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Report of the Workshop on Operational Longline Data

WCPFC-SC11-2015/SA-IP-02

SPC-OFP[1]

[1] Secretariat of the Pacific Community-Oceanic Fisheries Programme

Report of the Workshop on Operational Longline Data

SPC Headquarters, Noumea, New Caledonia
4-10 February 2015

1. Opening of the Workshop

A workshop on operational longline data was held at SPC HQ, Noumea between Wednesday 4th and Tuesday 10th February 2015. The objectives of the workshop were to collate operational longline catch and effort data in preparation for the 2015 Pacific wide assessment of bigeye tuna and to discuss, and agree where possible, the analyses that will be undertaken. The workshop was a result of the agreements reached at SC10 (Annex 1).

The workshop was chaired by Dr John Hampton (SPC) and attended by scientists from China, Japan, Korea, Chinese Taipei, the USA as well as SPC and WCPFC. A list of participants is provided in Annex 2.

The draft agenda (Annex 3) was accepted with one addition to discuss the potential use of the submitted data for the 2015 albacore assessment in addition to the Pacific wide bigeye assessment – this was covered under "Other matters", but discussed early in the meeting to allow parties to discuss with headquarters as necessary.

Due to the confidential nature of the data and the limited number of scientists who had access to it, the workshop took the form of a series of plenary discussions interspersed by breaks during which specific analyses would be undertaken, the results of which would be reported back to the main group through a series of presentations. During these 'gaps' SPC proposed to provide a series of presentations and demonstrations to parties on the various data entry, management, and query products used by SPC and its members, additionally presentations on recent progress on E-reporting and E-monitoring were also made.

2. Review of data provision logistics and data security arrangements

Fabrice Bouye (SPC) provided an overview of the data security arrangements that had been implemented by SPC to ensure that the data were managed in strict accordance with the agreement, noting that the data were not distributed but were stored in a single location on a secure virtual machine and that only named individuals (as per the agreement) were able to access the data. Participants felt that the arrangements in place were appropriate for safe guarding the security of the data.

3. Review of data provided

Individual scientists provided brief, but informative presentations on key aspects of their fisheries and data holdings. Some of the highlights are described below.

Hung-I Liu (Chinese Taipei) provided a written and oral overview of the development of the Taiwanese longline distant water fishery, noting the development of specific fleet components over time and the extent to which those fleets have targeted yellowfin, bigeye or albacore. The data submitted do not explicitly identify the fleet component and it was suggested that the catch composition would be the best indicator of vessel category. It was also noted that the

coverage rate of logbooks is currently high but has been highly variable over time and that total catches have been determined from sales notes since catch records have not yet been verified for 100% of log books. It was noted that for a period set positions were only available at 5x5 degree resolution.

Xiaojie Dai (China) provided an overview of Chinese operational data noting that coverage is low compared to total reported effort. Whilst measures are in place to address the historical backlog of logbook records it is unlikely that further data will be made available in time for this assessment, but data coverage for bigeye targeting vessels was likely higher than for the albacore fleet.

In considering the presentations by the parties and data summaries assembled by SPC, the Parties noted that:

- The logsheet data collected by the US National marine Fisheries Service (NMFS) through the voluntary programme in Pago Pago are very valuable data for the early years of the fishery and that these data holdings include data that are not currently held by Japan or Korea for their flagged vessels;
- Logsheet coverage of annual fishing effort is very low in some years for many fleets, but has improved recently;
- There are different approaches that can be used to construct unique vessel identifiers and different data sets sometimes have different basis for these, e.g., call sign, vessel name, vessel registration details. Depending on the systems in place in countries, some of these may be more robust than others in tracking individual vessels over time; and
- Some potentially critical targeting factors such as hooks between floats and set start time are not available for all parties, and some have only been recently collected and not yet entered into databases. Consequently it will not be possible to include these formally in the analyses, but the available data will be used as an auxiliary piece of information to inform how the results from the clustering analysis are used (see Section 4).

A summary of reconciliation work and future data-related tasks is provided in Annex 4.

4. Preliminary analyses of integrated data

Proposed methods

SPC presented two broad approaches that would be considered for the analysis of the CPUE data. The first approach described was the 'standard' GLM approach and the second was based around spatial modelling. Both approaches could be informed by cluster analyses which aim to identify target species changes, but only the latter approach explicitly attempts to take into account the uneven sampling of fishing fleets in time and space in order to make predictions across the entire region.

The standard approach was similar to that applied in 2014 in the calculation of indices for the bigeye and yellowfin tuna assessments (WCPFC-SC11 –SA-IP-03), while an example of the application of the second approach is provided in the analysis of how range size changes with abundance (aka range contraction; WCPFC-SC11–MI-WP-06). It was recognised that the standard approach does not explicitly address the changing spatial distribution of fleets through time, but uses multiple fleets to try and address this through improving the spatial coverage.

In section 5 below further details on proposed modelling approaches is provided based on discussions during the workshop.

Proposed spatial structure

SPC informed Parties that after discussion with IATTC, and noting the need to have results which were comparable with the 2014 WCPO assessment, the spatial structure outlined in Figure 1 had been considered the best approach for the Pacific-wide analysis. SPC noted that it needed to place greater emphasis on allowing comparison with the WCPO assessment than finding the most appropriate structure for the EPO. SPC further noted that IATTC were considering alternative spatial structures for their own assessment that was being conducted this year, but that any decisions made by IATTC would not be able to be incorporated into the 2015 Pacific-wide assessment.

