Annex 9

REPORT OF THE ALBACORE WORKING GROUP WORKSHOP

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

11-19 April 2017
Southwest Fisheries Science Center
La Jolla, CA, United States of America

1. OPENING AND INTRODUCTION

1.1 Welcome and Introduction

An intersessional workshop of the Albacore Working Group (ALBWG or WG) of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) was convened at the Southwest Fisheries Science Center (SWFSC), La Jolla, CA, USA. The objectives of this workshop were: (1) to complete a new assessment of the North Pacific albacore tuna stock, and (2) to develop scientific advice and recommendations on current status, future trends, conservation and research needs of North Pacific albacore tuna.

Toby Garfield, Director of the Environmental Research Division, welcomed 16 participants (Attachment 1) to the Southwest Fisheries Science Center and wished them a productive meeting. Scientists from Canada, China, Chinese Taipei, Japan, the United States of America (USA), and the Inter-American Tropical Tuna Commission attended the workshop.

This report is a record of discussions and decisions of the ALBWG during the workshop in which the 2017 stock assessment of North Pacific albacore was conducted. The 2017 stock assessment model structure and assumptions, results, interpretation, scientific advice and recommendations are documented in a separate assessment report available from the ISC website at: http://isc.ac.affrc.go.jp/.

1.2 Meeting Protocol

The ALBWG Chair noted that the efforts of the WG at this meeting would be collegial and emphasize empirical testing, open debate, documentation and reproducibility, reporting uncertainty, peer review, and constructive feedback.

1.3 Review and Adoption of Agenda

A draft agenda circulated prior to the meeting was adopted at the workshop. Once discussion began on the base model development, the agenda was revised as several issues were addressed simultaneously. This revised agenda is shown as Attachment 2.

1.4 Assignment of Rapporteurs

Rapporteuring duties were assigned to John Holmes, Hidetada Kiyofuji, Kevin Piner, Desiree Tommasi, Chiee-Young Chen, Zane Zhang, Hirotaka Ijima, Osamu Sakai, and David Itano. John Holmes had the overall responsibility for assembling the report.

1.5 Distribution of Documents and Working Paper Availability

Eleven working papers were submitted and assigned numbers for the workshop (Attachment 3). Ten of the working papers will be publicly available through the ISC website (http://isc.ac.affrc.go.jp/) and author contact details will be provided for the other working paper.

2. STOCK ASSESSMENT REPORT AND SECTION ASSIGNMENTS

The WG reviewed the draft table of contents for the stock assessment report distributed prior to the meeting. Some minor changes were suggested and approved. It was decided that Steve Teo would have primary responsibility for drafting the report and that John Holmes will assist him. The draft report will be circulated to WG members by mid-May for comment and the final version of the report will be submitted to the Office of the ISC Chair on or around 1 June 2017.

3. WORKING PAPER REVIEWS

Abundance indices of albacore caught by Japanese Longline vessels in the North Pacific during 1976-2015. Daisuke Ochi, Hirotaka Ijima, and Hidetada Kiyofuji. (ISC/17/ALBWG-01/01)

As an input data for stock assessment of albacore in the north Pacific scheduled in 2017, abundance (CPUE) indices were calculated from operational data by Japanese longline fisheries on refined Area 2. Considering the necessity of calculating coefficient of variation of standardized CPUE, we carried out generalize liner mixed model analysis with Bayesian inference for the CPUE standardization. The process of the CPUE standardization had two options: (1) using a series of catch data during 1976-2015 (model #1, #2); and (2) carrying out two standardization with separate datasets divided into 1976-1993 (model #3, #4) and 1994-2015 (model #5, #6) because nominal CPUE trend largely changed before and after 1993 according with a previous study. CVs of standardized CPUE in #1, #4 and #5, and Pearson residuals were lower in the model #3 and #5. It seems preferable to use values of those models for the stock assessment.

Discussion – The index of abundance of the whole-time series showed a marked jump around 1993-1994 that is too high to be the result of changes in abundance alone. The index value for 1993 was estimated as low and very precise. Although the stock was likely recovering around that time, as shown by a similar increase in the pole and line index, a suit of other factors also changed such as (1) the inclusion of the coastal fleet in the data collection in 1993; (2) the implementation of a new log-book system in 1994, and (3) changes in gear configuration: the fleet moved to a larger number of hooks per basket. These concomitant changes are confounded and cannot be disentangled in the standardization process. There was a question about whether there were changes in oceanography in this transition period as well, but not resolution of this point. Based on this discussion, the WG agreed that splitting the time series was appropriate due to the big change in apparent abundance. However, discussion then focused on whether a simple split in the series was sufficient or whether some anomalous years of CPUE data should be removed from the standardization analysis. The WG decided (1) to use two series: 1975-1992 and 1996-2015, with only quarter 1 data to avoid confounding with the seasonal dynamics of the stock, and (2) to assume a minimum CV=0.2, so it will be the main index of abundance and thus to be considered the most precise. If the CV provided by the standardization analysis is smaller than 0.2 then it will be set at 0.2 in the model. The WG asked the authors to undertake further analysis to provide the agreed standardized indices.

The authors subsequently presented the new standardization during the meeting with the later index starting in 1996. This analysis also had a small and very precise estimate for the first year in the series, now 1996. The group noted that the residuals for this model, as well as for the former model starting in 1993, were biased for the first year in the series. It was suggested that this was an effect of the parametrization of the standardization model that had only one parameter for both the intercept and the first year in the series. The author suggested that by including two parameters the problem could be solved. The group requested the authors conduct further analysis to correct this issue.

The authors presented the results of the new analysis and the issue was resolved. The estimated value for 1996 was like that in the longest series (starting in 1993) and has an uncertainty estimate like the other years in the series. The WG agreed that this was a great improvement and that this index be used as the main abundance index for the stock assessment model.

Length distributions of albacore catch made by Taiwanese albacore-targeting longline fishery in the Pacific Ocean north of 25°N, 2003-2015. Chiee-Young Chen and Fei-Chi Cheng. (ISC/17/ALBWG/03)

This working paper is aiming to estimate the length compositions of North Pacific albacore caught by Taiwanese albacore-targeting longline fishery in the waters north of 25°N, 2003-2015. Taiwanese longliners are requested to record fish body length up to 30 individuals (including albacore) on board of their daily operations. These albacore length data, assuming a random sample of albacore catch made by each boat-day operation, were raised by catch in number to obtain the length frequency of each boat-day albacore catch. The length frequency were summed up to estimate albacore length frequency of a given boat operated in each year/quarter/5°x 5° stratum, and also to estimate the length frequency of albacore caught by all boats operated in the same year/quarter/5°x 5° stratum. The length frequency of each year/quarter/5°x 5° stratum was further raised by the albacore catch in number recorded in the Task II data, which was made available by the Overseas Fisheries Development Council (OFDC) of Taiwan. Comparisons between the raised and un-raised percentage length compositions, by year/quarter, were conducted using $\chi 2$ test, and results show no significant differences in almost all the cases.

Discussion – Clarification was sought on the sampling procedure employed by vessel crews. It was noted that each boat is required to measure the first 30 fish caught daily as a randomization procedure, but there are no studies that show the randomness of these samples. It was noted that TWN size composition data prior to 2003 are problematic due to sampling issues (spatial and temporally restricted) and were not used in the 2014 assessment and will not be used in the 2017 assessment. The representativeness of the sampling process improved from 2003 onward. The

WG appreciated the effort by the authors to clarify the procedure used to raise size composition to the catch in the albacore-targeting component of the TWN LL fleet.

