



ANNEX 11

*22nd Meeting of the
International Scientific Committee for Tuna
and Tuna-Like Species in the North Pacific Ocean
Kona, Hawai'i, U.S.A.
July 12-18, 2022*

REPORT OF THE ALBACORE WORKING GROUP WORKSHOP

July 2022

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ANNEX 11

**REPORT OF THE PACIFIC BLUEFIN TUNA WORKING GROUP
INTERSESSIONAL WORKSHOP**

*International Scientific Committee for Tuna and Tuna-Like Species
in the North Pacific Ocean (ISC)*

9 – 12 May 2022 (Eastern Pacific)

10 – 13 May 2022 (Western Pacific)

Webinar

1. OPENING AND INTRODUCTION**1.1. Welcome and Introduction**

An intersessional workshop of the Albacore Working Group (ALBWG or WG) of the International Science Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) was convened as a webinar on 9 – 12 May 2022 (Eastern Pacific time) and 10 – 13 May 2022 (Western Pacific time). The ALBWG Chair welcomed 16 participants to the workshop (**Attachment 1**) and briefly described the objectives and expected outcomes of this workshop. The objectives were to: (1) review the findings from the evaluations, carried out by WG members, addressing the research recommendations identified in the 2020 assessment; (2) develop an approach to incorporate findings into the albacore assessment model to be used for the 2023 assessment.

1.2. Meeting Protocol

The ALBWG Chair noted that the efforts of the WG at this meeting would be collegial and follow the scientific method with an emphasis on empirical testing, open debate, documentation and reproducibility, reporting uncertainty, peer review, and constructive feedback to authors and presenters.

1.3. Review and Adoption of Agenda

The draft agenda was circulated prior to the meeting, reviewed, and adopted at the workshop (**Attachment 2**). Working papers and presentations can be found in **Attachment 3**.

1.4. Assignment of Rapporteurs

Rapporteur duties were assigned to Kevin Piner and Steve Teo.

2. BRIEFLY REVIEW 2020 NPALB ASSESSMENT

Re-examining the Model Diagnostics of the 2020 North Pacific Albacore Tuna Stock Assessment. Teo, S. and Minte-Vera, C. (ISC/22/ALBWG-01/01)

The ALBWG used a suite of model diagnostics to assess potential issues associated with convergence, model structure, parameter mis-specification, and data conflicts in the 2020 base case model. Some recent work on assessment model diagnostics and a workshop on model diagnostics by the Center for the Advancement of Population Assessment Methodology (CAPAM) in 2022, inspired us to re-examine the model diagnostics of the 2020 NPALB assessment. In this paper, we re-examine the R0 likelihood profiles and estimate the prediction skill of the 2020 base case model through hindcasting. First, a new set of R0 likelihood profiles were performed with recruitment deviates that were forced to sum to zero. Second, we examine the prediction skill of the 2020 base case model by hindcasting the model and calculating the mean absolute scaled error (MASE) for the primary abundance index of the model. The likelihood profiles of $\log(R0)$ from the 2020 assessment and the current study, where the estimated recruitment deviations summed to zero, provided largely consistent information about the overall population scale of the base case model but with fleet-specific differences in the relative importance of the size composition data. Our interpretation of these results are that R0 profiles remain useful for identifying consistency (or lack thereof) between data sources on the estimated population scale. However, the use of R0 profiles to identify the importance of specific fleets would need further work because the recruitment deviations can interact with different data sources in multiple ways, which can result in different scales of misfits. The MASE scores indicated that the 2020 base case model had approximately 16% and 10% improvements in forecast accuracy of the F09 abundance index over horizons of 1 and 2 years, respectively, as compared to naive forecasts. However, the MASE for 3 or more years were >1 , which indicated that forecasts of 3 or more years did not exhibit any prediction skill over naive forecasts. Given these results, 2020 base case model has sufficient skill to estimate and forecast current stock status with a horizon of 2 years. However, it may be useful to update the F09 abundance index during the intervening years to monitor the relative status of the spawning stock biomass.