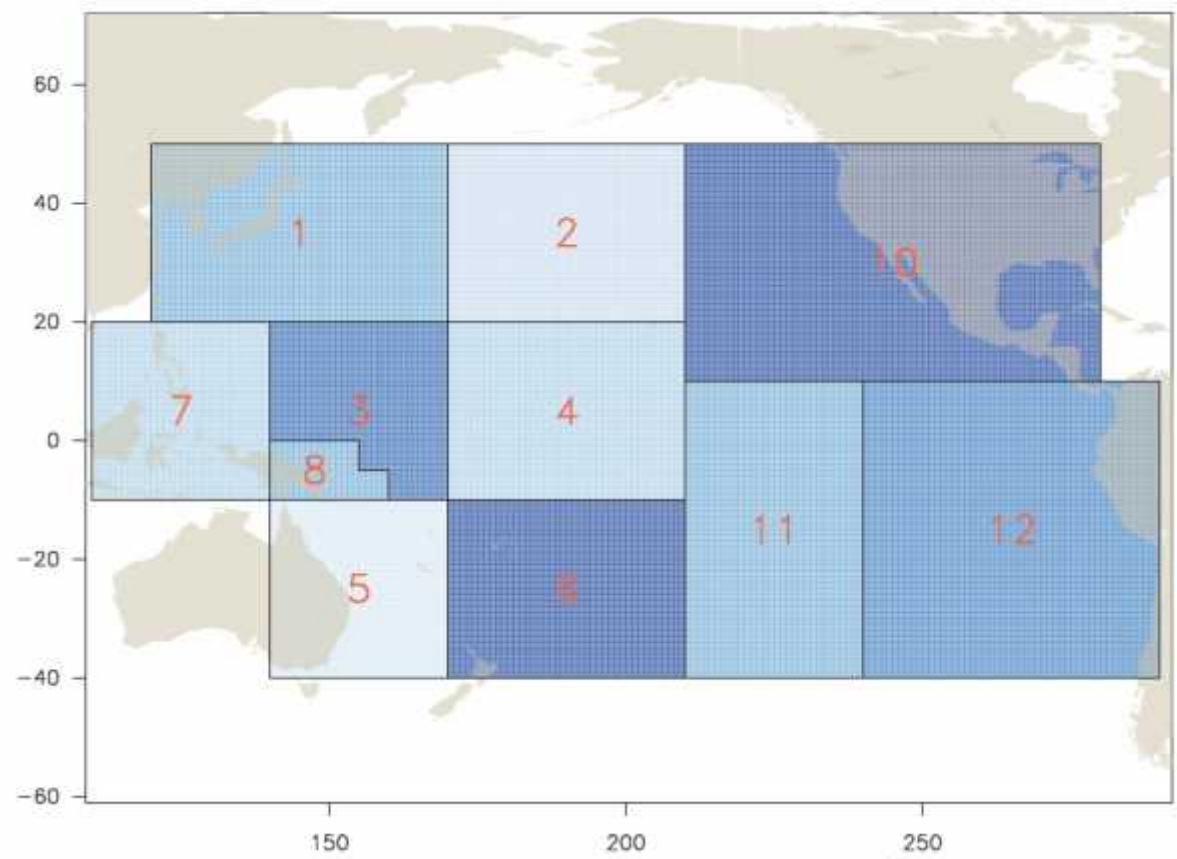

Figure 1: Proposed regions for the CPUE analyses. Note: the assessment will include a 9th region in the Coral Sea as was done for the 2014 WCPO assessment.

Preliminary analyses

In order to inform the Parties' discussions of best approaches to develop CPUE indices, SPC undertook numerous analyses during the workshop. These analyses included basic data descriptions, maps of catch, effort, and data availability in time and space. Clustering analyses were undertaken and some basic GLM models were also run. These analyses informed important data gaps and highlighted likely computational challenges.

Given the preliminary nature of the analyses and noting that they were also undertaken on incomplete data (before some of the reconciliation work was undertaken and without the inclusion of full SPC data holdings), it was agreed that detailed results of these analyses would **not** be reported in this report, rather the general conclusions that stemmed from them reported in the context of future proposed work (see Section 5).

Notwithstanding this, examples of the types of plots that would be used to describe the final analysis – from data characterisation through to filtering, clustering, and subsequent GLM analyses are provided in Annex 5.

General findings from the preliminary clustering analyses were:

- The computationally less intensive k-means clustering appeared to perform well and was stable when multiple analyses were undertaken on a particular data set;
- Clustering could be used both as a data filter, i.e., identify particular fleet components which would be excluded from subsequent GLM analyses (e.g., SWO targeting clusters), or as a categorical factor that could be explicitly included in the GLMs;
- Clusters that have strong spatial components might be able to be accounted for in models which include spatial explanatory variables (e.g., either 'cell effects' or latitude and longitude);
- Clusters with temporal trends (i.e., a shift from one cluster to another over time) should be carefully examined to determine whether they might reflect changes in targeting over time or changes in the abundance of one or more species;
- Given the species data available it could be difficult to separate swordfish and shark targeting activities (mostly occurring in the North Pacific); and
- Sometimes clusters comprising predominantly SWO or ALB might be identified with a two cluster model, but in other regions they might not be identified until the 3rd or 4th cluster and therefore it is not possible to have strict rules on the number of clusters to include. As an example one might go to four clusters to 'identify' a SWO target cluster to exclude from the analysis, but one might then combine two bigeye dominated clusters which may actually reflect temporal trends in abundance.

General findings from the preliminary GLM analyses were:

- Template Model Builder provides a much more 'memory efficient' platform for these analyses than R;
- The number of records and number of vessel effects in the GLMs are the most important determinants of computational requirements for these models. A 32GB machine hit maximum memory usage with some data sets unless considerable filtering of the data was made in terms of minimum cut-offs for fishery participation;
- Sensitivity to vessel filtering should be carefully examined where possible; and
- Computational problems can occur in the modelling if you have clusters with very different features not accounted for in the model structure, e.g., the proportions of sets with zero catch for the modelled species.

5. Plan for final analyses and SC11 papers

Discussions throughout the workshop identified several key tasks to be undertaken as well as important areas of analysis that should be considered. These are described below.

Creating final data sets

Two main outstanding tasks were required to create the final data set that would support the analysis 1) include the remaining Pago Pago data which was not included in most DWFN holdings[1]; and 2) include all remaining SPC data holdings for non-DWFN fleets. It was noted that these additions could result in different clustering results to those obtained during the preliminary analyses. Other data-related tasks are outlined in Annex 4.

[1] Only Chinese Taipei has undertaken a data reconciliation of their data and the NMFS data for Chinese Taipei. Therefore, the data provided for this work by Chinese Taipei incorporates all of the NMFS data.

Plots to produce

It was agreed that a series of standard plots be produced that would allow Parties and the SC to evaluate results and make decisions on the CPUE series (one or more) that should be considered in the assessment.

The table below roughly outlined the types of plots that Parties felt would be most useful and examples of some of these are presented in Annex 5 for region 4.

Analysis area	**Information to include**
Raw data	Hooks and sets by year and flag Maps of effort and catch (by decade, one degree resolution)
Data filtering	Reductions in sets, effort, vessels, and catch under different filtering thresholds Changes to the temporal and spatial coverage of the data (time series plot and a map)
Clustering	Deviance explained Stability in cluster membership (for vessels) Species composition Patterns in space and time Relationship to available HBF data
Indices	Nominal – including by cluster Standardised indices Step / influence plots Estimated spatial cell and other effects
Diagnostics	Standard regression model diagnostics including spatial/temporal residual patterns

What to do with missing vessel effects in early Japanese data

Noting the critical importance of vessel effects, both for the cluster analysis (done on a vessel / trip / month basis) and more generally accounting for targeting and/or efficiency changes, the absence of vessel effects from early (pre-1980) Japan data was a major concern. To address this issue three approaches were proposed:

- Calculate indices for the period from 1980 (i.e., ignore all early data);
- Exclude early Japanese data, but include early data for other fleets where it is available; and
- Consider an alternative clustering approach that does not depend on vessel or trip and apply this to the entire time series, e.g., 1x1 or 2x2 degree square and month could be the level of data aggregation for a clustering approach.