A brief description of the Japanese Data (size and drift net) for the NPALB stock assessment in 2017. H. Kiyofuji, H. Ijima, and D. Ochi. (ISC/17/ALBWG/03)

Japanese size sampling methods and drift net data were described for the 2017 NPALB stock assessment. Following are contents of this document. 1. Overview of port sampling for size data, 2. Difficulties of merging size data and logbook data, 3. Drift net data (1972-1992).

Discussion – This working paper clarified many details about the size sampling system for longline and pole-and-line vessels in Japan, as well as the drift net data that were requested by the WG during the data preparation workshop in November 2016. A participant asked how the weight data were collected. The author responded that the weight data are obtained by the crew on board and it is not fully checked. Therefore, it should not be used for the stock assessment, which should use the length data that is obtained from port sampling. In follow up discussions about the longline length-frequency data one of the authors clarified that during the 1990s and earlier, the length-frequency samples were taken mostly at one port, Yaizu port, which was the most important port. Later other ports were also included in the sampling.

Estimation for Japanese catch at length data of North Pacific albacore tuna (Thunnus alalunga). Hirotaka Ijima, Daisuke Ochi and Hidetada Kiyofuji. (ISC/17/ALBWG/04)

The size composition data given by fishery have not been sampled randomly. For instance, the sample size of the size composition data is not proportional to total catch amount. To consider cumulative catch number effect for size composition data, we estimated catch at length of North Pacific albacore tuna that was caught by Japanese longline and pole and line fishery. Using estimated catch at length, we summarized time/seasonal change of the area dependent fishery selectivity and we suggested candidate fishery definition for the stock synthesis 3. The estimated catch at length of longline fishery in Area 1 and 3 shows seasonal differences between quarter 1-2 and quarter 3-4. Catch at length of the longline fishery in Area 2 changed in the middle of the 1990s. Regarding the pole and line fishery, catch at length given by the Northern part of Pacific (>=30°N) also showed seasonal differences between quarter 1-2 and quarter 3-4. The authors could not estimate catch at length of drift net fishery because size composition data of drift net fishery is a little and operational data also is not precise. It is also difficult to define the area/seasonal difference for size composition data of Japanese drift net fishery. Thus, the authors suggested: first, to use a seasonal fishery definition for the Japanese longline fishery (Area 1 and Area 3) and the pole-and-line fishery in the Northern part; and second, to set two selectivity periods for the Japanese longline fishery in Area 2 (1966-1993, 1994-2015) and to use one drift net fishery, i.e., no north and south drift net fisheries.

Discussion –It was noted that LL length frequency data in Areas 1 and 3 show significant differences by season. The WG agreed with the recommendation to combine longline fishery in Areas 1 and 3, and then split it further into four seasonal fisheries, Q1, Q2, Q3, and Q4. The WG also agreed with the recommendation to divide the northern JPN PL fleet (>30°N) into two seasonal fisheries consisting of Q1+Q2 and Q3+Q4. Up until the early 1990s sampling occurred at Yaizu port only. Port sampling expanded to other ports after that time. A 1990s report from Yaizu noted the large number of large fish > 100 cm. These observations, support the WG decision to exclude the early period (1966-1992) from the assessment. Length frequency data for the driftnet gear are sparse and so looking at changes is difficult. The WG agreed to combine all the driftnet data (north and south of 30°N) into one fishery. There was some discussion about the choice of selectivity for the JPN PL fishery, which exhibits randomness in the size composition data, and it was recommended that the issue be explored further using time-varying selectivity for the next assessment in 2020.

Revised of standardized CPUE for North Pacific albacore caught by the Japanese pole and line data from 1972 to 2015. Junji Kinoshita, Daisuke Ochi and Hidetada Kiyofuji. (ISC/17/ALBWG/05)

The working paper introduced a revised (recalculated) the standardized CPUE (relative abundance index) for NPALB caught by JPN DWPL in new definition area because the index that was submitted to the previous data preparation meeting was calculated using all JPN DWPL data across JPN LL Areas 1, 2, and 3 although the majority of JPN DWPL's effort and catch occurs in Area 3.

Discussion – The JPN PL CPUE index is based on data from Area 3. Operational changes in 1989 led to the splitting of the index into an early and late period. Standardization in the later period was based on Q2 and Q3 data combined. The authors suggested using one index from 1972 to 2015. The WG deferred a decision on this issue until a stable base model was developed as it wants to see the effect of this index on the model. One reason to include this index in the model is because it provides recruitment signals.

Summary of reference point for North Pacific albacore tuna stock assessment. Hirotaka Ijima. (ISC/17/ALBWG/06)

This paper summarizes the calculation method and unit of F-based reference points used for the North Pacific albacore stock assessment. Based on this result, the author proposed some options on the calculation method of F-based reference points to be used for the stock assessment in 2017.

Discussion – The WG agreed with the author's recommendation to use SPR to calculate F-based reference points using Stock Synthesis output and that F_{MSY} and $F_{0.1}$ will be based on SPR as well. Guidance to management will be based on the limit reference point of 20% of unfished $SSB_{0\ F=0}$, which is a dynamic B_0 reference point.

Meta-analysis of north Pacific albacore tuna natural mortality: an update. Steven L. H. Teo. (ISC/17/ALBWG/07)

The instantaneous rate of natural mortality (M) parameter was identified by the albacore working group (ALBWG) as a key source of uncertainty in the 2014 stock assessment of north Pacific albacore tuna (NPA). A previous study (Kinney and Teo 2016) developed a probability distribution of M for NPA based on meta-analyses of several empirical relationships between life history parameters and adult M. After reviewing results from that study, the ALBWG recommended four potential base case assumptions for the 2017 assessment: 1) a constant M of 0.3 for all ages and sexes (i.e., base case for 2014 assessment); 2) age-specific M based on the meta-analyses in Kinney and Teo (2016), with a constant adult M starting at age-6+ ; 3) same as #2 but with a constant adult M starting at age-3+; and 4) sex-specific M based on meta-analyses similar to Kinney and Teo (2016). The aim of this study is to develop M values and/or priors that are consistent with these four options. The data sources and analytical methods used in this study are the same as Kinney and Teo (2016), albeit with minor differences. Meta-analyses of three empirical relationships between life history factors (i.e., maximum age, age at maturity, and growth) and M were used to calculate prediction intervals and priors for M of NPA. These multiple M priors were combined into a single M distribution using weights based on the degree of overlap in the data sets used for the meta-analyses (data independence weights). Age-specific M values were developed using the Lorenzen relationship between size and M. Overall, the author recommended that the ALBWG use one of these four options for the 2017 NPA assessment: 1) constant M of 0.3 for all ages and sexes; 2) age-specific M from 1.67 at age-0 to 0.38 at age-6+; 3) age-specific M from 1.32 at age-0 to 0.38 at age-3+; and 4) constant M of 0.48 for all ages of female NPA and 0.39 for all ages of male NPA.