Discussion

The WG discussed the diagnostics used in previous assessments given the recommendations from a recent CAPAM/IATTC diagnostic workshop. It was noted that the R0 profile may be helpful in identifying model conflict but not the source of the conflict. The WG noted the importance of the recruitment penalty in R0 profiling and agreed with authors that some consideration regarding treatment of recruitment (dev-vector, fixed recruitments, etc.) should be given. It was also suggested that other parameters or derived quantities (e.g. B_0 , depletion, terminal biomass, M etc.) could be profiled to provide additional diagnostic information. The WG agreed with the authors on the importance of incorporating a prediction skill diagnostic into its routine work. It was noted that the specifics of the prediction skill diagnostic will depend on the question being asked. The WG discussed if simpler or more complex models may have better prediction skills. Although no conclusion was reached, it was noted that harvest strategy simulations have been useful in evaluating simpler models for complex situations. The WG also discussed minimum standards for data as often model complexity is driven by the need to account for multiple processes that give rise to the observations.

3. RESEARCH RECOMMENDATION #1

Further investigation of the F01 fishery because there appears to be a mixture of two fisheries (one on juveniles and one adults) in this fishery.

3.1. Review findings from the detailed examination of the F01 Japanese longline fishery

H. Ijima presented the working paper: The work plan to improve the fleet definition of Japanese longline fishery. Ijima, H., Matsubayashi, J., and Tsuda, Y. (ISC/22/ALBWG-01/02)

This working paper reviewed the fleet definition of Japanese longline fishery in Stock Synthesis 3 and performed a preliminary analysis to improve it. Specifically, this study tried to classify by operation which cohort was caught using CPUE and mean body weight value. Model-based cluster analysis called the finite mixture model was used. In September, we will report the analysis results to the ISC albacore working group. We propose to agree on a Japanese longline fleet definition before the data preparatory meeting because the fleet definition is necessary for the CPUE standardization.

Discussion

The WG discussed the use of this new approach to define fisheries for the next stock assessment. In response to questions the authors clarified that their analysis can be done for data starting in 1994 and has the potential to identify more than the two groups. The WG noted that at least three groups will be needed as juveniles, adult females and adult males are considered important groups for defining fleet structure in the stock assessment. It was also noted that the grouping was done using both fish weight and numerical density, and that the weighting of the two factors may be influential on the results. The WG also noted that this approach to fishery definition could provide temporally changing fleet definitions. If this analysis is used to define fleet structure for other fisheries, the authors would need to provide detailed information on the spatial groupings to the WG.

3.2. Discuss how to incorporate results into 2023 assessment model.

The WG encouraged the authors to continue their research, but would need to see the results compared to other information previously used to define fleet structure (e.g., length composition). New fleet structure will also need to be evaluated for ‘biological realism’. The authors clarified that a more complete analysis would be available for a WG meeting in September. The WG requested that data for the stock assessment also be compiled using the old fleet definitions until a decision is reached on the reliability of this method.

4. RESEARCH RECOMMENDATION #2

Evaluate adult indices from the Japanese longline fisheries in southern areas (Areas 2 and 4), especially with respect to incorporating size data into the standardization process using a spatiotemporal process and/or data from alternative seasons.

4.1. Review findings from evaluation of the adult indices from the Japanese longline fisheries in southern areas (Areas 2 and 4).

The work plan for CPUE standardization of albacore in the North Pacific. Matsubayashi, J., Ijima, H., Matsubara, N., Aoki, Y. and Tsuda, Y. (Presentation 01)

This presentation provided a summary of the Japanese longline fisheries data and explained the work plan for a new strategy of CPUE standardization and current progress on the analysis. The main modifications from the previous albacore stock assessment include; 1) generate spatial-temporal models for CPUE standardization using INLA, 2) juvenile and adult fish will be classified by methods presented in ISC/22/ALBWG-01/02 (if approved by the WG in September), and CPUE analysis will be performed for both cohorts, and in this case, 3) analysis doesn't involve any area classification like previous assessment.

Discussion

The WG thanked the authors and discussed what model diagnostics and priors would be appropriate and how to evaluate them. The authors noted that the R libraries used for the analysis (TMB and R-INLA) sometimes require informative priors to improve model convergence but it was currently unclear what the appropriate priors are, and will report on their findings at the next WG meeting in November. The authors suggested that the Watanabe-Akaike Information Criteria (WAIC), Leave-one-out cross validation (LOOCV), and randomized quantile residuals could be useful model diagnostics.