Towards the end of the workshop Japan noted that it might be possible to obtain vessel/month identifiers (but not the vessel identifier) for the early data. This could allow 'trip clustering' but not the inclusion of vessel effects. The potential value of this additional information could be assessed through comparing the results of models run for the post-1980 data as would be considered for the approach described in the third bullet point above.

Modelling approaches to be used

It was noted that the CPUE analyses presented in the meeting focused on the 'traditional' delta-lognormal GLM approach and the models presented had vessel effects and different treatment of clusters. Other approaches may be considered in the analysis of these data by the SPC to

derive indices for use in the Pacific-wide bigeye tuna assessment. Such alternative approaches could include:

- Models with cluster, but no vessel effects – including potential approaches where the data are aggregated (e.g., 1x1 and month and cluster);
- Temporal clusters which are linked (e.g., identifying different temporal bigeye clusters in regions such as 3 and 7 where temporal shifts in cluster membership are observed);
- Spatial approaches using GAMs and other spatial smoothing techniques (e.g., Shelton et al. 2014 – CJFAS 71:1655-1666; Thorston et al. 2015 – ICES J. Mar. Sci. doi: 10.1903/icesjms/fsu243); and
- Incorporation of oceanographic variables with careful attention paid to factors that may impact catchability versus those that might instead be related to habitat quality (and therefore local abundance). Thermocline depth was considered the highest priority for consideration. Work undertaken in the Atlantic Ocean should be reviewed for relevance.

Papers for SC11.

- The Parties agreed that two documents would be produced for SC11 from this collaboration:
    - An Information Paper describing the workshop; and
    - A Working Paper that describes the detailed analysis supporting the indices produced for the Pacific-wide bigeye tuna assessment.

Proposed working arrangements

- The Parties agreed that SPC should aim to circulate the report of this workshop by Friday 20th February and allow one week for comments. Once finalized it would be provided to WCPFC and the SC Chair with a preference that it be posted on the SC11 website;
- A project update be circulated to members during the first week of May; and
- A final report for comment and approval will be circulated in mid-June to give sufficient time for this document to be submitted for the mid-July SC submission deadline.

6. Other matters

IATTC involvement

- Many parties strongly expressed the need for IATTC to be involved in the Pacific-wide bigeye tuna assessment and meetings such as this;
- SPC indicated that discussions between SPC and IATTC on this topic had occurred in late 2014 and other meetings would occur where possible and that unfortunately due to unforseen circumstances IATTC was unable to attend the current workshop;
- SPC further informed parties that WCPFC removed funding from the budget that would have provided financial support for the collaboration with IATTC, i.e., provide travel support; and
- SPC and the WCPFC Secretariat considered that those parties who were IATTC members were best placed to express the importance of IATTC involvement in the assessment.

Availability of these data for support of the SP-ALB assessment

- There was agreement in principle from all but one of the parties on the use of the data provided for this analysis (which includes data on albacore tuna) to support the upcoming South Pacific albacore tuna stock assessment. The agreed text from this discussion is provided in Annex 6; and
- SPC indicated that having to remove data for one of the parties for the albacore analysis would require duplication of data characterisation, grooming, and clustering efforts; and

- SPC further informed parties that as part of the Pacific-wide bigeye tuna analyses SP-albacore tuna CPUE indices would be produced – this was critical to the consideration of how targeting was being accounted for.

Availability of these data for inclusion in a WCPO bigeye model

- The Parties agreed that including the CPUE indices from this collaboration in a single run of the 2014 WCPO assessment model to allow comparison with the PW assessment was consistent with the spirit of the agreement between parties.

Future data use

- The Parties noted that the data provided for the collaboration are scheduled to be deleted from the SPC system at the conclusion of SC11 scheduled for August 2015; and
- The Parties agreed that given the considerable work in assembling this integrated data set, that this decision could be revisited at SC11 considering factors such as the schedule of assessments for 2016.

Publicity for the workshop

- Dr Hampton indicated to Parties the media interest in this workshop and sought their views on whether SPC should give an interview to a regional media group highlighting the positive nature of this workshop; and
- The Parties agreed that a media interview highlighting the positive aspects of this workshop would be useful and Dr Hampton indicated that Dr Harley would do this and provide details of the interview to the parties[2];

7. Close of the meeting

Dr John Hampton thanked participants for what was agreed was a productive and exciting meeting. He specifically highlighted the great progress made on reconciling various data holdings and the hard work undertaken in the evenings and weekend by Dr Sam McKechnie and Laura Tremblay-Boyer that ensured the workshop was able to make the most of its time.

[2] The transcript can be found at "Decades worth of data to predict Pacific's fish stocks" http://www.radioaustralia.net.au/international/radio/program/pacific-beat/decades-worth-of-data-to-predict-pacifics-fish-stocks/1414533 "

Annex 1: Agreement amongst the Parties

Attachment F

The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

Scientific Committee
Tenth Regular Session

Majuro, Republic of the Marshall Islands
6–14 August 2014

REPORT TEXT CONCERNING COMMITMENTS TO SUPPORT THE PACIFIC-WIDE BIGEYE ASSESSMENT WITH PROVISION OF OPERATIONAL-LEVEL DATA

Representatives from Japan, Korea, Chinese Taipei and SPC (and subsequently China and United States) discussed outside the meeting the assembly and collaborative analysis of operational-level longline data for the 2015 Pacific-wide bigeye assessment, and agreed that the following process would be the most effective and efficient way forward.

1. Korea and SPC will consult to reconcile their respective operational-level data holdings, with a view to the creation of a common data set for this fleet that includes all available data. (Japan hold all available data for their fleet, and this task was largely completed with Chinese Taipei in 2014, so this reconciliation is not required for Japan or Chinese Taipei.) These consultations will take place initially electronically, with follow-up as required at SPC headquarters in Noumea, New Caledonia at a mutually convenient time to be decided.