Discussion – It was noted that despite assuming M=0.3 for all age classes in previous stock assessments, the ALBWG was unable to provide a strong justification for its continued usage. Sex-specific Japanese research survey data supports a differential M for older males and females as does the growth data reported by Chen et al. (2012). The Lorenzen (1996) method that was used to estimate age-specific M assumes predation is the main driver of mortality, which may be appropriate for young albacore but is less plausible for older fish. Based on this discussion, the WG suggested that age-specific mortalities be estimated using the Lorenzen (1996) approach only for ages 0-2. The possibility of letting the model estimate age and sex-specific M was discussed, but the WG concluded that the resolution of the data may not be enough to warrant this approach (only the short JPN research survey has sex-specific data). An alternative approach was suggested in which male M is fixed and a differential M offset for females is estimated, but it was noted that this method would require a different preprocessing of the input data to the model that could not be completed during the stock assessment workshop. It was also proposed that the stock-recruitment relationship start at age 2 to avoid the need to estimate M for younger ages. However, the Stock Synthesis software requires recruitment to start at age 0.

Based on its knowledge of the life history and hypothesized movement patterns as well as knowledge of the size composition data, the ALBWG concluded that fixing M=0.3 for all male and female combined age classes was no longer a viable assumption. The ALBWG recommends using a combination of age- and sex-specific M values (options 3 and 4 in the WP) in the 2017 base model. That is, an age-specific M constant calculated for ages 0-2 across both sexes using the Lorenzen relationship and a sex-specific constant M of 0.48 for females and 0.39 for males age 3+ taken from Teo (2017: ISC/17/ALBWG/07). Other options could be explored in sensitivity analyses. It was noted that independent analysis of tagging data reported a similar range of natural mortality estimates for north Pacific albacore (Ichinokawa et al. 2008).

Catch and size composition time series of the US and Mexico surface fishery for the 2017 north Pacific albacore tuna assessment. Steven L. H. Teo. (ISC/17/ALBWG/08)

The objective of this paper is to describe the data sources and methods used to develop seasonal catch and size composition time series of the US and Mexico albacore surface fleet in the north Pacific Ocean for the 2017 stock assessment. Similar to the 2014 assessment, in order to simplify model structure, albacore landings from all US gears, except handline and longline, and all Mexico gears were combined into the Eastern Pacific Ocean (EPO) surface fleet. However, unlike the 2014 assessment when it was assumed that size data were randomly sampled, this analysis followed the recommendations of the ALBWG and developed a size composition time series that was raised to the catch. Three main sources of data were used: 1) annual landings of albacore tuna in metric tons by gear in the north Pacific Ocean reported to the ISC by the US and Mexico; 2) catch-effort information from US fishermen logbooks; and 3) biological (fork length) information from a US port sampling program. Size composition data in 1 cm bins were first matched to logbooks to obtain average fishing location and aggregated into area/month/year strata. Strata with less than three sampled trips were discarded because large spikes were evident in preliminary size compositions. Size compositions from these strata were combined into seasonal size compositions by performing a weighted average of the size compositions of all strata by year and season. Strata weights were calculated as the relative proportion of albacore catch in each stratum within each season and year, using the albacore catch in number recorded in the abovementioned logbook program. Similarly, the input sample size for the size composition data was considered to be the weighted average of the number of trips of all strata by year and season. The catch in a season was calculated by multiplying the proportion of catch in weight for that season with the total annual catch of the US and Mexico surface fishery for the year. Raising of the size composition data to the catch resulted in important changes in the size compositions for some seasons. However, the difficulty in matching the port sampling data with the logbook data resulted in the size composition time series starting only in 1977 instead of 1966 as in the 2014 assessment, and a sparser size composition time series. The input sample sizes ranged from 3 to 145.2, with an average of 29.7. It is recommended that the ALBWG use the catch and size composition time series described in this working paper for the 2017 stock assessment of north Pacific albacore tuna. In addition, it is recommended that the seasonal Canadian albacore catches be combined with the US and Mexico surface fishery for the 2017 assessment.

Discussion – The ALBWG agreed with the recommendation to use these data for the 2017 stock assessment and the recommendation to combine Canadian albacore catches with the US and Mexico surface fishery catches.

Relative abundance indices of juvenile albacore tuna for the US surface fishery in the north Pacific Ocean. Steven L. H. Teo. (ISC/17/ALBWG/09)

The objective of this paper is to describe the data sources and methods used to develop relative abundance indices of juvenile albacore tuna for the US surface fishery in the north Pacific Ocean. The US surface fishery for albacore tuna consists of troll and pole-and-line vessels that primarily capture albacore tuna ranging from ages-2 to 4. Unlike assessments in 2011 and 2014, when data from both Canadian and US vessels were used to develop these abundance indices, only data from US vessels were used to develop abundance indices in this study. Similar to the 2014 assessment, relative abundance indices for three periods (1966 – 1978, 1979 – 1998, and 1999 – 2015, excluding 2012), which corresponded to periods of major changes in fishing operations in this fishery, were developed in this study. Data for 2012 was excluded because a lapse in the fishing regime of the US-Canada albacore treaty in 2012 may have changed the fishing operations of the US surface fishery. Data from January to March were also excluded due to very low catches during those months. The main source of data used in this study was a vessel logbook program. Catch and effort data were aggregated into strata of 1° x 1° spatial blocks by month. Only logbook data where locations were recorded at ≤1° resolution and the vessel was actively fishing were included. For each time-area strata, effort was calculated as the number of boat days and catch was calculated as the total number of fish caught (sum of retained and discarded albacore). Strata with less than three boat days of effort were removed from analysis to reduce the influence of peripheral fishing areas with minimal effort. The nominal CPUE (fish per boat day) of each stratum was first calculated and log-transformed by ln(CPUE + 1). Each strata was assigned to a year, quarter, and one of eight areas based on distance from the coast, latitude, and/or longitude bounds. A lognormal generalized linear model (GLM) approach was used to standardize abundance indices for the three periods using year, quarter, and area as main explanatory factors, and interactions between quarter and area. Residual and Q-Q plots for the GLMs indicated that the models were not fitting the data well at low and high CPUE values. The standardization process did not appear to perform well and may not have adequately standardized the changes in catchability for the US surface fishery. Given the poor diagnostics of the standardization models and uncertainty in the representativeness of these indices with respect to abundance trends of the entire north Pacific stock, it is recommended that the ALBWG not use these abundance indices as the primary abundance indices for juvenile albacore tuna in the 2017 stock assessment. Instead the ALBWG should use these indices in sensitivity model runs. In addition, the ALBWG should not assume that abundance indices from all three periods share the same catchability.

Discussion – The ALBWG agreed with the recommendation that these indices not be used as primary abundance indices in the 2017 stock assessment given the poor diagnostics of the standardization models and uncertainty in the representativeness of these indices with respect to abundance trends in the entire north Pacific stock. It was also recommended that other approaches to standardization in addition to the delta log-normal model be explored for future assessments.