The WG noted that the results from the clustering will result in numerous zeros and potentially missing values, which will have to be filled in by interpolation and extrapolation. The WG wondered if there are any potential problems with standardizing and using indices with this type of data. The authors clarified that the clustering separating the logbook data into 2 or more categories will not have more missing values because the recorded catch number for an area will be assigned to one category based on the clustering and the other categories be set to 0. However, there will be substantial proportions of 0s and the authors plan on investigating several methods for handling the large numbers of 0s. Three methods were discussed: 1) zero-inflated models; 2) delta (i.e., hurdle) models; and 3) multi-species models. It was thought that using multi-species models would be the most appropriate but may be harder to develop while the zero-inflated and hurdle models were relatively simple to develop.

The WG asked if the spatial domain and mesh for the models would have to change over time as the areas assigned to each cluster changes over time. The authors responded that the same spatial domain and mesh could be used over time, especially if a multi-species model is used.

The WG recommended that the authors continue their work and look forward to reviewing the detailed results of their work at the data preparatory meeting in November, 2022.

4.2. Discuss how to incorporate results into the 2023 assessment model.

The WG noted that if the area definitions from the clustering analysis in ISC/22/ALBWG-01/02 were used for the Japanese longline fisheries and potentially other fisheries, the fleet-as-areas approach would be based on fleet-area definitions that change over time. The WG wondered how this would impact the assessment model. The WG concluded that this would not be an issue for fleets with only catch and size/age data because the primary aim in modeling these fleets is to remove the correct catch-at-age from the population. However, some thought would have to be given for the fleet with the primary index because the WG was unsure whether the changing

fleet-area definitions will impact the catchability of the index. The WG agreed to continue discussing this at the data preparatory meeting and potentially test out the indices in preliminary models.

5. REVIEW AND DISCUSS WORKING PAPER “CATCH, LENGTH COMPOSITION, AND STANDARDIZED CPUE OF THE NORTH PACIFIC ALBACORE CAUGHT BY THE TAIWANESE DISTANT-WATER LONGLINE FISHERIES IN NORTH PACIFIC OCEAN FROM 1995 – 2020”

Catch, length composition, and standardized CPUE of the North Pacific albacore caught by the Taiwanese distant-water longline fisheries in North Pacific Ocean from 1995 – 2020. Lee, K., Yi, C., Hsu, J., Chang, Y., and Wang, H. (ISC/22/ALBWG-01/03)

In this working paper, standardized catch rate data and length composition of albacore exploited by Taiwanese distant-water longliners (DWLL) in the North Pacific Ocean (NPO) from 1995 - 2020 were summarized. Catch data of the albacore caught by Taiwanese longliners in the NPO was also summarized. In addition, albacore-targeting fleets were identified using two-step cluster analysis based on their catch composition, and the fishing strategies between albacore-targeting fleets and non-albacore-targeting fleets were compared. Catch rates were standardized using a Vector-Autoregressive Spatio-Temporal model with year, quarter, vessel, targeting group, spatial, and spatio-temporal effects as explanatory variables. Results showed that the standardized catch rate of the albacore caught by Taiwanese DWLL fleets was relatively stable and has been fluctuating since 1999. Additionally, the length frequency distribution of NPO albacore caught by Taiwanese DWLL fleets during 1995 - 2020 indicated that after 2003, the length frequency distribution appeared to be more consistent, with the mean fork length value fluctuating around 89 cm.

Discussion

The WG suggested that the initial cluster analysis to identify the albacore-targeting fleet includes an implicit area effect. Therefore, if the standardization model also includes an area effect, the area effect may have been double counted. The authors responded that the WG is correct that the area is already accounted for in the initial cluster analysis and including the area effect in the standardization model may be confounding.

The WG asked if the size compositions presented were from the entire fleet or just the albacore-targeting portion, which was what was used in the last assessment. The authors responded that the size compositions presented were from the entire fleet and would be split into the appropriate fleet-area definitions for the assessment.

The WG asked if the Taiwanese fleets would be able to use the same area definitions as the Japanese longline fleets, which likely changes over time. The authors responded that as long as the area definitions are known and consistent with the Taiwanese data, it should not be a problem to use the same area definitions even if they change over time. The WG agreed to examine this in more detail during the data preparatory meeting once the cluster analysis is completed by the Japanese scientists.

