Report of the June 2017 CPUE Web Meeting

Prepared by Professor John Pope, Chair of CPUE modelling group

Start times

Seattle: 3:00pm, Tue 13 June
Buenos Aires, Halifax 7:00pm, Tue 13 June
London: 11:00pm, Tue 13 June
Brussels, Cape Town: 12:00am, Wed 14 June
Denpasar, Taipei: 6:00am, Wed 14 June
Seoul, Tokyo: 7:00am, Wed 14 June
Canberra, Hobart: 8:00am, Wed 14 June
Wellington: 10:00am, Wed 14 June

Attachments

Attachment 1: List of Participants
Attachment 2: List of Documents
Further Attachments available at CCSBT Website
Chair's facilitation PowerPoint presentation (annotated during the meeting
Informal record of typed comments
Video of slide presentations and vocal record.

Agenda 1. Opening - Agree Agenda

1. The meeting was opened at 2300h BST[1]. The chair explained the agenda (CCSBT-CPUE/1706/01) and indicated that the purpose of the Web Meeting was to address Catch per Unit Effort (CPUE) issues that have an input into on other intersessional work (particularly the Operating Model and Management Procedure (OMMP) working group) to check there are no emerging problems with the core CPUE series and to encourage intersessional work on CPUE analysis. The agenda was agreed.

Agenda 2. To agree which of the revised core CPUE series (that exclude the NZ chartered Japanese Long Line vessel that will no longer be available) is the most suitable replacement for our previous core CPUE series as an input to OM, MP and annual status advice

2. The working group had been informed that the NZ chartered Japanese Long Line vessel that previously formed part of the core fleet used to calculate the base CPUE

[1] British Summer Time

series will no longer be operating. This means that coverage of areas 5 and 6 will be sparse. Consequently ways to deal with this problem were urgently needed before the OMMP working Group meeting. At the beginning of the year, the Chair had requested Japan to make an early comparison of the behaviour of the reduced data set compared to the full data set over the past time series. These analyses were provided in very timely fashion that allowed the working group members adequate time to comment on the alternatives options prior to the web meeting. Two papers result from this work and were presented under this agenda item. The main results were as follows:

Paper 4) Examination of influence of absence of data from New Zealand chartered Japanese longline vessels on the core vessel CPUE and proposal of its solution by Dr Tomoyuki Itoh

3. The paper considered the main problem of the loss of data from NZ Charters Paper to be:

    - NZ Chartered Japanese LL cease from 2016 (This gives low coverage for areas 5 & 6. But in general areas 5 & 6 not big proportion of the total < 16 % since 1986;
    - However the proportion is large in 45ºS (up to 57 %). This gives problems with the Generalised Linear Model (GLM) used for the core CPUE series.

4. The Author saw three possible fixes for this problem. These together with their drawbacks are:

    - A-1. Delete data in Area 5 and Area 6 and remove data in 45ºS in other Areas
        - Problems: Amount of data in previous years become small. Future data from Japanese vessels operating in Area 5 and Area, if they occur, will not be utilised.
    - A-2. Delete data in Area 5 and Area 6 and combine data in 45ºS into 40ºS
        - Problems: Amount of data in previous years become small, but utilise 45ºS data. Future data from Japanese vessels operating in Area 5 and Area, if they occur, will not be utilised.
    - B. Combine Area 5 data into Area 4 and Area 6 data into Area 7
        - Problems: No problem has been found so far. A potential problem is that relative data amount of Area 4 and Area 5 in combined Area 4 & 5 (or Area 6 and Area 7 in Area 6 & 7) will be changed and might cause problems. However, the data amount in Area 5 (Area 6) have not been large in previous years.

5. An examination of the historic trends of each option compared to those of the full data set showed rather little deviation for all the cases. Results are shown for w0.8 (Fig. 1 and Fig. 2) and w0.5 (Fig. 3 and Fig. 4). No large change was observed in any of the options. The Author suggested that option B (combined Areas) seems to be appropriate in terms of utilise data as much as possible and causing no problems with the year*latitude interactions.