Catch and size composition time series of the US pelagic longline fleets for the 2017 north Pacific albacore tuna assessment. Steven L. H. Teo. (ISC/17/ALBWG/10)

The objective of this paper is to describe the data sources and methods used to develop seasonal catch (in metric tons) and size composition (raised to the catch) time series for two US pelagic longline fleets based in the north Pacific Ocean, for use in the 2017 assessment. In a previous study, two US pelagic longline fleets were defined, based on the consistency of size compositions within areas. Fleet 1 consists of a northern area with mostly juvenile and sub-adult albacore. Fleet 2 consists of a southern area with mostly large, adult albacore. Size composition data in 1 cm bins from an observer sampling program was subdivided into 10x10° area/month/year strata. Strata with <3 observed trips were discarded. Size compositions of strata in each fleet were combined into seasonal size compositions by performing a weighted average of the size compositions of all strata in each fleet by year and season. The input sample sizes for the size compositions were considered to be the weighted average of the number of trips of all strata in each fleet by year and season. The total annual landings by US pelagic longline fishery were subdivided into the seasonal landings for Fleets 1 and 2, based on the relative proportion of albacore catch in each area and season using logbook data, and the size composition of albacore in each area and season. Seasonal albacore catch in metric tons for Fleets 1 and 2 of the US pelagic longline fishery in the north Pacific Ocean are shown. Most of the albacore catch occurs in the area defined for Fleet 2. Seasonal size compositions (raised to the catch) for Fleets 1 and 2 of the US pelagic longline fishery are shown. Input sample sizes ranged from 3 to 16 for Fleet 1, and 3 to 20.7 for Fleet 2. It is recommended that the ALBWG use the seasonal catch and size composition time series described in this working paper for the 2017 stock assessment of north Pacific albacore tuna.

Discussion – The WG agreed with the recommendation to use the catch and size composition data from the US LL fishery in the 2017 assessment.

Relative abundance indices of adult albacore tuna for the US pelagic longline fishery in the north Pacific Ocean. Steven L. H. Teo. (ISC/17/ALBWG/11)

The objective of this paper is to describe the data sources and methods used to develop abundance indices of adult albacore tuna for the US pelagic longline fishery in the north Pacific Ocean. Juvenile and adult albacore appear to segregate spatially, with juvenile and sub-adult albacore tuna being caught in the north, and large adults being caught in the southern area. The ALBWG suggested that candidate abundance indices for the southern area be developed for the 2017 assessment. Major regulations have severely affected the fishing operations of US longline vessels in the north Pacific. In particular, there was a ban of shallow-set gear during 2001 – 2004 and other regulations post-2004, in order to reduce turtle interactions. The fishing operations of the US longline fishery changed substantially post-2004 and likely affected the catchability of albacore. Therefore, two abundance indices (1991 – 2000; and 2004 – 2015) were developed by standardizing the catch-per-unit-effort (CPUE) of US longline vessels operating in the southern area to represent the relative abundance trends of adult albacore tuna before and after the shallow-set ban. The main source of data used in this paper is catch-effort information from fishermen logbooks (1991-2015). Delta-lognormal models were used to standardize the CPUE of the longline fishery, with each set as a stratum, because a substantial portion of the sets (>50%) did not capture any albacore. Three explanatory factors (year, quarter, and 10x10° subarea) were used in both the lognormal and binomial submodels. Confidence intervals of the abundance indices were subsequently estimated from 1000 bootstrap runs. During the 1991 – 2000 period, the abundance index peaked in 1997 before declining and the CVs were relatively large (>0.55). The relative abundance in the 2005 – 2015 period was substantially lower than for the 1991 – 2000 period but peaked in 2011 before declining. It is currently unclear if the standardization process has adequately standardized the changes in catchability for the US longline fishery due to the changes in regulations for the fishery. Given the large changes in regulations for this fishery, and the diagnostics of the standardization models, it is recommended that the ALBWG do not use these abundance indices as the primary abundance indices for adult albacore tuna in the 2017 stock assessment. Instead the ALBWG should use the indices in sensitivity runs. In addition, the ALBWG should not assume that both abundance indices share the same catchability.

Discussion – The ALBWG agreed with the recommendation that these indices not be used as primary abundance indices in the 2017 stock assessment given the large changes in regulation for this fishery and the poor diagnostics of the standardization models. It was also recommended that other approaches to standardization in addition to the delta lognormal method be explored for future assessments. The LL index from the southern area will be used in a sensitivity run.

4. DATA ISSUES

The WG noted a big change in JPN longline fleet size composition data in the 1990s with the relatively sudden appearance of large fish and their subsequent disappearance. Several hypotheses to explain this observation were discussed: (1) a real change in growth occurred in this period, (2) selectivity of the longline fleet changed, (3) the location of fishing operations and catches changed, and (4) a data issue related to how the size composition data are collected. Some anecdotal information was discussed that in the 1990s the JPN LL fleet may have indeed shifted in space and that there was a change in data collection procedures. Regardless of the explanation, the 1990s appears to be a transition in which the WG is unable to explain the size composition data, leading it to conclude that data from 1993-1995 should not be included in the JPN LL standardization process. Thus, the WG requested that Japanese scientists recalculate the JPN LL index from 1996 to 2015, which was completed during the workshop:

1. Late Index: 1996-2015: Areas 1+3 Q1 data
2. Early Index: 1976-1992: Areas 1+3 Q1 data

5. CPUE INDICES

The WG reviewed the results of the new standardization of the JPN LL index and noted a persistent underestimation problem with CPUE estimates in the first year of the late series. After discussion, the WG agreed that separating the intercept and first year estimate of CPUE helped solve this problem. The author of the JPN LL CPUE WP (ISC/17/ALBWG/01) was questioned on the use of a prior on the standard deviation of the year effect and responded that an uninformative prior was used. The WG noted that a prior on the year effect could smooth the series, but in this case the nominal CPUE is less variable than the standardized series which may indicate smoothing is not a problem. The WG observed that the revised JPN LL index calculated for 1996-2015 produced much more consistent results, with the standardized CPUE consistently slightly higher than the nominal CPUE. Based on this review, the WG decided that this CPUE series will be the primary index used in the 2017 assessment.

A new analysis of JPN PL CPUE was conducted (Kinoshita et al. 2017: ISC/17/ALBWG/05), with seasons represented in the index. Issues arise in the amount of catch in some seasons. It was noted that PL size composition data are quite variable and, importantly, that the Information from JPN PL abundance indices is not consistent with JPN LL abundance indices. The JPN PL index is thought to provide recruitment signals to the model. The WG is still unclear if this index will be part of the final model, but will test it later when a base model has been established.

Based on its experience in two previous assessments using the Stock Synthesis platform (2011, 2014), the ALBWG did not consider other potential indices as primary indices in the model or sensitivity runs.

Japanese scientists suggested that JPN LL fisheries operating in Area 1 and 3 capture small juvenile-sized fish in Q1 and that an index based on these areas combined might be an alternative to the pole-and-line index. The WG reviewed some additional work that was done to standardized this index from 1996 to 2015 using a procedure similar to that described in Ochi et al. (2017: ISC/17/ALBWG/01). The new index is smoother than the pole-and-line index, but more importantly when lagged 3-yrs relative to the JPN LL index used in the base case model, the peak and valleys seem to line up. The WG group believes that this index is promising but further work is needed to confirm its utility for future assessments.

6. BASE MODEL DEVELOPMENT

The WG reviewed a preliminary model developed and forwarded to the WG prior to the assessment workshop and discussed whether data inputs should be limited to 1993 onward due to the appearance of much larger fish in the early period. The WG also discussed whether the JPN LL index, which is proposed as the main index in the model, is influential for the estimation of population scale. If the JPN LL index is not influential, then the key to this assessment will be getting a reasonable catch curve type analysis on length data to get at a measure of population scale (unfished) and relative scale (depletion).

