent charge by the ISC for Working Groups to propose biological research plans (in general) that could help improve upon current stock assessment efforts. In this context, at this time, it was recommended that such a sampling plan consider only the North Pacific Ocean population, given the ISC has no formal mandates currently in place for conducting research projects in the South Pacific Ocean.

Currently, population models for North Pacific albacore are based on maturity-related data accumulated in the mid-1950s and ultimately, a step-function maturity schedule is defined by 50% mature-at-age 5 and fully-mature for age 6 and older. Ultimately, these reproductive-based stock parameters are used to estimate levels of spawning stock biomass (SSB), which provides the basis for assessing the overall status (health) of an exploited fish population. In general, the overriding objective of the research proposal was to rigorously (in statistical and practical terms) develop female maturity schedules both spatially and temporally and subsequently, to provide researchers the most appropriate reproductive time series to use in stock assessments. Secondary objectives of the study included: detailed evaluations of stages of gonad maturation via histological examinations of gamete subsamples; developing indices of well-being, such as the Gonadosomatic Index, GSI; examining sex ratio statistics, and providing ecological-related information concerning extent of spawning distributions and seasonality. The proposed sampling design will allow spatial/temporal partitioning within the overall statistical analysis, which is necessary to account for potential biases associated with determining representative (accurate) maturity schedules for highly migratory species that are typically characterized by both broad timing (seasonality) and distribution (range) of spawning. Design-related discussion generally addressed field, laboratory, and analysis methods, as well as anticipated costs. It is important to note that the proposed study will necessarily rely on support (funds, field/laboratory/analysis staff, etc.) from particular nations associated with the ISC-ALBWG. Finally, a revised Proposal is presented in Appendix 4 based on the recommendations below from the Working Group.

Discussion

The ISC-ALBWG communicated the following regarding development of a North Pacific Ocean-wide biological sampling program for albacore, i.e., consensus was reached on the following issues:

- Overall, Working Group participants communicated that such a sampling program was needed; however, the current plan tabled by the USA should not be considered the final design, but rather, a general outline for collection of representative sample data that will inevitably require more detailed discussion;
  - In this context, it was noted that actual sampling methods will differ (to some degree), depending on which biological data are of interest;
- Biological parameters of highest priority follow (not in any order of importance):
  - Maturity and fecundity;
  - Sex ratio of larger fish;
  - Age, growth, longevity;
- Although emphasis on the spatial/temporal framework of the sampling plan is critical to obtaining representative data, size-stratified (length-based) sampling within the overall design will necessarily be important as well;
- It is important that the overall project includes input from all nations (i.e., a collaborative project) and further, this research is expected to benefit not only stock assessment efforts, but also produce publications in the professional literature;

- Before starting such a project, it will be necessary to obtain adequate funding for the two-year timeframe;
  - In this context, a potential funding source for this project may be the Northern Committee forum (via the WCPFC);
  - Also, it is expected that nations will need to provide additional funding and/or staffing and/or laboratory support as well; and finally,
- Participants felt strongly that coordination-related activities surrounding this sampling effort are likely the most important aspect of the overall design and thus, it was strongly suggested that a task group be assigned to further develop the plan (the following nations/individuals were identified);
  - South Korea (S. D. Hwang);
  - Japan (K. Uosaki) … additionally, Japan has preliminary sampling plans in place for collection of reproductive-related data;
  - USA (J. Childers and P. Crone);
  - Chinese-Taipei (S. K. Chang, C. Y. Chen);
  - Canada (J. Holmes).

2.4 Plan for the next North Pacific albacore stock assessment (March 2010)

2.4.1 Meeting Schedule

The WG discussed the plan to transition from VPA to the Stock Synthesis II (SS2) model for the next formal stock assessment, which is scheduled to be completed in March 2010. The Chair proposed two inter-sessional meetings for data preparation and model development prior to the formal stock assessment meeting in March 2010. After discussion, the ALB WG agreed to a tentative schedule of three meetings to accomplish these tasks. The first inter-sessional meeting will be 24 February – 03 March 2009, Shimizu, Japan. The second inter-sessional meeting is tentatively scheduled for 06-13 October 2009 and the full stock assessment meeting, 02-09 Mar 2010. Hosts and locations for the latter two meetings have not been determined yet.