Paper 5) A Recommendation on the All Vessels CPUE Series Considering Loss of Data from Japanese-Flagged Charter Vessels in the New Zealand Fishery by Dr Norio Takahashi

6. This analysis was based on the Nishida & Tsuji model. CPUE series between 1969 and 2015 were calculated using all vessels data. Two approaches to dealing with the problem were adopted that were similar to those of paper 4.These were:
   - A: Data for Areas 5 and 6 were omitted in standardisation and index calculation. This approach is a similar approach to “A-1” in paper 4;
   - B: Data were analysed as Areas 4 and 5 combined, and as Areas 6 and 7 combined. This approach is the same as the approach “B” in paper 4.
7. Both of the approaches produced almost no difference in trends of the CPUE series, and thus it was considered that there would be only a small impact from the loss of data from the New Zealand chartered vessels on the CPUE series. Given the merits and demerits of both approaches with respect to data utilisation and future data availability (as indicated in paper 4) the author recommended approach B to use for future calculation of the CPUE indices.
8. The chair noted that in an Email to the CPUE modelling Group on 02 May 2017 the Chair had said “Fortunately these papers suggest that the effect of adjusting to this loss of data does not change our CPUE time series appreciably ……, it is important that as a group we either agree or sort out any problems as soon as possible”. The Chair noted that no problems had been raised with the papers conclusions.
9. The Working Group agreed to recommend method B for use in the MP and for other CPUE tasks in future.

Agenda 3. To check and agree that the agreed core series behaves adequately as an input to OM, MP and annual status advice

Paper 8) Update of the core vessel data and CPUE for southern bluefin tuna in 2017 by Dt Tomoyuki Itoh and Dr Norio Takahashi

10. This paper summarises the BASE core vessel CPUE which is the abundance index of southern bluefin tuna used for the Management Procedure in CCSBT. It describes data preparation, CPUE standardisation using GLM and area weighting. The approach is as adopted in past years except that Option B of the previous agenda item was employed. The Lower limit of number of hooks per cell was reduced for a special case (to obtain the RTMP factor). But the usual threshold for data filtering used was the same as in previous years. The RTMP to log book conversion ratio was 0.946 for 2016.
11. The Models calculated were:

    The Base series:

    $$\log(CPUE+0.2) = Intercept + Year + Month + Area + Lat5 + BET\_CPUE + YFT\_CPUE + (Month*Area) + (Year*Lat5) + (Year*Area) + Error,$$

Two additional Monitoring CPUE series were also updated.

Monitoring series 1 (Reduced base model):

$$\log (CPUE+0.2) = Intercept + Year + Month + Area + Lat5 + BET\_CPUE + YFT\_CPUE + (Month*Area) + Error,$$

Monitoring series 2: Same procedure as applied in Base series, but the data used were prepared at the shot-by-shot daily level rather than the aggregated 5x5-degree/month level. The paper shows various diagnostic about the data and fit. These include cell fished and mean number per cell and QQ plot and AIC & BIC. There was considerable discussion about the divergence seen between the reduced base series and the base series since about 2006. This raised a concern that the divergence might be reflecting some change in behaviour after the Japanese management regime changed. However, it was also noted that this might result from some statistical effect of the weighting process. It was noted that the Base series allows different trends in different areas while the reduced base series does not. The Base series weights the different trends by area while the reduced base series combines them all according to the amount of data in each area. It was agreed that this comparison should be the subject of future work to clarify how the differences come about.

12. The chair provided comparison of w.8 results from this paper with Korean LL CPUE trends in areas 8 and 9. These showed broadly similar results for these two areas. It was agreed that these two independent series showed encouragingly similar trends in the two areas. It was noted that further collaborative work would be needed to compare trends on a similar latitudinal, time and fish size basis.

Paper 9) Change in operation pattern of Japanese southern bluefin tuna longliners in the 2016 fishing season by Dr Tomoyuki Itoh

13. In this paper operation pattern of the longline fishing was examined by comparison between the most recent year and the previous 10 years. It provides helpful tables and figures. These show:

- The number of 5x5 degree square where longline operations conducted by year, month and area in RTMP data;
- The number of operations by year, month and area in RTMP data (N.B. Some increase noted in month 5 in areas 7 & 9);
- The number of vessels that caught SBT in RTMP between 2006 and 2016 by the number of years participated in RTMP in past years (2001-2005) in RTMP data. (N.B. More first year (New?) vessels were seen in recent years and less long term 5 year vessels;
- Changes in vessel numbers hooks and SBT;
- Changes in the area of catch; and
- Changes in size composition.