The WG recommends starting the investigation of these questions with a model using: 1) updated life history (age- and sex-specific M vectors) , 2) updated JPN LL indices for 1976-1992 and 1996-2015, and 3) with the full time period from 1966 (see data issue 1 above). The full time period is used because it will allow the WG to understand whether the early JPN LL CPUE series provides information on population scale that would be lost if we start the model at a later date. If there is little scale information in the early period, then starting at a later date may be acceptable. The WG also recommends starting with simplified selectivity assumptions at this early stage of development. This model can be used for R_0 profiles and ASPM diagnostics to judge the information load in the JPN LL indices. Based on that understanding, the WG began to structure the model as appropriate.

The natural mortality vector that the WG agreed to use (age-specific for ages 0-2 as estimated by Lorenzen (1996) method, sex specific age 3+) in this assessment is:

Age	Male	Female
0	1.36	1.36
1	0.56	0.56
2	0.45	0.45
3+	0.39	0.48

No R_0 or ASPM diagnostics were applied to the preliminary model. However, it was clear from the results that growth between time periods from southern LL fleets cannot be fit unless growth changes over time or separate selectivity by sex was estimated.

The WG requested a model with updated M vectors and JPN LL indices be used to estimate separate selectivity patterns for male and females in the JPN LL fleets operating in Area 4. Domed-shaped selectivity was applied to males in the late period and females had domed-shaped selectivity in the early period, but the scale between selectivities was not estimated. The goal of this request was to account for the change in fish size in the southern LL fisheries.

After reviewing these early runs, the WG observed that there was some conflict between potential indices (JPN LL and JPN PL) and size composition data of some fleets, primarily longline fleets capturing large fish. The WG discussed how to move forward and decided on the following: simplify the model with a shortened time series beginning in 1993 because it cannot explain what is happening in the early period, apply dome-shaped length selectivity and combine the sexes, rather than estimating sex-specific selectivity, and focus on determining whether the JPN LL late index (1996-2015) has a production function that will provide scale to the assessment, i.e., a relationship between catch-at-age and the index. The WG also decided to investigate the consistency of trends among different data types using an age-structured production model (ASPM).

The WG began constructing a base case with a scaled down model using data starting in 1993 (short model). This model included domed shaped but time invariant length selection. Age-based selectivity was applied to juvenile fish (ages 1-5) to capture changes in their availability related to movements. An R_0 profile on that model indicated only ~1 negative log-likelihood of information from the JPN LL late index on scale (mostly to lower R_0 values). Similarly, an age structured production model (ASPM) fit the index quite well (better than the short model), but the unfished biomass estimate of the ASPM was ~33% different from that of the base case and had very wide confidence intervals.

Based on the short model, the R_0 results and the ASPM:

1. The WG concludes that there appears to be a production relationship between catch-at-age and the JPN LL late index (JPNLL9615). This relationship does not have a tremendous amount of information on population scale, but the WG believes that it is the best source available; and
2. the WG decided to construct subsequent models to prioritize this production relationship. These models will be judged based on the fit to the JPN LL index (using as a criterion that the fit must not be degraded relative to the ASPM fit) and that additional data and model process should increase the precision of the model estimates of derived quantities.

The WG decided to continue structuring additional models based on these conclusions and starting from the ASPM. First, composition data from high catch (in number) fleets (JPN PL and EPO Surface Fisheries) were added with the appropriate model processes (flexible selection and recruitment deviations) to adequately fit the composition data without degrading the fit to the JPN LL9615 index. In addition, it was noted that in some early runs, the model fit to the aggregated F9 size composition data (the JPN LL9615 index fleet) was shifted to the right of the data and so adopted an additional criterion of fit to the F9 aggregated size composition in its explorations. Next, composition data from other fleets were sequentially added with same two criteria described above. For some fleets that catch limited numbers of fish, data weighting could be used to ensure that misfit to the composition data does not unduly degrade fit to the JPNLL9615 index.

After several model iterations, the WG found that fitting to the size composition data from longline fleets operating in Areas 2 and 4 (F9, F10, F13, F19, F20) resulted in degraded fits to the JPN LL9615 index. Secondarily, fitting to JPN PL size composition data (F17, F18) also degraded the fit to the JPN LL9615 index. The WG investigated downweighting the fit to longline size composition data using lambda values of 0.1 and 0.05 (relative to a full weight value of 1.0) and found that downweighting the size composition on the five longline fleets either improved the fit to the JPN LL9615 index or did not degrade the fit relative to the ASPM, while maintaining reasonable fits to the aggregate size composition data, especially for F9. There was no difference in the fit to the aggregated size composition data for F9 when either lambda = 0.1 or 0.05 was used for downweighting so the WG recommends using lambda = 0.1 to downweight the size composition data for five longline fleets (F9, F10, F13, F19, F20) in the base model. While some conflict with the JPN PL size composition data (F17, F18) was noted, downweighting these data (lambda = 0.1) had marginal effects on the fit to the JPN LL9615 index and seemed to degrade the fit to the aggregated F9 size composition data. The WG decided not to downweight the JPN PL size composition data. It was noted through many iterations that fits to the JPN LL9615 index were acceptable because estimates of unfished SSB and recruitment did not vary much. In addition, R_0 profiling of size composition data consistently showed about 1 log-likelihood unit of information on the low side (below R_0 =12.2-12.4), and very little information on the high side; similar R_0 profiling results were observed for the JPN LL9615 index. Further, it was noted that regardless of the downweighting applied, trends in the latter part of the series (2010 onwards) and terminal year depletion in 2015, the main changes are occurring at the beginning of the model series. The WG interpretation of these findings is that defining the lower limit of population scale is relatively robust but that the upper limit is highly uncertain. This interpretation means that the WG can be fairly confident in determining the status of the stock relative to the limit reference point and providing this advice to managers.

It was also noted that in applying age-based selectivity to capture changes in the availability of juvenile fish, fixing age-1 selectivity at 0 had undesirable effects so the WG agreed to use dome-shaped age-based selectivity and live with the dual peaks this produces for some fleets.

The WG notes that applying dome shaped selectivity to all fleets potentially raises the issue of cryptic biomass, i.e., large old fish that are unobserved because they are too big to be caught based on selectivity patterns. It was noted that many preliminary model runs consistently showed that the selectivity estimated for the US LL fleet (F20) was essentially asymptotic at the largest observed sizes. In addition, the WG decided to conduct a sensitivity run assuming asymptotic selectivity on the US LL fleet to address this concern.

A review of an ASPM model fit to the early JPN LL76-92 based on Q1 showed that the fit to this index is good and that the overall the trend is relatively flat. Fitting the ASPM to both indices did not affect the fit to the early series but did degrade the fit to the JPN LL9615 index. While the WG concluded that there might be a production function in the JPN LL76-92 index, but at a smaller scale than the JPN LL9615 index, more investigation is needed before the early JPN

LL7692 index can be included in the model. The WG decided that a sensitivity run using the JPN LL7692 should be conducted.

The WG agreed to a use a base case model with the following structural characteristics:
1. Start year – 1993;
2. Fitting to one index, the JPN LL 1996-2015;
3. Age- and sex-specific M vectors;
4. Dome-shaped time-invariant length-selectivity on all fleets;
5. Downweight size composition data for F9, F10, F13, F19 and F20 using lambda = 0.1;
6. Other size composition data are fully weighted (lambda = 1.0);
7. Time blocks were used for selectivities of the US LL and EPO surface fisheries;
8. Age-based selectivity on ages 1-5 for juvenile fisheries (F16, F17, F27) to capture changes in availability related to movement; and
9. Sex-specific von-Bertalanffy growth estimated externally to the model (Xu et al. 2014: ISC/14/ALBWG/04) as in the 2014 assessment.