The WG noted that the albacore-targeting fleet is likely predominantly catching juvenile and subadult albacore. Therefore, the most likely use for an index from the Taiwanese longline fleet would be for an index of the juvenile and subadult portion of the population. The WG asked if it was possible to develop such an index. The authors responded that it would be possible once the area definitions for the juvenile areas were available.

6. RESEARCH RECOMMENDATION #3

Evaluate potential juvenile indices from the Japanese longline fisheries in northern areas (Areas 1, 3 and 5), the Japanese pole-and-line and/or EPO surface fisheries.

6.1. Review findings from evaluation of the juvenile indices from the Japanese pole-and-line fishery.

Overview for Japanese Pole and Line fishery Matsubara, N., Aoki, Y., Tsuda, Y., and Ijima, H. (Presentation 02)

This presentation summarized the catch, size composition, spatial distribution, and the index of Standardized CPUE of north albacore for Japanese pole-and-line (JPPL). Albacore are caught by JPPL in quarter 2 & 3 mainly. From size composition data of JPPL, there were some modes under 90 cm in each year. It was also confirmed that Catch by Offshore vessel (OS) were increasing since 2000. The same methodologies as the last stock assessment were used for the analysis of CPUE standardization. It was confirmed that updated CPUE are highly variable. Finally it authors suggested use of a JPPL CPUE analysis by Geostatistical model, including OS data and a multi species model with consideration of JPPL targeting.

Discussion

The WG vice Chair reminded the WG that the JPPL fishery has the largest catch of albacore stock and previous assessments have tried to make sure that the catch at age is matched well by the model. However, there had been problems with obtaining a good index from this fishery because this fishery targets both albacore and skipjack. There had been an issue with distinguishing albacore effort versus skipjack effort. The authors proposed using a multi species model to address this concern.

The WG also discussed the implications of the apparent time-varying selectivities of the fishery. If the index does not have consistent selectivity associated with it, it cannot be confidently used in the stock assessment. The authors will further investigate the size composition data to address this concern. The authors proposed three potential modelling approaches for dealing with the variable selectivity issue: 1) a multi-species model, similar to differentiating between albacore and skipjack targeting effort; 2) a multi-species model with logbook-derived CPUE and port-sampled size composition data; and 3) a multi-species model with logbook-derived CPUE and mean weight data (similar to the method used for Japanese longline fisheries). The WG noted that the IATTC has experience with similar methods to standardize both CPUE and size compositions at the same time, and could be a source of technical help, if required.

The WG wondered if the operational area for this fishery has changed over time and how this would affect the proposed index. The authors noted that the operational area for the fishery has changed over time and this may affect the proposed index. However, the authors did not prepare plots to illustrate this and agreed to provide details of operational changes at the next meeting. The authors agreed to prepare a working paper on this fishery for the upcoming data preparatory meeting.

6.2. Update on evaluation of the juvenile indices from the EPO surface fisheries.

The US scientists apologized to the WG for not making progress on this analysis for this meeting and agreed to provide an update and working paper at the data preparation meeting.

6.3. Discuss how to incorporate results into 2023 assessment model.

The WG noted that the size composition data should be presented with the JPPL index at the data preparation meeting so that the WG can decide on use in the assessment model.

7. REVIEW AND DISCUSS RESEARCH RECOMMENDATION #4-6.

The WG vice-Chair gave a brief background on each of the remaining research recommendations identified in the 2020 NPALB stock assessment and the WG discussed the issues and decisions for the 2023 NPALB stock assessment.

RESEARCH RECOMMENDATION #4

Collect sex-specific age-length samples using a coordinated biological sampling plan to improve current growth curves, and examine regional and temporal differences in length-at-age.

Research recommendations #4 and #5 are related issues and the WG has recognized for some time that there are sex specific difference in biology of albacore and it is important to examine the regional and temporal differences. The NPALB stock assessment has incorporated assumptions about sex specific growth and natural mortality (see 2020 NPALB assessment), however these assumptions are based on limited aging data (e.g., sex ratio data from Japanese academic or government research). An analysis has been done to identify the required number of samples required to understand (ISC/20/ALBWG-01/09).