Given the proposed schedule, the database to be used in the stock assessment should be finalized no later than October 2009 so that the analysts have sufficient time to conduct modelling runs prior to the March 2010 stock assessment meeting. Major modelling decisions (e.g., CPUE time-series, area-time strata, etc.) will also need to be finalized by this date.

2.4.2 Transition to the Stock Synthesis Model for the next assessment

The WG reviewed the transition schedule. The WG noted that the meeting in February. 2008 reviewed progress on the development of age-based modeling using SS2, and also noted that further work was needed to demonstrate that the length-based modeling in SS2 works effectively for the North Pacific albacore stock. Comprehensive length-based modelling results are expected by the February 2009, if not before.

The WG also discussed whether the next stock assessment will use only SS2 or both SS2 and VPA, recognizing that the next stock assessment results may differ (in important ways) from the last stock assessment – in which case, it will important to understand whether these differences are data-driven or model-driven. A WG decision on this matter will be facilitated by the length-based SS2 results, and should be made at next WG meeting (February 2009).

The WG also agreed on the need to invite experts in stock assessment modeling to the February 2009 WG meeting to provide guidance and advice. In order to make the further progress between now (July 2008) and the February 2009 meeting, the chair suggested that WG members utilize all possible opportunities for collaboration, e.g. an opportunistic, informal meeting before or after the IATTC Workshop in October 2008. Good communication among researchers by email correspondence will also be needed to advance progress.

2.4.3 Other Software Needed for Stock Assessment

The chair of the PBF WG explained their experience using SS2 for the latest stock assessment in May 2008. SS2 is a large and complicated software package with many built in features that are useful but also restrictive, i.e., if a feature is not suitable for a particular task, there are no other options in SS2. Because of this complexity there is reluctance to modify the code to accomplish a particular task required by the PBF WG because of concern that other parts will be changed unknowingly in subtle ways. As a result, the WG has developed its own software to accomplish specific tasks that SS2 cannot do. For example, SS2 only provides F-based reference points in relation to the latest year, rather than averaging over several years. Also, SS2 has limitations on future projections and reference points calculations. Because of these limitations PBF WG needed other software to do stochastic projections and biological reference points calculations where SS2 leaves off and developed R-code to do these calculations.

Markov Chain Monte Carlo routines are built into SS2 to estimate uncertainty associated with management quantities produce by stock assessments. The PBF WG found that it could not use these routines because bluefin data are very complex and ended up bootstrapping to estimate uncertainty quantitatively. This approach is not easy to do and takes a long time and lots of computing power. Lastly, it is important to clearly document the major modelling decisions when using SS2 because the complex nature of SS2 makes it difficult to trace the cause of odd or unexpected results. From an ALB WG perspective, SS2 does not calculate the suite of reference points that were provided in the 2006 stock assessment so custom built software will likely be needed to support the upcoming stock assessment. ALB WG members need to be very familiar with SS2 software before the stock assessment meeting in early 2010 and should consider holding a small subgroup meeting before stock assessment meeting.

There was also discussion of alternative approaches for generating management advice from reference points. For example, Steve Martell (UBC) has an MSY-based model for reference point estimation that is simpler to implement and run than the SS2 model. This model has been applied to Pacific hake and published in CJFAS. V. Wespestad and J. Holmes will explore this with Martell and draft a working paper for consideration at a future ALB WG meeting.

2.4.4. Effect of Possible Assigned Tasks other than Stock Assessment

The ALB WG discussed the potential effect of potential requests (from the Northern Committee or the ISC Plenary) for further work on reference points using the last assessment as the foundation for such work. Any such requests for additional work are important because they will use resources that would normally be applied to the upcoming assessment. Other issues that the ALB WG needs to follow include the implications of high fuel prices on the standardization of effort time-series because of the changes in fishing patterns that are occurring. Should funding become available, further work will be needed to complete the ALBWG's biological research plan (Appendix 4). It may also be useful to continue the retrospective review of projections from the last assessment relative to realized catches (as in ISC/08-02/ALBWG/03) to improve forecasting capabilities. The 2006 stock assessment was followed by

innovative reference point analyses. Considerable additional work will be needed to move passed the "proof of concept" stage. Many of these topics will be reviewed at the February-March 2009 meeting.