14. In summary, the paper suggested that no remarkable change was found in the 2016 operational pattern in terms of catch amount, the number of vessels, time and area operated, proportion by area, length frequency, and concentration of operations. It

can be said that the Japanese longline CPUE in 2016 represents the change of SBT stock abundance in consistently as in previous years. The increase of Japanese total catch resulted largely from higher CPUE rather than from the expansion of time and area of operation or from increases in the number of operation.

15. The meeting agreed with the authors conclusions. In discussion it was noted that the size composition of the catch should be further studied for any impact on CPUE. For example it might indicate a concentration on particular size components of the stock. It was noted that changes in size composition should be of concern to the OMMP group. It was also thought that further work would be merited on the effects of vessel age on catchability since there seems to be increased turnover in the fleet composition.

16. In concluding Agenda 3, the CPUE modelling group agreed it was content to continue to endorse the Base CPUE series for use in assessment and OMMP work.

Agenda 4. To develop and encourage new work on CPUE series

Paper 7) Data exploration and CPUE standardisation for the Korean Southern bluefin tuna longline fishery (1996-2016) by Simon Hoyle, Sung Il Lee and Doo Nam Kim

17. This paper shows approaches to standardising southern bluefin tuna (SBT) CPUE from Korean tuna longline fisheries (1996-2016) using Generalised Linear Models (GLM) with operational data. It explores CPUE by area, and identified two separate areas in which Korean vessels have targeted SBT. SBT CPUE was standardised for each of these areas. Two alternative approaches were applied, data selection and cluster analysis, to address concerns about target change through time which can affect CPUE indices. Explanatory variables for the GLM analyses were year, month, vessel identifier, 5° cell, and number of hooks. GLM results for the whole area suggested that location, year, targeting, and month effects were the most important factors affecting the nominal CPUE. The standardised CPUEs for both areas decreased until the mid-2000s and have shown an increasing trend since that time.

18. The paper was presented by the lead author who focused on the cluster analysis approach to handling targeting issues. Three clusters of effort targeting were developed for areas 8 and 9. This identified a cluster which represented fairly pure SBT fishing. The different species clusters show different spatial and temporal distributions. Indices were prepared that show CPUE trends. The authors concluded that:

- Both areas show increasing standardised CPUE trends over the last 5 - 10 years;
- Relatively small sample sizes, few vessels and small area fished increase the variability of these series;
- Targeting and potential target change are important issues for these series;
- Both cluster analysis and data selection do a reasonable job and provide similar outcomes; and

- It would be interesting to compare the approach used in this paper with the approach to changing targeting used in the base model of Japanese LL CPUE data.

19. After the presentation there was discussion on the form of log normal model used this year compared to that used in last year's paper. The potential for using these series in the OMMP work was also considered. However, it was thought that currently there would be technical problems with including the Japanese and the Korean CPUE as separate series in the OMMP model. Thus for the moment its more likely use is as a new stock indicator and as a monitoring series. The paper was considered very useful both in providing independent series to compare with the Japanese CPUE and as an illustration of alternative approaches to CPUE analysis.

Paper 6) Preliminary analysis of CPUE standardisation for southern bluefin tuna caught by Taiwanese longline fishery for 2002-2016 by Sheng-Ping Wang, Shu-Ting Chang and Shiu-Ling Lin

20. In this paper, the patterns of catch compositions and CPUE distributions were explored based on the data of Taiwanese longline fleets operated in the waters of south of 20°S during 2002-2016. To select data from SBT fishing operations, cluster analysis (based the suggestions in the CCSBT ESC meeting in 2016) was performed based on the weekly-aggregated data instead of set-by-set data. For CPUE standardisations, the simple models without interactions were adopted to avoid the confounding from interactions. In addition, the models were run by areas separately.