This base-case model represents two important advances in the north Pacific albacore model effort:

1. New coherent definitions of fleets, especially the JPN LL and PL fleets, based on area and season that achieve constant length-selectivity; and
2. A new standardization procedure for the JPN LL index which shows that the model is able to measure changes in the albacore population due to fishing. The new standardization procedure is a zero-inflated negative binomial mixed effects model, using 5°x5° area and vessel as random effects (Ochi et al. 2017: ISC/17/ALBWG.01).

7. GROWTH MODEL

C. Minte-Vera gave a presentation on modelling growth in North Pacific Albacore. She reviewed the tagging data available from Japan and the US and otolith data from Chen et al. (2012) and Wells et al. (2013). Males consistently predominate in larger sizes, with females up to 100 cm and males up to 118 cm in these datasets. The Japan training vessel data have females up to 136 cm in size, but they are rare above 100 cm, and males up to 140 cm. A preliminary fit to the Maunder growth model using otolith and tagging data for fish<4 yr old was shown. Size is predicted to be too large for fish that have been at liberty for a long time. A Richard's model was also fit, which estimates a size of 124 cm at 15 years old, which may be reasonable. The optimal approach to estimating growth was laid out as:

1. Include otolith and sex ratio data in SS3;
2. Update M in SS3 model;
3. Include juvenile availability by age in SS3 according to area of fleet operation;
4. Estimate parameters of SS3 model by starting from the growth curve from Xu et al. (2014: ISC/14/ALBWG/04; as base case); and
5. Use an Expectation - Maximization like approach using growth and tagging data or estimates.

An alternative way to estimate growth is to try the Richards model because it approximated the shape of growth curve from new model well. The WG discussed growth and it was noted that incorporating the tagging and otolith data into the model was an important idea. It was also noted that the CV used on L2 (asymptotic length in a von Bertalanffy growth model) can be influential on growth estimates and it was suggested that L_{inf} needs to be independent of the fit to young fish.

At the conclusion of this discussion, the WG decided that it could not implement a new approach to growth in this assessment and agreed to use the two sex growth model estimated externally by Xu et al. (2014) that was used in the 2014 assessment. The WG also agreed that growth modeling should be identified as a high priority research recommendation for the next assessment.

8. BASE MODEL INITIAL CONDITIONS

Finding an appropriate F to ensure that fish are being removed approximately correctly prior to the beginning of the model proved tricky. Initial attempts using the JPN LL and PL resulted in F of one or both fleets hitting the upper bound of 4.0. Eventually, it was found that estimating F from a fleet capturing a wide size range of albacore (TWN LL Areas 3 and 5 F21) resulted in an appropriate initial F for the model. The initial conditions for the base-case model are: (i) estimate an initial F for TWN LL F21 while not fitting to equilibrium catch, to capture the initial fished state of the population; (ii) estimate 10 years of early recruitment deviations, to set up the initial age structure, and (iii) estimate a deviation from the virgin recruitment (R1) at the start of the model.

9. DIAGNOSTIC ANALYSES

The WG decided to use the following diagnostic analyses during the data preparation workshop: (1) Recruitment (R_0) profiling, to assess model performance, (2) residual patterns of size composition fits to evaluate model performance, (3) fit to CPUE indices and size composition data, (4) age structured production model, (5) jitter analysis to evaluation global model convergence, and (6) retrospective analysis.

The WG reviewed diagnostic analyses for the base case model. Based on the jitter analysis the current base case model appears to be the best maximum likelihood estimate (MLE). Trends and fit to the JPN LL9615 index are consistent with the ASPM analysis and SSB_0 estimates are similar. The R_0 profiling shows that the CPUE index influences population scale on the low side and that size composition data influence the high side of population scale. Based on the log-likelihood change, the index has more information than the size composition data, some of which were downweighted because they conflict with the index. In the terminal age class (15) the sex ratio of males:females is 3:1 and above 110cm fish the ratio is 10:1. There is no retrospective pattern in SSB or recruitment when 1-3 years of data are removed, but as the number of years increases to 4 and 5 a pattern emerges probably because the time series is only 21 years long and removing 5 years of data is about 25% of the time series. The WG was satisfied that it is able to explain the diagnostic results.

The WG also reviewed the estimated population sex ratio and noted that the fraction of females at length changed substantially around 100 cm FL. This finding was considered reasonable by the WG on the basis of the sex-specific growth and natural mortality assumptions used in the model.

10. SENSITIVITY ANALYSES

Sensitivity analyses were discussed and the WG agreed to the following runs to assess either model performance or the range of uncertainty associated with a particular parameterization:

1. Natural mortality (M): Constant M= 0.3 for all male and female ages, the base-case setting of the 2014 assessment and constant 0.39 for all male and 0.48 for all females ages (to see the effect of juvenile mortality);
2. Starting year of the model: 1966, the base-case setting of the 2014 assessment. Size composition data before 1993 is not used, but catch and CPUEs are included to assess whether they have information;
3. Fit to the Japanese pole-and-line CPUE index (1990-2015, Area 3, >30°N): this index is believed to provide recruitment signals;
4. Setting size-composition data to their natural weights (lambda=1) rather than down weighting these data;
5. Changing the weighting of size composition data: lambda=0.1 is applied to all size composition data, rather than the longline fleets which catch large fish; lambda=1.0 is also used for all size composition data to assess the effect of down weighting;
6. Growth: changes in the variability of size at age, mainly for older fish using CV2=0.06, 0.08, and estimated, and CV1=0.08 for young fish;
7. Using the Richards growth model: The Richards form including the estimation from tagging data are used as an alternative growth assumption. The growth model is sex combined, estimated outside the assessment model;
8. Asymptotic selectivity on a fleet: Using asymptotic selectivity on fleet capturing the largest fish, USA LL, to address the cryptic biomass issue;
9. Alternative steepness setting: Alternative steepness values (0.70, 0.75, 0.85) are used instead of 0.9.
10. Fit to equilibrium catch.

The WG reviewed the sensitivity results and noted that the fit to the JPN LL9615 index was still good and that trends in biomass (total and spawning) and recruitment did not change with alternative assumptions, but there were some changes in the scale of these quantities, i.e., absolute estimates changed. In most cases, the scale of these alternative estimates was within the error associated with the base case model estimates of biomass and recruitment. The most important sensitivities are the natural mortality assumption, asymptotic selectivity on the USA LL fleet, and growth (CV). During discussion of the M=0.3 run, which affects scale, the WG requested an additional run fixing M=0.39 for males and M=0.48 for females, in order to demonstrate that juvenile mortality (which is high in the new vectors) is not driving the results. The additional run was consistent with this hypothesis and will be included in the stock assessment report. It was noted that Ichinokawa et al. (2008) used the tagging data to estimate natural mortality, which ranged from 0.38 to 0.49, providing some independent evidence consistent with the WG's decision on natural mortality. The sensitivity using asymptotic selectivity on the US LL fleet (F20) did not produce results that differed from the base case, showing that using dome-shaped selectivity on all fleets was appropriate. The growth sensitivity runs show that fits to the index can be improved somewhat by altering CVs on L2, which is equivalent to downweighting the size composition data. Alternative steepness runs showed that the estimated SSB trajectories were almost same among the models. The WG noted that the current assessment model does not provide information about the steepness parameter because the stock did not experienced serious depletion during the model period, 1993-2015. It was pointed out that the steepness parameter would be important not only for the assessment model, but also for future projection, because the current projection model uses the stock-recruitment relationship to generate stock recruitment. The WG concluded that the growth sensitivity runs probably show the range of uncertainty in SSB, but there were no runs in which the base case model results were an outlier relative to the sensitivity results.