2.4.5 Other Issues

ISC/08-2/ALBWG/04 was presented and discussed. This paper demonstrates that the length of the projection period can affect the estimated F_{SSB} quantities , particularly early in the projection period. The implications of this finding for the ALB WG are as follows: projections from the 2005 stock assessment used a long-term 30 year perspective. These long-term projections reflect the equilibrium condition and will continue to be provided in future stock assessments. However, this paper opens up the idea of looking at shorter-term projections, which capture events such as recent recruitment. This paper demonstrates that guidance to managers based on future projections may differ depending on length of the projection period used. Both short- and long-term projections should be provided with the next stock assessment.

3.0 Administrative Matters

3.1 Procedure for clearing the report

A draft of the entire report (other than Appendix 4) was reviewed by the WG prior to adjournment of the WG meeting. After the WG meeting, the Chair will distributed a second draft of the report (including Appendix 4) via email for review, comment, and approval by participants. Subsequently, the Chair evaluated suggested revisions, made final decisions on content and style, and provided the report for ISC8 Plenary review.

3.2 Time and place of next meeting

The next ISC-ALBWG Regular Meeting will be scheduled (subject to approval by the ISC8 Plenary) for 24 February – 3 March 2009, with Japan offering to host the meeting. The primary goal of this meeting will be to further progress on SS model development and reach consensus on the modelling platform(s) to be used for the next stock assessment (see details in Section 2.4, above).

4.0 Adjournment

The Meeting was adjourned at 20:00 on 16 July 2008. The Chair thanked all of the participants for their attendance and contributions and finally, stressed to National Coordinators the need to maintain ongoing communication concerning scientific data exchange and research progress.

Table 1. North Pacific albacore catches (in metric tons) by fisheries, 1952-2007. Blank indicates no effort.
-- indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

Year	Japan							Korea		Chinese-Taipei		
	Purse Seine	Gill Net	Set Net	Pole and Line	Troll	Longline	Other	Gill Net	Longline	Gill Net	Longline [1] Distant Water	Longline [1] Offshore
1952	154		55	41,787	--	26,687	182					
1953	38		88	32,921	--	27,777	44					
1954	23		6	28,069	--	20,958	32					
1955	8		28	24,236	--	16,277	108					
1956	--		23	42,810	--	14,341	34					
1957	83		13	49,500	--	21,053	138					
1958	8		38	22,175	--	18,432	86					
1959	--		48	14,252	--	15,802	19					
1960	--		23	25,156	--	17,369	53					
1961	7		111	18,639	--	17,437	157					
1962	53		20	8,729	--	15,764	171					
1963	59		4	26,420	--	13,464	214					
1964	128		50	23,858	--	15,458	269					
1965	11		70	41,491	--	13,701	51					
1966	111		64	22,830	--	25,050	521					
1967	89		43	30,481	--	28,869	477				330	
1968	267		58	16,597	--	23,961	1,051				216	
1969	521		34	31,912	--	18,006	925				65	
1970	317		19	24,263	--	16,222	498				34	
1971	902		5	52,957	--	11,473	354		0		20	
1972	277	1	6	60,569	--	13,022	638		0		187	
1973	1,353	39	44	68,767	--	16,760	486		3		--	
1974	161	224	13	73,564	--	13,384	891		114		486	
1975	159	166	13	52,152	--	10,303	230		9,575		1,240	
1976	1,109	1,070	15	85,336	--	15,812	270		2,576		686	
1977	669	688	5	31,934	--	15,681	365		459		572	
1978	1,115	4,029	21	59,877	--	13,007	2,073		1,006		6	
1979	125	2,856	16	44,662	--	14,186	1,139	0			81	
1980	329	2,986	10	46,742	--	14,681	1,177	6	402	--	249	
1981	252	10,348	8	27,426	--	17,878	699	16		--	143	
1982	561	12,511	11	29,614	--	16,714	482	113	5,462	--	38	
1983	350	6,852	22	21,098	--	15,094	99	233	911	--	8	
1984	3,380	8,988	24	26,013	--	15,053	494	516	2,490	--	--	
1985	1,533	11,204	68	20,714	--	14,249	339	576	1,188	--	--	
1986	1,542	7,813	15	16,096	--	12,899	640	726	923	--	--	
1987	1,205	6,698	16	19,082	--	14,668	173	817	607	2,514	--	
1988	1,208	9,074	7	6,216	--	14,688	170	1,016	175	7,389	--	
1989	2,521	7,437	33	8,629	--	13,031	433	1,023	27	8,350	40	
1990	1,995	6,064	5	8,532	--	15,785	248	1,016	1	16,701	4	
1991	2,652	3,401	4	7,103	--	17,039	395	852	0	3,398	12	
1992	4,104	2,721	12	13,888	--	19,042	1,522	271	1	7,866	--	
1993	2,889	287	3	12,797	--	29,933	897		21		5	
1994	2,026	263	11	26,389	--	29,565	823		54		83	
1995	1,177	282	28	20,981	856	29,050	78		14		4,280	
1996	581	116	43	20,272	815	32,440	127		158		7,596	
1997	1,068	359	40	32,238	1,585	38,899	135		404		9,119	337
1998	1,554	206	41	22,926	1,190	35,755	104		226		8,617	193
1999	6,872	289	90	50,369	891	33,339	62		99		8,186	207
2000	2,408	67	136	21,550	645	29,995	86		15		7,898	944
2001	974	117	78	29,430	416	28,801	35		64		7,852	832
2002	3,303	332	109	48,454	787	23,585	85		112		7,055	910
2003	627	126	69	36,114	922	20,907	85	(0)	146		6,454	712
2004	7,200	61	30	32,255	772	17,341	54	(0)	78		4,061	927
2005	850	154	97	16,133	665	20,548	234	(0)	395		3,990	482
2006	364	221	55	16,847	460	21,606	42	(0)	147		3,848	469
2007	(5,194)	(221)	(55)	(38,289)	(460)	(21,606)	(42)		(91)		(2,465)	(451)