2. China, Japan, Korea, Chinese Taipei, United States and SPC (hereafter referred to as the Parties) shall agree on a format for operational-level data to be provided and integrated into a common data set for subsequent collaborative analysis. The format shall include, *inter alia*:
    a. Set-by-set data for individual vessels, with vessel identity protected by a vessel code applied consistently through the time series;
    b. Effort in number of hooks;
    c. Hooks between floats (where available);
    d. Catch in number of bigeye, yellowfin, albacore tuna and swordfish;
    e. Date of set;
    f. Start time of set in local time (where available);
    g. Position specified to the nearest 1 degree square.

3. The scope of the data will be 1952 – 2013, and for the entire Pacific Ocean.

4. A data preparation and analysis workshop will be held at SPC headquarters involving the Parties at a time to be decided, but as early as possible in 2015. The objectives of the workshop will be to review the operational-level longline data held by the Parties and to make provisional analyses of CPUE standardization for the Pan-Pacific bigeye stock assessment, which will be conducted in 2015. The data prepared in the agreed format shall be integrated into a single data set which will be used for exploratory analyses of the data and preliminary estimation of standardized CPUE indices.

5. For the purpose of collaboration on tuna research, SPC can exceptionally use data under the following conditions. Each Party may monitor the analysis.
   i. SPC shall maintain the data in a secure fashion. The security arrangements include the following:
      - The data shall be held in a secure server location that is accessible via login credentials only to the SPC staff who are directly involved in the analysis. These staff are:
        - Dr John Hampton, Chief Scientist & Deputy Director FAME (Oceanic Fisheries Programme)
        - Dr Shelton Harley, Principal Fisheries Scientist, OFP
        - Mr Peter Williams, Principal Fisheries Scientist, OFP
        - Dr Sam McKechnie, Fisheries Scientist, OFP
        - Dr Laura Tremblay-Boyer, Fisheries Scientist, OFP
        - Mr Fabrice Bouyé, Fisheries IT Specialist, OFP
        - Emmanuel Schneiter, Fisheries IT Specialist, OFP
      - Once finalised, one single backup copy of the data will be made to another identically-restricted server location. The purpose of this backup copy is limited to allow the data to be restored in the event of data loss or corruption (e.g. through computer hardware failure).
      - Apart from this single backup, the data shall not be copied or backed up to any other server location or to any portable file storage media.
      - The data shall not be disseminated or uploaded to any internet or email address.
      - All SPC staff have strict contractual obligations in their terms of employment to maintain the confidentiality of information. Severe disciplinary action shall be taken for any breaches of these contractual obligations.
   ii. The usage of the data is strictly limited to the collaborative work for the purpose of the 2015 Pacific-wide bigeye assessment.
   iii. Access to and use of the data is strictly limited to the SPC scientists named above.
   iv. The data can be used only until the end of SC11. All data, including intermediate products which can restore the data, shall be deleted by the end of the last day of SC11, unless agree otherwise by the Parties.
   v. Any report or presentation that documents the results of this collaborative work shall be provided to the Fishery Agency of each Party prior to release, allowing reasonable time for comments.

6. Other countries may be invited to join this collaboration, as appropriate, with the agreement of the Parties.

Annex 2: Meeting participants

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Annex 3: Agenda

WORKSHOP ON OPERATIONAL LONGLINE DATA

SPC Headquarters, Noumea, New Caledonia

4-10 February, 2015

Draft Agenda

1. Preliminaries
    - Introductions and opening remarks
    - Meeting arrangements
    - Report
2. Review of logistics of data provision and internal data security arrangements
3. Review of data provided, by country. The meeting will review the characteristics of the data provided, including:
    - An overview of key characteristics of the fishery and changes over time (short presentation by the country)
    - Data fields provided
    - Overall coverage of operational data
    - Time and spatial coverage
4. Preliminary analysis of integrated data
    - Proposed methods
    - Preliminary results
        - After a presentation of preliminary results, modified analyses suggested by workshop participants will be undertaken and reviewed during the workshop[3]
5. Plan for final analyses and SC11 papers[4]
6. Workshop report
7. Other matters
    - Arrangements for potential future submissions of operational data

[3] The extent of analysis available for the meeting will depend on the timing of data submission and completeness of the data. We expect to have 'gaps' in the meeting when analysts go away to undertake analyses, but please note that some of the analyses may take many hours and have to be run over night.
[4] This will include discussion of the process to get clearance of the final SC11 papers by all participants.

Annex 4: Summary of decisions and recommendations related to the consolidation of available data

The following table summarises the data the main components of operational data that were consolidated prior to the workshop held in early February 2015.

Country / Data	JAPAN	CHINA	USA	TAIWAN	KOREA	OTHERS
Overal year range	**1952-2013**	**2008-2012**	**1991-2013**	**1964-2013**	**1971-2013**	**1963-2013**
Fleets	DW/OS/CS/Unknown		HW/AS	DW	DW	Excludes JP, CN [2008-2012 outside PICs Area], USA (HW/AS), TW-DW, KR
Vessel IDs	1979-2013	All	All	All	All	All
Effort (hooks)	All	All	All	All	All	All
HBF	1959-1966 / 1971-2013	All	1995-2013	1995-2013	All	1978-2013 (gaps for some fleets)
Date	All	All	All	All	All	All
Set Start Time	Not provided	Not provided	All	Not provided	Not provided	1978-2013 (gaps for some fleets)
Positions	All	All	All	All	All	All
ALB	All	All	All	All	All	All
BET	All	All	All	All	All	All
YFT	All	All	All	All	All	All
SWO	All	All	All	All	All	All

Operational data consolidation – updates from workshop

The following list summarises the decisions made to alter the consolidation of operational data based on decisions made through a review of the data during the workshop.

I. For the 1960s, the **Japanese operational data** provided in the south Pacific area bounded by 5°S-35°S and 180°-130°W were clearly lower coverage than the data collected through the US National Marine Fisheries Service (NMFS) for Japanese-flagged vessels operating out of Pago Pago, American Samoa (see FIGURE 1). In the short term for the CPUE standardisation work, the decision was made to substitute the Japanese data for this period/area with the NMFS data (until such time as Japan liaises with NMFS to receive the NMFS Japanese operational data and incorporates these data into their original operational datasets through a trip-by-trip reconciliation). The initial reconciliation work would review the data at the annual level to determine where substitution or simply addition of NMFS data is undertaken.

II. There were no data provided by Korea for the 1960s and the coverage of the **Korean operational data** provided for the 1970s are clearly lower than the coverage of operational data collected through NMFS for Korean-flagged vessels operating out of Pago Pago, American Samoa (see FIGURES 2 and 3). The NMFS KR LL data have therefore been used for the 1960s and, in the short term, the decision was made to substitute the entire Korean operational data for 1970s with the NMFS 1970s data (until such time as Korea liaises with US/NMFS to receive the NMFS Korean data and incorporate these data into their original operational datasets). The initial reconciliation work would review the data at the annual level to determine where substitution or simply addition of NMFS data is undertaken.