In addition to above sensitivity runs, the WG reviewed a model run replicating the assumptions and parameterization of the 2014 assessment as closely as possible. The WG recommended that these results be included in the stock assessment report.

11. PROJECTION SCENARIOS

New projection software (Ijima et al. 2016: ISC/16/ALBWG-02/06) was approved by the WG during the November data preparation meeting, but no decision was made on how to incorporate uncertainty. The WG discussed how to estimate the initial population structure with uncertainty for future projections based on two approaches: (1) maximum likelihood estimates, which capture parameter uncertainty, and (2) bootstrapping the time series, which captures recruitment uncertainty. It was noted that base case model estimates of historical SSB were biased low relative to the bootstrap estimates, but they were within the range of uncertainty. The WG decided against using the bootstrap method to estimate uncertainty. The current base model does not have a low recruitment period like the previous assessment, so the WG decided during the November data preparation meeting that an auto-correlated recruitment model should be used to estimate recruitment in the projections. The projections start with 500 values sampled randomly from a normal distribution averaged at the point estimate of SSB_{2015} and its estimated variability from the assessment model. For each starting point, a sample of 1,000 recruitment vectors of 10 years is obtained from the historical recruitments, with the same autocorrelation of the historic period (acf = 0.1). A total of 500,000 projections were thus performed. Projections are based on estimated F-at-age averaged over 2012-2014 for constant F scenario or the catch averaged over 2010-2014 for the constant harvest scenario. Fleet based selectivity is not used in these projections.

The WG discussed projection scenarios and agreed to two 10-yr projection scenarios:

1. Constant harvest at $F_{2012\text{-}2014}$ for 10 years;
2. Constant average catch for 2010-2014 for 10 years.

The WG also discussed a scenario designed to determine what F would be required to push SSB to the limit reference point of $20\%SSB_{0\ F=0}$. It was noted that because of uncertainty about population scale, advice that is provided should be limited so the WG decided not to use this scenario.

12. BIOLOGICAL REFERENCE POINTS AND KOBE PLOTS

The WG discussed the reference points that would be estimated and presented in the assessment and agreed to estimate F_{MSY}, $F_{0.1}$, $F_{10\%}$, $F_{20\%}$, $F_{30\%}$, $F_{40\%}$, and $F_{50\%}$ using the SPR approach recommended by Ijima (2017: ISC/17/ALBWG/06) shown below.

Reference Point	Estimator
F_{MSY}	$(1\text{-}SPR_{2015})/(1\text{-}SPR_{MSY})$
$F_{0.1}$	$(1\text{-}SPR_{2015})/(1\text{-}SPR_{F0.1})$
$F_{10\%}$	$(1\text{-}SPR_{2015})/(1\text{-}SPR_{10\%})$
$F_{20\%}$	$(1\text{-}SPR_{2015})/(1\text{-}SPR_{20\%})$
$F_{30\%}$	$(1\text{-}SPR_{2015})/(1\text{-}SPR_{30\%})$
$F_{40\%}$	$(1\text{-}SPR_{2015})/(1\text{-}SPR_{40\%})$
$F_{50\%}$	$(1\text{-}SPR_{2015})/(1\text{-}SPR_{50\%})$

The WG also discussed Kobe plots. The WG agreed to prepare one Kobe plot using the chosen limit reference point of $20\%SSB_{F=0}$ (dynamic SSB_0) $SSB_{20\%}$ and the equivalent F, $F_{20\%}$.

13. PROJECTION SCENARIO RESULTS

The WG reviewed projection results for the constant F ($F_{2012\text{-}2014}$) and constant catch (average 2010-2014) scenarios projected over a 10-yr period to 2025. Data from 2015 are provisional and so were not included in the estimation of F or average catch. It was noted that the projected uncertainty is less than the MLE estimate of historical uncertainty because the MLE estimate includes parameter uncertainty. A constant F scenario reduces female SSB from 80,618 t in 2015 to a mean estimate of 63,483 t by 2025 and there is a <0.01% chance that SSB will fall below the LRP by 2025. In contrast, a constant catch scenario results in a bigger reduction of female SSB to a mean estimate of 47,591 t in 2025 and a 30% chance that SSB is below the LRP in 2025. The WG notes that it is important to communicate to managers that the probabilities of falling below the LRP are likely higher but the median trend of SSB never drops below the LRP in any of the base case or sensitivity runs reviewed during the workshop.

14. CURRENT STOCK STATUS AND CONSERVATION ADVICE

The WG reviewed text prepared by the WG Chair describing current stock status and conservation advice for the Executive Summary and stock assessment report. The WG made some changes to the proposed text and reviewed the new text while reviewing this workshop report. SSB_{2015} (80,618 t) is 2.47 times greater than the LRP threshold and current F is below all of the F-based reference points that were calculated. The WG recommends the following for stock status: overfishing likely is not occurring and the stock likely is not overfished. The WG recommends the following conservation advice: the stock is healthy and current productivity is able to sustain recent exploitation levels.

15. RESEARCH RECOMMENDATIONS

John Hyde, NOAA/NMFS SWFSC, provided a short update on progress with a project to develop genetic sex-specific markers for albacore. Samples were obtained from Japan and the USA. Some of the samples were degraded, which created difficulties for sequencing and primer development. However, some higher quality samples were obtained and a sufficiently long sequence was produced. However, at this point sex-specific markers have not been identified, but Dr. Hyde noted that the same techniques were used to develop such markers for Bluefin. Dr. Hyde is redoing some of the analysis to improve results and is considering resampling in the summer of 2017 to get appropriate tissue samples for sequencing. If this project is successful, the resulting markers will provide a non-destructive method to estimate albacore sex ratio in catch data.

The WG identified the following recommendations to improve the stock assessment model:

1. Further investigation of sex-specific growth is required with respect to the model and the inclusion of growth increment data from tagging (change in size between release and recapture) and otolith data in the growth model;
2. Evaluate the use of Japan LL juvenile index from northern areas to represent juvenile albacore trends rather than the Japan PL index;
3. Investigate incorporating the early period (1966-1992) back into the model and address the data conflict during this period;
4. Evaluate sampling protocols and accuracy of historical and current size frequency data (length and weight) for all fleets, including Japan training vessels;
5. Standardizing size composition data to the CPUE index that they represent;
6. Collect high quality samples for development of genetic sex markers;
7. The collection of sex ratio data by fleet should be implemented;
8. Explore the utility of conventional and electronic tagging (archival and PSAT) data to inform growth, catchability, spatial dynamics in future models; and
9. Explore ocean productivity as drivers of albacore trends and dynamics.