The WG discussed the difficulty of coordinating between the regions the collection of albacore otoliths and the associated biological data (e.g., sex, maturity, size, etc.). The Japanese scientists reported that Japan has begun collecting sex-specific age-length samples (~70 samples so far). However, the otolith samples have not been read yet. Overall, the work is ongoing and not expected to contribute to the assessment in 2023. The US scientists also reported that they are performing similar work in the EPO but also do not expect to complete the work in time to contribute to the assessment in 2023.

RESEARCH RECOMMENDATION #5

Collect sex ratio data by fishery using a coordinated biological sampling plan.

The US scientists also reported that the US is beginning a project to collect sex ratio data from the US longline fishery. However, the US scientists do not expect the project to be completed in time to contribute to the 2023 assessment.

RESEARCH RECOMMENDATION #6

Evaluate and document historical high seas drift gillnet catch by member countries.

Based on the work of other ISC WGs, the WG recognized that the historical high seas drift gillnet catch during the 1980s and 1990s may be inconsistent and under-reported. For the past two NPALB stock assessments the supporting historical data has starts in 1994 in order to exclude the inconsistent historical data sources. The WG noted that if the NPALB stock assessment was to use historical data from 1966, significant investigation, analyses and assumptions would need to be made to make these data suitable for use in the 2023 stock assessment. The WG agreed that this issues is not a priority to be addressed in the upcoming stock assessment because the high seas gillnet fisheries were banned in 1993 and this issue is minimized by starting the assessment model in 1994. The WG agreed to further discuss this issue at the data preparatory meeting.

8. NEXT MEETING:

In September 2022 the WG plans to reconvene for a short web meeting to review progress on working paper ISC/22/ALBWG-01/02 which will be presented by Japan.

The WG discussed the tentative time and place of the data preparation workshop. Japan tentatively offered to host the WG data preparation workshop (November 2022) in Yokohama. This in-person meeting will be COVID-19 dependent and Japan will confirm in late August. US and Canada will be investigated as back up locations if Japan cannot host due to COVID-19 restrictions. The WG agreed that it will be difficult to proceed with this data preparation meeting in a web meeting given the changes to the input data and models that are anticipated.

9. ANY OTHER MATTERS

9.1. IATTC SAC

The WG Chair asked for clarification on what updates the WG was to provide at the IATTC SAC (Web-meeting, May 16-20, 2022). The WG vice-Chair explained that in general the WG works with the IATTC staff to see what they require for the SAC and if there is time a presentation is provided. The IATTC staff will provide the WG updates at the SAC. This year there is plan to have a brief and general follow up discussion on the NPALB MSE.

9.2. ISC Plenary

The WG discussed the ISC22 Plenary meeting which is being planned for an in-person meeting in July, 2022. The WG Chair asked for clarifications of what updates the WG typically provides at these meeting. The WG vice-Chair clarified that a summary of all current WG workshops and the NPALB stock status update is to be presented at this meeting by the WG Chair.

10. CLEARING OF MEETING REPORT

The WG Chair prepared a draft of the workshop report. The WG reviewed the report prior to adjournment of the workshop. After the workshop, the WG Chair evaluated and incorporated suggested revisions, made final decisions on content and distributed a second draft for approval by WG members.

11. ADJOURNMENT

The WG meeting was adjourned at 5:40 pm on 12 May 2022 (West Coast North America time), 9:40 am on 13 May 2022 (Japan time), 8:40 am on 13 May 2022 (Chinese-Taipei time). The WG Chair thanked the WG scientists and other participants in the workshop for their attendance and contributions to the NPALB assessment improvements.

APPENDIX 1: LIST OF PARTICIPANTS

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APPENDIX 2: AGENDA

**ALBACORE WORKING GROUP (ALBWG)
INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE
SPECIES
IN THE NORTH PACIFIC OCEAN**

WEB MEETING

DATES

9-12 May 2022 (Eastern Pacific)
10-13 May 2022 (Western Pacific)

TIME

JAPAN & KOREA: 9:00 – 13:00
CHINESE-TAIPEI: 08:00 – 12:00
NOUMEA: 11:00 – 15:00
WEST COAST NORTH AMERICA: 17:00 – 21:00

MEETING OBJECTIVES: (1) review findings from evaluations addressing research recommendations identified in the 2020 assessment; (2) develop an approach to incorporate findings into the albacore assessment model to be used in the 2023 assessment.