Future improvements in operational data

The following list highlights the potential areas for improving each of the operational data sets so that any future collaborative work of a similar nature will benefit from the best available consolidated operational data.

I. **Korea** to formally request the provision of the historical NMFS operational data for their fleet so they can reconcile and improve the coverage of their operational data. Korea should check if they have any trips in their operational data for vessels based out of Pago Pago American Samoa (if there are no Pago data in the Korea operational data, then the NMFS data can simply be added).

II. **Japan** to formally request the provision of the historical NMFS operational data for their fleet so they can reconcile and improve the coverage of their operational data.

III. **Chinese Taipei** to work with SPC (when time permits) to continue their data reconciliation and exchange for the Chinese Taipei small-tuna longline fleet (STLL). Initial work should focus on producing a consolidated dataset for this fleet covering 2010-2014, and then considering whether it is possible to rescue any operational logbook data for the domestically-based fleet for years prior to this.

IV. **China** to attempt to process the backlog of their operational longline logbook data and (if/when time permits) consider data reconciliation with China longline operational data held by SPC.

V. **Japan** to consider the 'data rescue' work involved in processing and generating the missing **Vessel ID** information in their operational data prior to 1979, since the **Vessel ID** has been provided in all other operational data, it is important in the cluster analyses and, more generally, is useful for accounting for targeting. This work should take priority over the rescue of "set start time" data and may best be undertaken on a year-by-year basis.

VI. **Japan, China, Korea and Chinese Taipei** to consider the 'data rescue' work involved to process '**Set Start time**' data that was recorded on logbooks but not entered/extracted nor otherwise available for this study. Where data exist but were simply not extracted, the provision of these data is requested as soon as possible.

VII. **SPC** to investigate the missing "**Hook between Float**" information in the data for some PIC fleets.

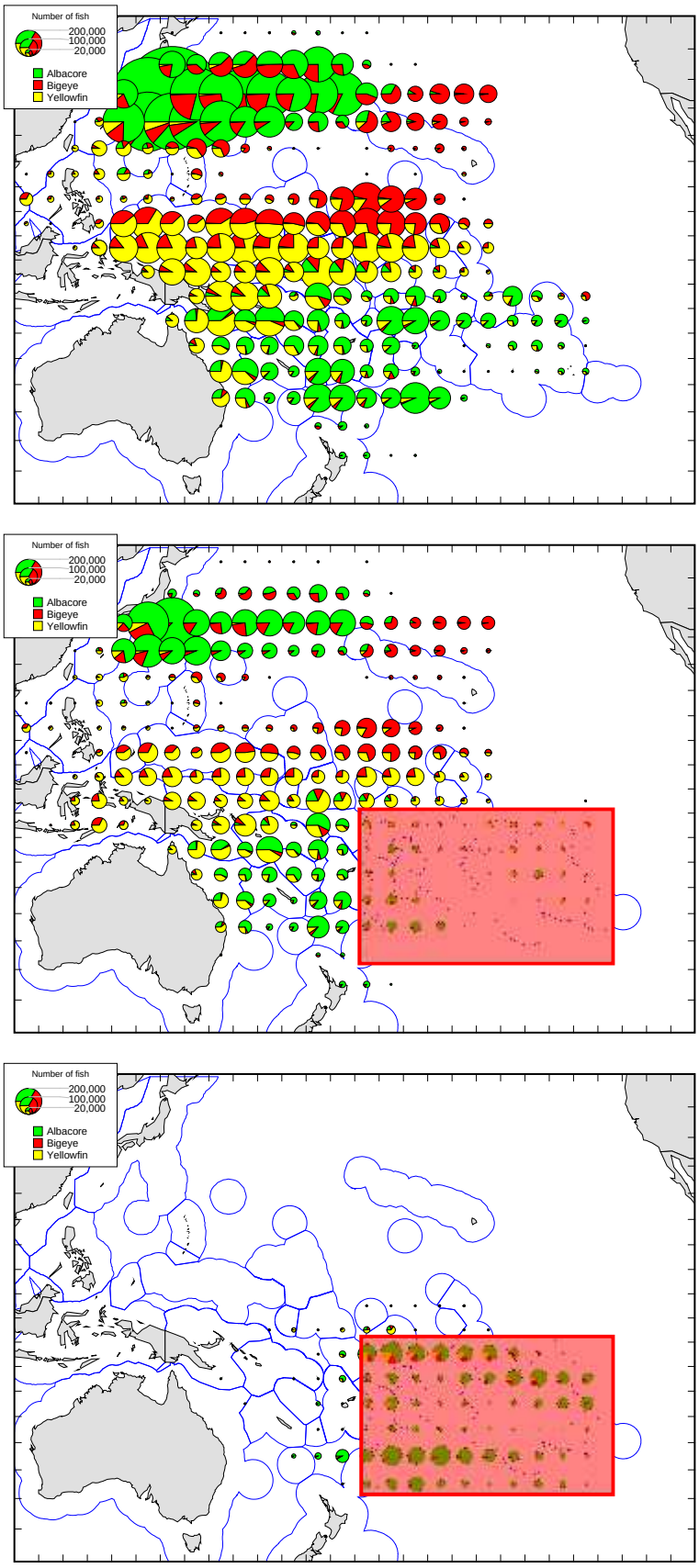

FIGURE 1. JAPAN LONGLINE – **1960s** (1) Aggregate raised data, (2) Operational data provided by Japan, (3) NMFS Operational data for Japan fleet