Table 1. (Continued)

Year	United States								Mexico			Canada	Other		
	Purse Seine	Gill Net	Pole and Line	Troll	Handline	Sport	Longline	Other	Purse Seine	Pole and Line	Longline	Troll	Troll [1]	Longline	Gr Tot
1952				23,843		1,373	46					71			
1953				15,740		171	23					5			
1954				12,246		147	13								
1955				13,264		577	9								
1956				18,751		482	6					17			
1957				21,165		304	4					8			
1958				14,855		48	7					74			
1959				20,990		0	5					212			
1960				20,100		557	4					5			
1961			2,837	12,055		1,355	5	1	2	39	0	4			
1962			1,085	19,752		1,681	7	1	0	0	0	1			
1963			2,432	25,140		1,161	7		31	0	0	5			
1964			3,411	18,388		824	4		0			3			
1965			417	16,542		731	3		0			15			
1966			1,600	15,333		588	8	1	0			44			
1967			4,113	17,814		707	12					161			
1968			4,906	20,434		951	11					1,028			
1969			2,996	18,827		358	14		0			1,365			
1970			4,416	21,032		822	9		0			390			
1971			2,071	20,526		1,175	11		0			1,746			
1972			3,750	23,600		637	8		100	0	0	3,921			1
1973			2,236	15,653		84	14		0			1,400			1
1974			4,777	20,178		94	9		1	0	0	1,331			1
1975			3,243	18,932		640	33	10	1	0	0	111			
1976			2,700	15,905		713	23	4	36	5	0	278			1
1977			1,497	9,969		537	37		3	0	0	53			
1978			950	16,613		810	54	15	1	0	0	23			1
1979			303	6,781		74	--		1	0	0	521			
1980			382	7,556		168	--		31	0	0	212			
1981			748	12,637		195	25		8	0	0	200			
1982			425	6,609		257	105	21	0	0	0	104			
1983			607	9,359		87	6		0	0	0	225			
1984	3,728		1,030	9,304		1,427	2		107	6	0	50			
1985	26	2	1,498	6,415	7	1,176	0		14	35	0	56			
1986	47	3	432	4,708	5	196			3	0	0	30			
1987	1	5	158	2,766	6	74	150		7	0	0	104			
1988	17	15	598	4,212	9	64	307	10	15	0	0	155			
1989	1	4	54	1,860	36	160	248	23	2	0	0	140			
1990	71	29	115	2,603	15	24	177	4	2	0	0	302			
1991	0	17	0	1,845	72	6	312	71	2	0	0	139			
1992	0	0	0	4,572	54	2	334	72	10	0	0	363			
1993		0	0	6,254	71	25	438		11	0	0	494			
1994		38	0	10,978	90	106	544	213	6	0	0	1,998	158		
1995		52	80	8,045	177	102	882	1	5	0	0	1,763	137		
1996	11	83	24	16,938	188	88	1,185		21	0	0	3,316	505	1,735	
1997	2	60	73	14,252	133	1,018	1,653	1	53	0	0	2,168	404	2,824	1
1998	33	80	79	14,410	88	1,208	1,120	2	8	0	0	4,177	286	5,871	1
1999	48	149	60	10,060	331	3,621	1,542	1	0	23	34	2,734	261	6,307	1
2000	4	55	69	9,645	120	1,798	940	3	70	29	4	4,531	490	3,654	
2001	51	94	139	11,210	194	1,635	1,295		5	17	0	5,248	127	1,471	
2002	4	30	381	10,387	235	2,357	525		28	0	0	5,379	(127)	700	1
2003	44	16	59	14,102	85	2,214	524		28	0	0	6,861	(127)	(2,400)	
2004	1	12	126	13,346	157	1,506	361		104	0	0	7,856	(127)	(2,400)	
2005		202	66	8,413	175	1,719	296		0	0	0	4,845	(127)	(2,400)	
2006		3	23	12,524	95	385	270		109	0	0	5,832	(127)	(2,400)	
2007	(77)	(4)	(21)	(11,436)	(100)	(1,147)	(250)		(40)	(0)	(0)	(6,075)	(127)	(2,400)	