16. MANAGEMENT STRATEGY EVALUATION

Desiree Tommasi reviewed the management strategy evaluation (MSE) process and current progress on the albacore MSE. She also laid out some key biological, fishery and management uncertainties and available candidate harvest control rules. The WG discussed and the software platform for constructing the operating model (SS, Multifan CL) and it was suggested that using SS might be appropriate. The WG also discussed the MSE workplan and expectations for the upcoming managers' workshop on MSE to be held in Vancouver, Canada, in October 2017. There was agreement that the initial round of the MSE process should be completed prior to the next assessment which means a deadline in 2019. The WG also agreed that it was important that Desiree and the WG work collaboratively on the MSE process.

17. ADMINISTRATIVE MATTERS

17.1 Workplan for Completing Stock Assessment Report

The WG is required to submit its stock assessment report to the Office of the ISC Chair no later than June 1. In order to meet this deadline, Steve Teo will be responsible for drafting the stock assessment report and John Holmes will draft the Executive Summary. A first draft of the assessment report with the executive summary will be circulated to WG members by May 15. WG members will have 1 week to provide feedback after which the assessment report will be finalized and submitted to the ISC by June 1.

17.2 National Contacts for the ALBWG

The following were confirmed as national contacts for ALBWG matters:

Canada – Zane Zhang
China – X. Dai, Y. Chen
Chinese Taipei - C.-Y. Chen
Japan – Hidetada Kiyofuji
Korea - Sang Chul Yoon
Mexico - Michel Dreyfus
USA – Desiree Tommasi, Steve Teo
IATTC – Carolina Minte-Vera
SPC – John Hampton
Data Manager – John Childers

17.3 Time and Place of Next Meeting

There will be a half-day session to review the stock assessment presentation in advance of the ISC17 Plenary on July 9, 2017 in Vancouver, Canada.

17.4 Other Matters

The WG Chair reported that there will be an election for a new Chair on July 9. He noted that the job is not onerous and that new leadership was important for the future of the WG. He urge every member to seriously consider the position.

The WG discussed presenting provisional stock assessment results at the upcoming IATTC Science Advisory Committee meeting in May 2017. Although the results and recommendations will lack formal ISC approval, there is precedence within both the ALBWG and the PBFWG for providing provisional results to the IATTC. Steve Teo was tasked by the WG to present preliminary/provisional stock assessment results to IATTC SAC meeting in May 2017. The WG Chair will inform the ISC Chair of this decision.

WG members thanked Allan Hicks (International Pacific Halibut Commission) and Mark Maunder (Inter-American Tropical Tuna Commission) for their participation and help in defining an improved base-case model for the 2017 assessment and tasked the WG Chair with conferring their appreciation to the Directors of their respective organizations as well as the Executive Director of the IATTC for the use of IATTC facilities during the meeting.

18. CLEARING OF REPORT

The WG Chair prepared a draft of the report, which was reviewed by the WG prior to adjournment of the workshop. After the workshop, the WG Chair evaluated and incorporated suggested revisions, made final decisions on content and style and distributed a second draft via email for approval by WG members. The final report will be forwarded to the Office of the ISC Chair for review and approval by the ISC17 Plenary.

19. ADJOURNMENT

The ALBWG meeting was adjourned at 12:00 on 19 April 2017. The WG Chair thanked the host (Dr. S. Teo, SWFSC) for his hospitality and overall arrangements for a productive workshop in which the albacore assessment was advanced. He also thanked the scientists participating in the workshop for their attendance and contributions and stressed the need to maintain ongoing communication and cooperation on albacore matters.

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The Albcore Working Group - Back (left to right) – Carolina Minte-Vera, Steve Teo, John HOlmes, Zhe Geng, Osamu Sakai, Zane Zhang, Chiee-Young Chen; Front (kneeling) left to right – Hidetada Kiyofuji, Hirotaka Ijima, Daisuke Ochi.

ATTACHMENT 2
ALBACORE WORKING GROUP (ALBWG)
INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE SPECIES IN THE NORTH PACIFIC OCEAN
INTERSESSIONAL WORKSHOP
11-19 April 2017
SWFSC, La Jolla, CA, USA
***REVISED* Agenda**

April 11

1. Opening of Albacore Working Group (ALBWG) Stock Assessment Workshop
    - 1.1 Welcoming remarks
    - 1.2 Introductions
    - 1.3 Scheduling
2. Meeting Logistics
    - 2.1 Meeting Protocol
    - 2.2 Review and Adoption of Agenda
    - 2.3 Assignment of Rapporteurs for Workshop Report
    - 2.4 Working Paper Distribution and Availability
3. Stock Assessment Report and Section Assignments
4. Review of Working Papers

April 12-17

5. Data issues (seasonal, area splits in fisheries)
6. CPUE indices
7. Base Model Development
8. Growth model
9. Base Model Initial Conditions
10. Diagnostic Analyses
11. Sensitivity analyses
12. Projection Scenarios
13. Biological Reference Points and Kobe Plots
14. Review Projection Scenario Results
15. Current status and Conservation Advice

April 18

16. Research Recommendations
17. MSE Planning
18. Rapporteurs and participants complete assigned sections of workshop report
19. Draft of workshop report circulated for review

April 19

20. Clearing of Meeting Report
21. Administrative Matters
    - 21.1 Workplan for Completing Assessment Report
    - 21.2 Update national contacts for ALBWG
    - 21.3 Time and place of next meeting
    - 21.4 Other matters
22. Adjournment

ATTACHMENT 3
List of Working Papers

WP Number	Title and Authors	Availability
ISC/17/ALBWG/01	Abundance indices of albacore caught by Japanese Longline vessels in the North Pacific during 1976-2015. Ochi, D., Ijima, H. and Kiyofuji, H.	Author contact details only
ISC/17/ALBWG/02	Length distributions of albacore catch made by Taiwanese albacore-targeting longline fishery in the Pacific Ocean north of 25°N, 2003-2015. Chiee-Young Chen and Fei-Chi Cheng.	Public
ISC/17/ALBWG/03	A brief description of the Japanese Data (size and drift net) for the NPALB stock assessment in 2017. Kiyofuji, H., Ijima, H., and Ochi, D.	Public
ISC/17/ALBWG/04	Estimation for Japanese catch at length data of North Pacific albacore tuna (*Thunnus alalunga*). Hirotaka Ijima, Daisuke Ochi and Hidetada Kiyofuji.	Public
ISC/17/ALBWG/05	Revised of standardized CPUE for North Pacific albacore caught by the Japanese pole and line data from 1972 to 2015. Junji Kinoshita, Daisuke Ochi and Hidetada Kiyofuji	Public
ISC/17/ALBWG/06	Summary of reference point for North Pacific albacore tuna stock assessment. Hirotaka Ijima.	Public
ISC/17/ALBWG/07	Meta-analysis of north Pacific albacore tuna natural mortality: an update	Public
ISC/17/ALBWG/08	Catch and size composition time series of the US and Mexico surface fishery for the 2017 north Pacific albacore tuna assessment	Public
ISC/17/ALBWG/09	Relative abundance indices of juvenile albacore tuna for the US surface fishery in the north Pacific Ocean	Public
ISC/17/ALBWG/10	Catch and size composition time series of the US pelagic longline fleets for the 2017 north Pacific albacore tuna assessment	Public
ISC/17/ALBWG/11	Relative abundance indices of adult albacore tuna for the US pelagic longline fishery in the north Pacific Ocean	Public