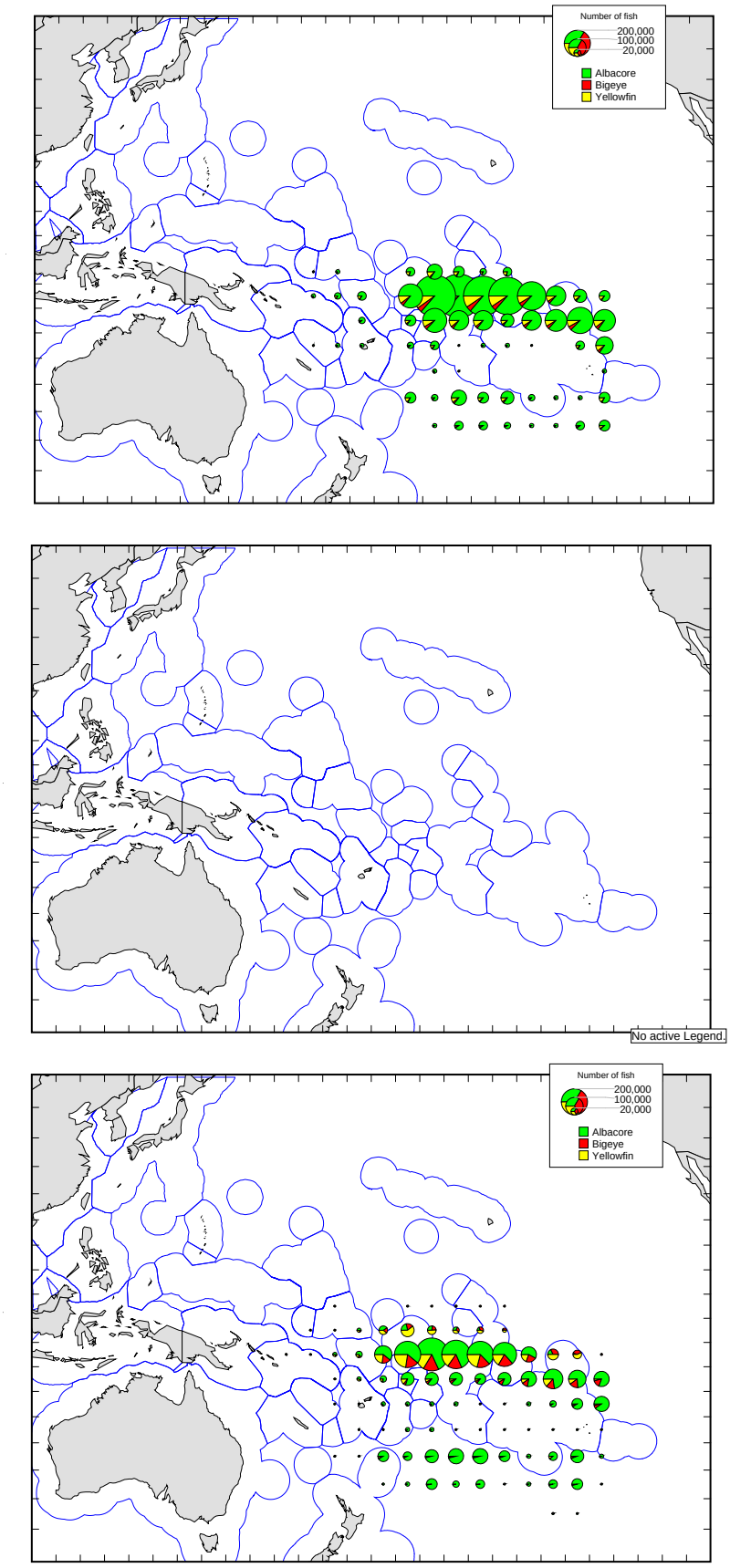

FIGURE 2. KOREA LONGLINE – **1960s** (1) Aggregate raised data, (2) [No operational data provided by Korea for the 1960s], (3) NMFS Operational data for Korean fleet

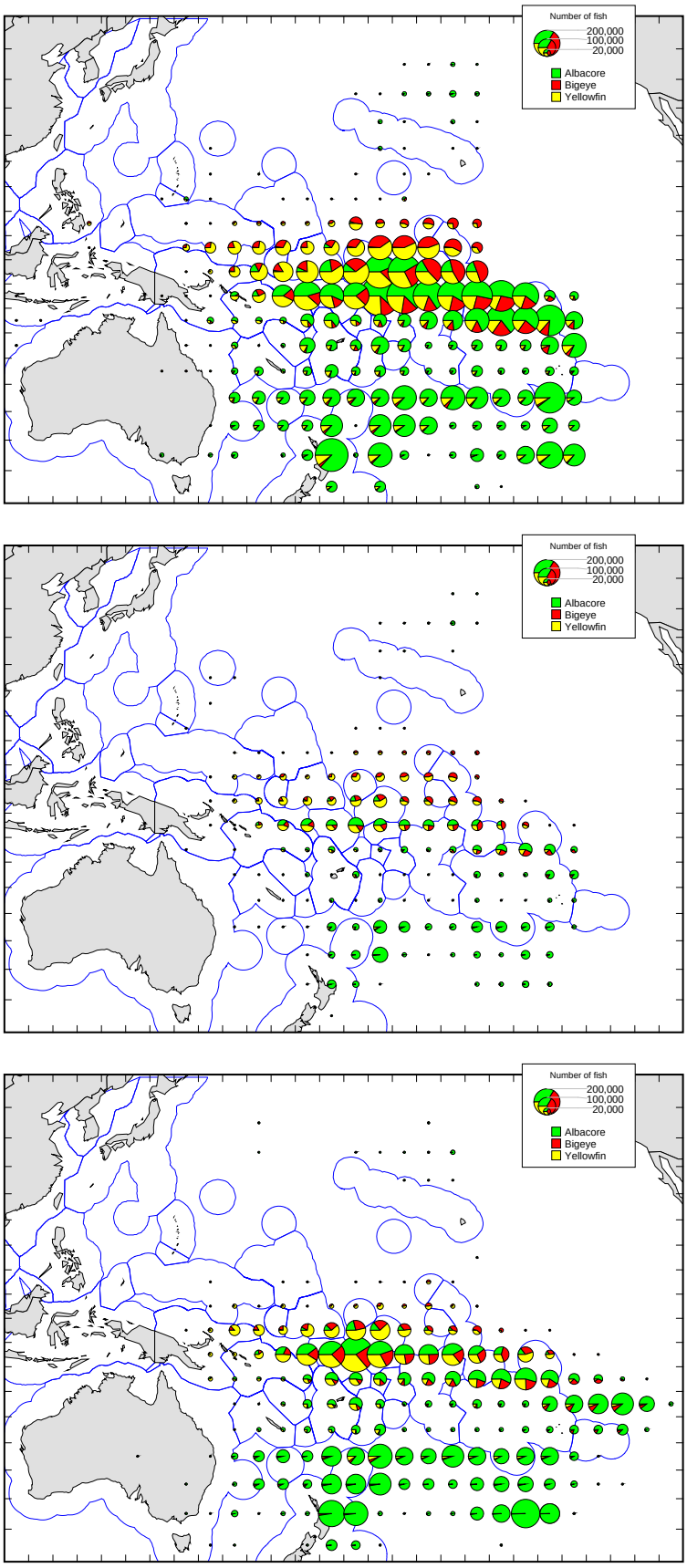

FIGURE 3. KOREA LONGLINE – **1970s** (1) Aggregate raised data, (2) Operational data provided by Korea, (3) NMFS Operational data for Korean fleet

Annex 5: Examples of the types of tables and figures that will be used to describe the analyses undertaken

Table A5.1: Example of how the models run in each region will be described.