1 Other troll catches from vessels registered in Belize, Cook Islands, Tonga, and Ecuador.

APPENDIX 1

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APPENDIX 2

AGENDA

INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE SPECIES IN THE NORTH PACIFIC OCEAN

ALBACORE WORKING GROUP MEETING

Meeting Room #63
Kagawa International Conference Center
Takamatsu Symbol Tower
Takamatsu-shi, Kagawa
Japan

15-16 July 2008

1. Preliminaries

1.1 Opening of the meeting[1]
1.2 Welcome and Introductions
1.3 Distribution of documents[2]
1.4 Approval of agenda
1.5 Appointment of rapporteurs

2 Meeting Objectives

2.1 Update fisheries statistics through 2007 including:
- 2.1.1 Total catch by nation and gear (Table 1)
- 2.1.2 Size frequency data by nation and gear
- 2.1.3 CPUE indices
- 2.1.4 Discussion points for the ISC Statistics WG meeting
- 2.1.5 Other

2.2 Provide a qualitative update on stock status since the last assessment[3]
- 2.2.1 Catch and effort trends
- 2.2.2 Strength of recent year-classes (including update on the 2001 & 2003 YCs)
- 2.2.3 CPUE trends
- 2.2.4 Other stock status indicators

2.3 Develop a biological research plan designed to improve albacore stock assessment[4]
- 2.3.1 Maturity
- 2.3.2 Age, growth, and longevity
- 2.3.3 Natural mortality

[1] On Tuesday, 15 July 2008, please register at 09;00 the meeting will begin at 09:30

[2] Please use the ISC-ALBWG cover sheet and bring 20 copies of each working document

[3] The last stock assessment was conducted in December 2006 using data through 2005. The focus here will be primarily on 2006-2007 data and whatever inferences can be drawn regarding recent stock status. Qualitative information from fishing during the first semester of 2008 will also be discussed, when relevant.

[4] On Thursday, 24 July 2008, an ISC Seminar will be held, where the Chair will present this research plan.

2.3.4 Other

2. Meeting Objectives, continued

2.4 Plan for the next North Pacific albacore stock assessment (March 2010)
- 2.4.1 Meeting schedule
- 2.4.2 Transition to the Stock Synthesis model for the next assessment
- 2.4.3 Other software needed (e.g. for projections, reference points, etc.)
- 2.4.4 Effect of possible assigned tasks other than stock assessment (e.g. additional reference point research, management strategy evaluation, etc.)
- 2.4.5 Other issues

3 Administrative matters

3.1 Clearing the report of this meeting
3.2 Time and place of the next meeting
3.3 Other matters

4 Adjournment

APPENDIX 3

List of Documents

ISC/08-2/ALBWG/01:	International Scientific Committee Albacore Working Group Database. J. Childers.
ISC/08-2/ALBWG/02:	Update on Catch Statistics from U.S. Albacore Fisheries in the North Pacific. J. Childers.
ISC/08-2/ALBWG/03:	Critical Time Series Included in Stock Assessment Models for North Pacific Albacore. P. Crone and J. McDaniel.
ISC/08-2/ALBWG/04:	Further analysis of the future projection and the FSSB-Min from the results of the 2006 stock assessment for the North Pacific albacore. K. Uosaki and H. Kiyofuji.
ISC/08-2/ALBWG/05:	The 2007 Canadian North Pacific Albacore Troll Fishery: An Update. J. Holmes.
ISC/08-2/ALBWG/INFO/1:	Maturity Study for Albacore of the Pacific Ocean: A Proposal. P. Crone and J. McDaniel. (Originally presented as **ISC/05/ALBWG/03**, November 2005)