DRAFT AGENDA

DAY 1 (EPO: Mon, May 9; WPO: Tues, May 10)

1. Opening and Welcome

- 1.1** Introductions
- 1.2** Meeting Protocol
- 1.3** Review and Adoption of Agenda
- 1.4** Assignment of Rapporteurs

2. Briefly review 2020 NPALB assessment. (US)

3. Research recommendation #1: *Further investigation of the F01 fishery because there appears to be a mixture of two fisheries (one on juveniles and one adults) in this fishery.*

- 3.1** Review findings from the detailed examination of the F01 JPLL fishery. (*Japan*)
- 3.2** Discuss how to incorporate results into 2023 assessment model.

DAY 2 (EPO: Tues, May 10; WPO: Wed, May 11)

4. Research recommendation #2: *Evaluate adult indices from the Japanese longline fisheries in southern areas (Areas 2 and 4), especially with respect to incorporating size data into the standardization process using a spatiotemporal process and/or data from alternative seasons.*

4.1 Review findings from evaluation of the adult indices from the Japanese longline fisheries in southern areas (Areas 2 and 4). (*Japan*)

4.2 Discuss how to incorporate results into 2023 assessment model.

5. Review and discuss working paper “Catch, length composition, and standardized CPUE of the North Pacific albacore caught by the Taiwanese distant-water longline fisheries in North Pacific Ocean from 1995 – 2020” (*Chinese Taipei*)

DAY 3 (EPO: Wed, May 11; WPO: Thurs, May 12)

6. Research recommendation #3: *Evaluate potential juvenile indices from the Japanese longline fisheries in northern areas (Areas 1, 3 and 5), the Japanese pole-and-line and/or EPO surface fisheries.*

6.1 Review findings from evaluation of the juvenile indices from the Japanese pole-and-line fishery. (*Japan*)

6.2 Update on evaluation of the juvenile indices from the EPO surface fisheries. (US)

6.3 Discuss how to incorporate results into 2023 assessment model.

7. Review and discuss research recommendation #4-6.

8. Next meeting: Data preparation meeting, November 2022

9. Any Other Matters

9.1 IATTC SAC

9.2 ISC Plenary July 2022

DAY 4 (EPO: Thurs, May 12; WPO: Fri, May 13)

10. Clearing of Meeting Report

11. Adjournment

APPENDIX 3: LIST OF WORKING PAPERS AND PRESENTATIONS

Number	Title and Authors	Availability
ISC/22/ALBWG-01/01	Re-examining the Model Diagnostics of the 2020 North Pacific Albacore Tuna Stock Assessment. Teo, S. and Minte-Vera, C.	ISC Website
ISC/22/ALBWG-01/02	The work plan to improve the fleet definition of Japanese longline fishery. Ijima, H., Matsubayashi, J., and Tsuda, Y.	ISC Website
ISC/22/ALBWG-01/03	Catch, length composition, and standardized CPUE of the North Pacific albacore caught by the Taiwanese distant-water longline fisheries in North Pacific Ocean from 1995 – 2020. Lee, K., Yi, C., Hsu, J., Chang, Y., and Wang, H.	ISC Website
Presentation 01	The work plan for CPUE standardization of albacore in the North Pacific. Matsubayashi, J., Ijima, H., Matsubara, N., Aoki, Y. and Tsuda, Y.	Contact the author
Presentation 02	Overview for Japanese Pole and Line fishery. Matsubara, N., Aoki, Y., Tsuda, Y., and Ijima, H.	Contact the author

APPENDIX 4: MEETINGS AND WORKPLAN

Date	Location/Method	Task/Event
May 16-20, 2022	Online	IATTC SAC 2022: Brief discussion of MSE
September 2022	Online	Review working paper ISC/22/ALBWG-01/02
July 12 – 18, 2022	Kona, Hawaii	ISC Plenary: Present workshop summary and stock status
October, 2022	TBD	WCPFC NC18
November 2022	Tentatively Yokohama, Japan	ALBWG workshop: Data Preparation
Early 2023	Tentatively La Jolla	ALBWG workshop: Stock Assessment