21. The paper shows extensive plots of Catch Composition by area month and year to illustrate the distribution and complexity of the species mix of the Taiwan fishery. Cluster Analysis was used to define the part of the fishery most directed at SBT. This allowed CPUE trends to be standardised for two areas, a central-eastern area and a western area. The trends are rather difficult to interpret. In the western area the trend declines which is rather contradictory to other countries CPUE trend in this area. The trend in the central eastern area is rather variable. Given the younger age structure of the Taiwan catch compared to other Long Line fisheries we might hope that the Taiwan trends would show recruitment trends similar but perhaps lagged to those in the GAB aerial surveys. There seemed to be some correspondence between the SAPUE survey results and the Taiwan results in the Central eastern area but this is very tentative and needs more years to test. Clearly the Taiwan fishery is very mixed, is conducted at the Northern margin of the SBT distribution and has also evolved in its species targeting through time. This makes it a very difficult data series to interpret and the authors were congratulated on the progress they have made with this.

22. There was considerable discussion of this paper together with clarifications from the lead author. These were about issues such as the composition of other catch and the size structure of the Taiwan SBT catch and the extent it was likely to reflect recruitment given that the bulk of young SBT are in the GAB at the time of the Taiwan fishery occurs. It was thought that some comparative analyses of the different SBT fisheries would be useful. This might consider issues such as how

much each focuses on SBT, how best to handle by-catch issues, how much variance is explained.

23. In conclusion it was noted that:

- The new cluster analysis approach seems far more comprehensive;
- The trends in CPUE are very different in the W and SE Areas;
- The Central Eastern area trends seem somewhat like those of SAPUE when lagged a year but given the variability of both series it is difficult to tell at the current time;
- The Western Taiwan CPUE decreases which is unlike how we believe most of the stock to have behaved; and
- The Analysis gives us a very much clearer picture of how the Taiwan fishery operates. This is a very valuable addition to our knowledge of how this fishery operates. Such knowledge is a vital component of stock assessment.

Agenda 5. Any Other Business and Close Meeting

24. There was no other business for the meeting. The Chair said he felt it had been a useful and fruitful meeting and had made important decisions about the core series and seen two interesting papers on new series. The Chair thanked all the author and the participants for their contributions. The meeting closed at about 0100 BST.

Attachment 1

List of Participants
CCSBT CPUE Modeling Working Group Webinar on 14 June 2017

First name	Last name	Title	Position	Organisation	Postal address	Tel	Fax	Email
CHAIR								
John	POPE	Professor			The Old Rectory Burgh St Peter Norfolk, NR34 0BT	44 1502 677377	44 1502 677377	popeJG@aol.com
ADVISORY PANEL								
Ana	PARMA	Dr		Centro Nacional Patagonico	Pueto Madryn, Chubut Argentina	54 2965 451024	54 2965 451543	parma@cenpat.edu.ar
James	IANELLI	Dr		REFM Division, Alaska Fisheries Science Centre	7600 Sand Pt Way NE Seattle, WA 98115 USA	1 206 526 6510	1 206 526 6723	jim.ianelli@noaa.gov
MEMBER								
AUSTRALIA								
Fay	HELIODONIOTIS	Dr	Scientist	Australian Bureau of Agricultural and Resource Economics and Sciences	GPO Box 858, Canberra ACT 2601 Australia			Fay.Helidoniotis@agriculture.gov.au
Campbell	DAVIES	Dr	Senior Research Scientist	CSIRO Marine and Atmospheric Research	GPO Box 1538, Hobart, Tasmania 7001, Australia	61 2 6232 5044		Campbell.Davies@csiro.au
Rich	HILLARY	Dr	Senior Ecological Modeller	CSIRO Marine and Atmospheric Research	GPO Box 1538, Hobart, Tasmania 7001, Australia	61 3 6232 5452		Rich.Hillary@csiro.au
FISHING ENTITY OF TAIWAN								
Sheng-Ping	WANG	Dr	Professor	National Taiwan Ocean University	2 Pei-Ning Road, Keelung 20224, Taiwan	886 2 24622192 ext 5028	886 2 24636834	wsp@mail.ntou.edu.tw