Appendix 4

Biological Sampling Plan Proposal for North Pacific Albacore[1]

International Scientific Committee – Albacore Working Group

INTRODUCTION

In general, biological data represent a critical source of information necessary to objectively evaluate the status of fish populations. Ultimately, these data are used to develop biological parameters (e.g., reproductive- and age/growth-related statistics), which are included in typical stock assessment models. Currently, population assessments of North Pacific albacore (*Thunnus alalunga*) are conducted through the Albacore Working Group of the *International Scientific Committee* (ISC-ALBWG). Since 2000, the ISC-ALBWG has strongly recommended that a population-wide sampling plan be undertaken to update current assumptions regarding biological parameters used in assessment modeling efforts, i.e., current population models rely on maturity and age/growth information collected over three decades ago. The biological sampling plan described here is generally based on a working document presented at an earlier Working Group meeting that emphasized the collection of reproductive-related data only from both the North and South Pacific Oceans (ISC-ALBWG/08-2/INFO/01). Recommendations from the recent ISC-ALBWG Meeting dictated that this current Proposal consider both reproductive, as well as age/growth parameters and further, for practical purposes, to limit the study to strictly the North Pacific Ocean population (see section 2.3 of this Report). Finally, it is important to note that the cooperative study proposed here will necessarily rely on support (funds, field/laboratory/analysis staff, etc.) from particular nations involved in the ISC-ALBWG.

METHODS

Arguably, the most problematic issues surrounding the development of a North Pacific Ocean-wide study is that this species is broadly distributed, with individuals moving frequently during their overall lifespan. Thus, collection of biological data that are representative (accurate) of the population-at-large will necessarily rely on sampling different ‘fisheries’ (say different combinations of nations/gears, e.g., Japan longline fleet, Chinese-Taipei longline fleet, Japan pole-and-line fleet, USA troll fleet, etc.). That is, this sampling plan is based strongly on adaptive data collection procedures, whereby the bulk of the sample data will be collected collaboratively via the commercial fishing fleets above, as well as additional support from research surveys conducted by both Japan and Chinese-Taipei. Finally, this sampling design will allow spatial/temporal partitioning within the overall statistical analyses, which is necessary for evaluating assumptions regarding stock structure.

We propose a stratified, random multi-stage sampling design combined with post stratification. Strata (temporal) are individual years (e.g., 2009 and 2010). Representative samples will be collected across each stratum by sampling particular fisheries on a quarterly (strictly speaking, monthly) basis, i.e., sub-strata are quarters within years. It is important to note that we are not concerned with evaluations regarding ‘within-boat trip’ (or even ‘between-boat trip’) variability, but rather need to collect representative samples on a sub-stratum level (say quarterly basis). It is expected that further

stratification-related details will be needed in the final sampling plan developed in the future, e.g., size (length) of fish will likely also be an important sampling consideration. Finally, it will be necessary to post stratify samples accordingly, given there is no way of explicitly knowing a priori fishery operations in each of the sub-strata and thus, it is likely that some sub-strata samples will be sparse (or even not available) and in others, there will be many opportunities for obtaining the requested sample data. Research surveys can be used to fill gaps in the overall sampling design.

First and foremost, the following sample size discussion should be considered preliminary (and minimum estimates), given actual numbers of boat trips and fish within boat trips cannot be strictly determined (say from a statistical basis) at this time. Further, it is important to note that the first year of the project should be considered a 'pilot' year, i.e., it is likely that practical considerations (funding constraints in the field and laboratory, etc.) will dictate design changes in the second year of the overall project. Again, the sampling plan is strictly based on most samples collected via the normal operations of particular fisheries, including surface gear (e.g., Japan pole-and-line fleet and USA troll fleets) and longline gear (e.g., Japan and Chinese-Taipei longline fleets). Actual samples can be collected by observers or fishermen while at sea and/or port biologists during the unloading process. Finally, it is likely that arrangements with particular fishing boats will need to be in place prior to obtaining the sample data at sea during the trip or at the ports following a completed trip. These logistical arrangements for obtaining the sample data can be determined at a later date (e.g., industry cooperation and reimbursement issues, selection of fisheries/ports during the year, etc.).