Region	Clusters	Models (run from 1980 to overcome JPN vessel issue)	Comments
1	4	1. All data with vessel effects and no clustering; 2. All data with vessel effects and clustering; 3. As in 1, but remove SWO cluster; 4. As in 2, but remove SWO cluster.	Consider special treatment of the YFT cluster?
2	3	1. All data with vessel effects and no clustering; 2. All data with vessel effects and clustering; 2a. As in 2 but TW removed; 3. As in 1, but remove SWO cluster; 4. As in 2, but remove SWO cluster.	How to treat US sets in the ALB cluster?
3	3	1. All data with vessel effects and no clustering; 2. All data with vessel effects and clustering; 3. As in 1, but remove ALB cluster (preferred model?); 4. As in 2, but remove ALB cluster.	
4	3	1. All data with vessel effects and no clustering; 2. All data with vessel effects and clustering; 3. As in 1, but remove ALB cluster (preferred model?); 4. As in 2, but remove ALB cluster.	Same as region 3
5			
6			
7	3	1. All data with vessel effects and no clustering; 2. All data with vessel effects and clustering; 3. As in 1, but remove ALB cluster (preferred model?); 4. As in 2, but remove ALB cluster.	Same as region 3
8			
9			
10	4	1. All data with vessel effects and no clustering; 2. All data with vessel effects and clustering; 3. As in 1, but remove SWO cluster; 4. As in 2, but remove SWO cluster.	Consider special treatment of the YFT cluster? Same as region 1 If we remove YFT cluster as well then might as well just

			go back to three clusters! US should be in either BET or SWO, but not ALB
11	2	1. All data with vessel effects and no clustering; 2. All data with vessel effects and clustering; 3. As in 1, but remove ALB cluster (preferred model?);	
12	3	1. All data with vessel effects and no clustering; 2. All data with vessel effects and clustering; 3. As in 1, but remove ALB cluster (preferred model?); 4. As in 2, but remove ALB cluster.	Same as region 3

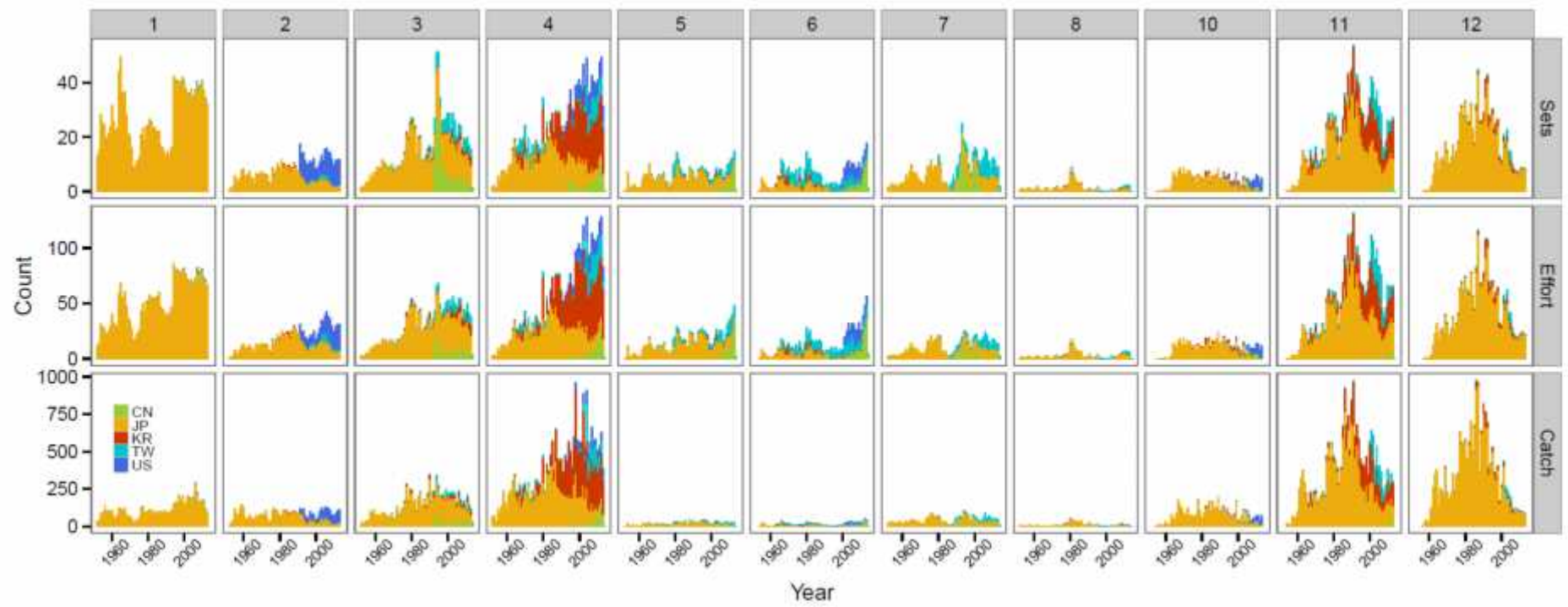

Figure A5.1: Example of how overall data coverage by fleet and time will be displayed.