First name	Last name	Title	Position	Organisation	Postal address	Tel	Fax	Email
JAPAN								
Tomoyuki	ITOH	Dr	Group Chief	National Research Institute of Far Seas Fisheries	5-7-1 Orido, Shimizu, Shizuoka 424-8633, Japan	81 54 336 6000	81 543 35 9642	itou@fra.affrc.go.jp
Norio	TAKAHASHI	Dr	Senior Scientist	National Research Institute of Far Seas Fisheries	2-12-4 Fukuura, Yokohama, Kanagawa 236-8648, Japan	81 45 788 7501	81 45 788 5004	norio@fra.affrc.go.jp
Hiroyuki	KUROTA	Dr	Senior Scientist	Seikai National Fisheries Research Institute	1551-8 Tairamachi, Nagasaki 851-2213, Japan	81 95 860 1600	81 95 850 7767	kurota@fra.affrc.go.jp
Osamu	SAKAI	Dr	Researcher	National Research Institute of Far Seas Fisheries	5-7-1 Orido, Shimizu, Shizuoka 424-8633, Japan	81 54 336 6000	81 543 35 9642	sakaios@fra.affrc.go.jp
Yuichi	TSUDA	Dr	Researcher	National Research Institute of Far Seas Fisheries	5-7-1 Orido, Shimizu, Shizuoka 424-8633, Japan	81 54 336 6000	81 543 35 9642	u1tsuda@fra.affrc.go.jp
Doug	BUTTERWORTH	Professor		Dept of Maths & Applied Maths, University of Cape Town	Rondebosch 7701, South Africa	27 21 650 2343	27 21 650 2334	Doug.Butterworth@uct.ac.za
NEW ZEALAND								
Kevin	SULLIVAN	Dr	Fisheries Stock Assessment Manager	Ministry for Primary Industries	PO Box 2526, Wellington, New Zealand	64 4 819 4264	N/A	Kevin.Sullivan@mpi.govt.nz
REPUBLIC OF KOREA								
Doo Nam	KIM	Dr.	Senior researcher	National Institute of Fisheries Science	216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083, Rep. of Korea	82 51 720 2330	82 51 720 2337	doonam@korea.kr
Sung Il	LEE	Dr.	Researcher	National Fisheries Research and Development Institute	210 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 617-705, Korea	82-51-720-2325	82-51-720-2337	k.sungillee@gmail.com
Simon	HOYLE	Dr	Fisheries Scientist	National Institute of Water and Atmospheric Research (NIWA)	217 Akersten Street, Port Nelson 7010, PO Box 893, Nelson, New Zealand	64 3 545 7883	N/A	simon.hoyle@gmail.com

First name	Last name	Title	Position	Organisation	Postal address	Tel	Fax	Email
CCSBT SECRETARIAT								
Robert	KENNEDY	Mr	Executive Secretary		PO Box 37, Deakin West ACT 2600 AUSTRALIA	61 2 6282 8396	61 2 6100 9461	rkennedy@ccsbt.org
Akira	SOMA	Mr	Deputy Executive Secretary					asoma@ccsbt.org
Colin	MILLAR	Mr	Database Manager					cmillar@ccsbt.org

Attachment 2

List of Documents

CCSBT CPUE Web Meeting - June 2017

(CCSBT-CPUE/1706/)

1. Provisional Agenda
2. List of Documents.
3. (CPUE Chair) June 2017 CPUE Web Meeting Presentation.
4. (Japan) Examination of influence of absence of data from New Zealand chartered Japanese longline vessels on the core vessel CPUE and proposal of its solution.
5. (Japan) A recommendation on the all vessels CPUE series considering loss of data from Japanese-flagged charter vessels in the New Zealand fishery.
6. (Taiwan) Preliminary analysis of CPUE standardization for southern bluefin tuna caught by Taiwanese longline fishery for 2002-2016.
7. (Korea) Data exploration and CPUE standardization for the Korean Southern bluefin tuna longline fishery (1996-2016).
8. (Japan) Update of the core vessel data and CPUE for southern bluefin tuna in 2017.
9. (Japan) Change in operation pattern of Japanese southern bluefin tuna longliners in the 2016 fishing season.