Ultimately, per strata (year), we feel that roughly 60 fish per month, ranging in lengths from approximately 40 to 120 cm, will be needed to meet the primary goal of the study; this will result in approximately 720 fish (male and female), with quarterly totals based on at least 180 fish (i.e., likely the lowest temporal level of statistical analysis). Therefore, within each sub-stratum, the primary sampling unit (PSU) is defined as a boat trip (based on specific fisheries, say gear types) and the secondary sampling unit (SSU) a subsample of fish within a boat trip, e.g., each sub-strata results in 6 PSUs (say 2 boat trips from both a surface and longline fishery per month, which equals 24 PSUs per year). A SSU represents a *random* subsample of fish collected within a boat trip, e.g., each SSU represents $n = 30$ specimens. It is important to note that samplers should employ random protocols whenever possible when selecting the SSU, which should reflect (on average) attributes of the total catch within the PSU (boat trip), e.g., proportions regarding sex (male/female) and sizes (small/medium/large) within sex.

Unfortunately, sex determination of tuna (particularly, smaller fish) is problematic and thus, tissue samples need to be collected from all specimens within the SSU, i.e., no field-based method to definitively select just females for the laboratory phases of the overall study. Thus, assuming a 1:1 sex ratio, this sample-selection scheme will (on average) result in roughly 15 female specimens per PSU (approximately, 360 females per year). Keep in mind that the remaining males in the overall samples can be either included in this overall analysis (i.e., male, as well as female biology examinations) or re-sold to potential buyers).

Samplers will be responsible for obtaining the following data from each specimen of a SSU: length; total body weight; hard parts for age analysis (e.g., otoliths); a small tissue ('plug') sample of gonad mass (i.e., total gonad weight will need to be recorded if GSI evaluations are conducted); and typical logbook data (e.g., fishing locale, date of capture, etc.). Finally, these samples and related data will allow objective evaluations regarding biological parameters of highest priority identified by the Working Group (i.e., maturity/fecundity, sex ratio of larger fish, and age/growth/longevity, see section 2.3). An example of a general sampling design for obtaining PSUs for a given year follows:

Table 1. General sampling design for collection of biological data from albacore fisheries of the North Pacific Ocean. Legend: ++ = high fishing effort quarter; + = moderate fishing effort quarter; and empty cell = limited to no fishing effort.

SPATIAL	***TEMPORAL***			
Fishery	***Month (Quarter)***			
	Jan-Mar	*Apr-Jun*	*Jul-Sep*	*Oct-Dec*
Longline[1]	++	+	+	+
Troll[2]		+	++	
Pole-and-line[3]		++	++	+

[1]The following nations have major longline fisheries and regularly participate in the ISC-ALBWG: Japan, and Chinese-Taipei.

[2]The following nations have major troll fisheries and regularly participate in the ISC-ALBWG: USA and Canada.

[3]Japan pole-and-line fishery.

Finally, preparation techniques for laboratory analysis for both reproductive tissue and hard parts are well documented in the literature and thus, not discussed here; however, discussion addressing both laboratory and statistical analysis procedures involved in maturity evaluations is presented in the original sampling paper (ISC-ALBWG/08-2/INFO/01).

BUDGET

Table 2. Preliminary (minimum) budget for biological sampling plan[1].

PLAN COMPONENT	***TOTAL COST***
Field[2]	$25,000
Laboratory[3]	$15,000
Analysis[4]	NA
Miscellaneous[5]	$25,000

[1]Budget represents one year of the two-year study and assumes staff 'time' to accomplish the goals is the responsibility of participating nations (namely, Japan, Chinese-Taipei, and USA). Also, costs are based on obtaining fish for free. **It is important to note that for some fisheries additional funds will be needed to reimburse the fishermen for the specimens, e.g., to obtain the complete sample at current market value for an average size fish, roughly $28,800 ($40 per fish) will be needed**.

[2]Field estimate represents costs associated with transferring fish from the field to the laboratory (roughly, $35 per fish).

[3]Laboratory estimate includes costs of slide preparation. Procedural standardization is critical across different laboratories (roughly, $20 per fish).

[4]Analysis is NA, given only staff time is expected at this stage of the study.

[5]Miscellaneous costs include primarily 'coordination' expenses (e.g., quality control visits to sampling ports) and secondarily, computer hardware/software, data management, related supplies, etc.