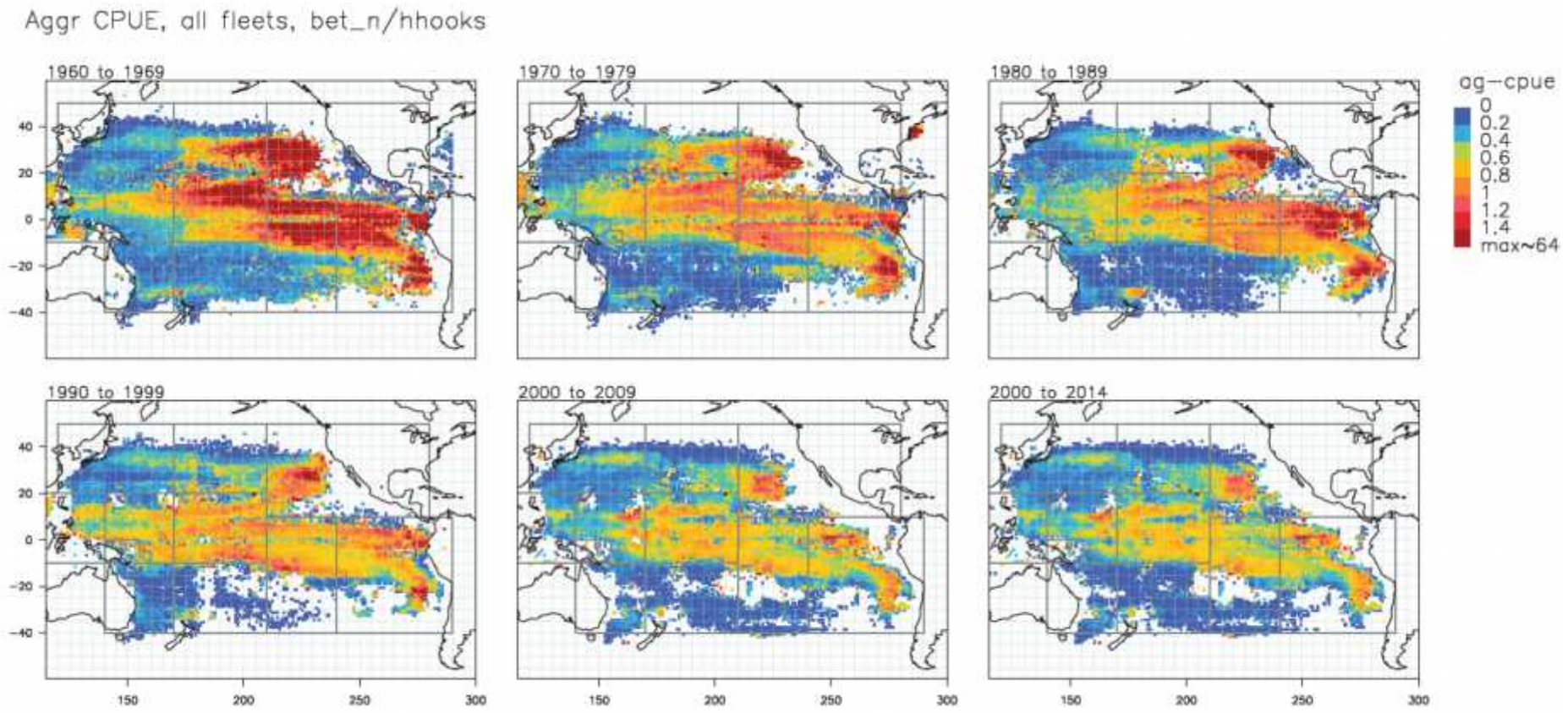

Figure A5.2: Example of a decadal plot of bigeye CPUE.

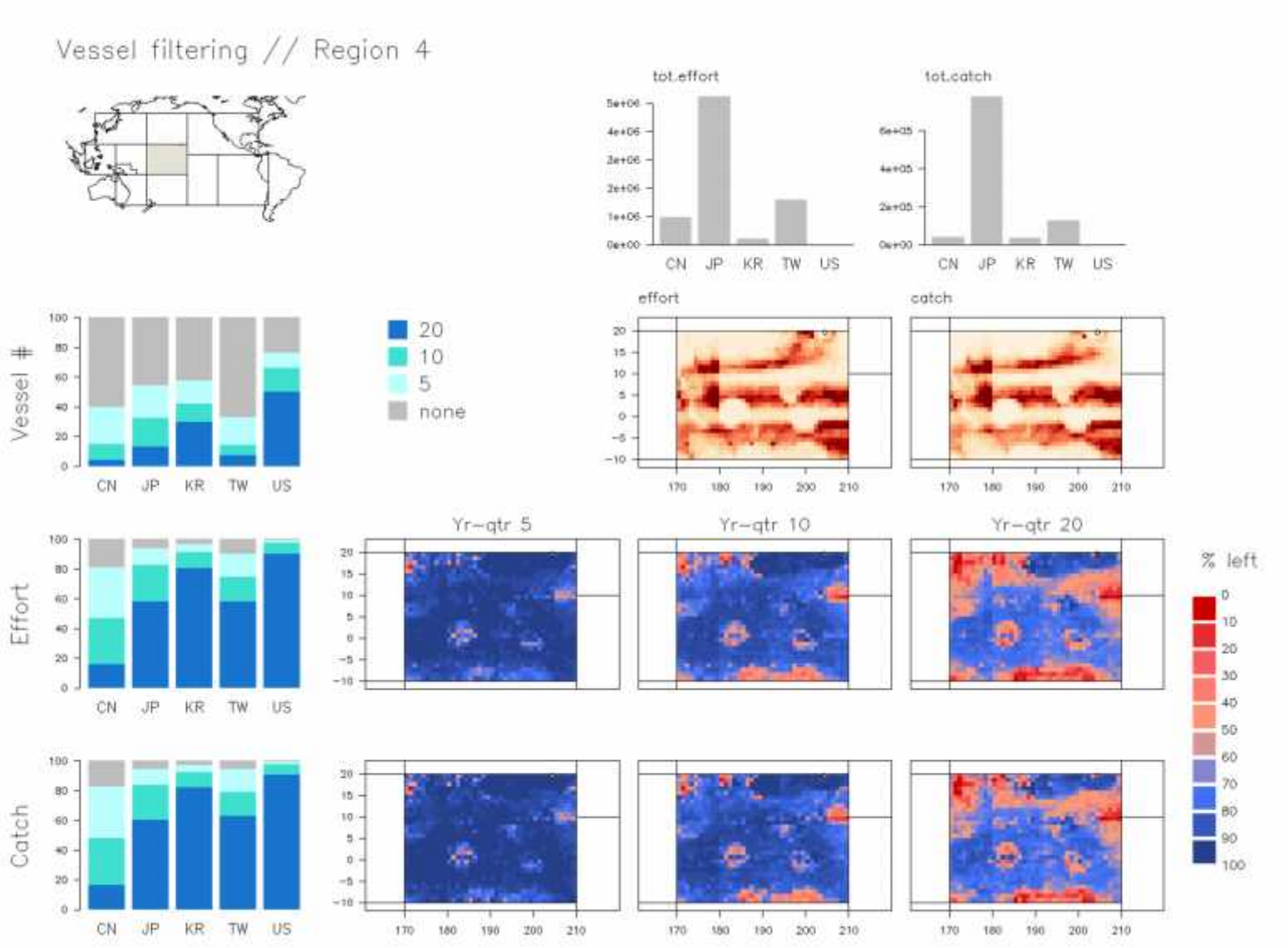

Figure A5.2: Example of a panel plot used to demonstrate how different vessel filtering rules impact on data coverage by fleet and in space.

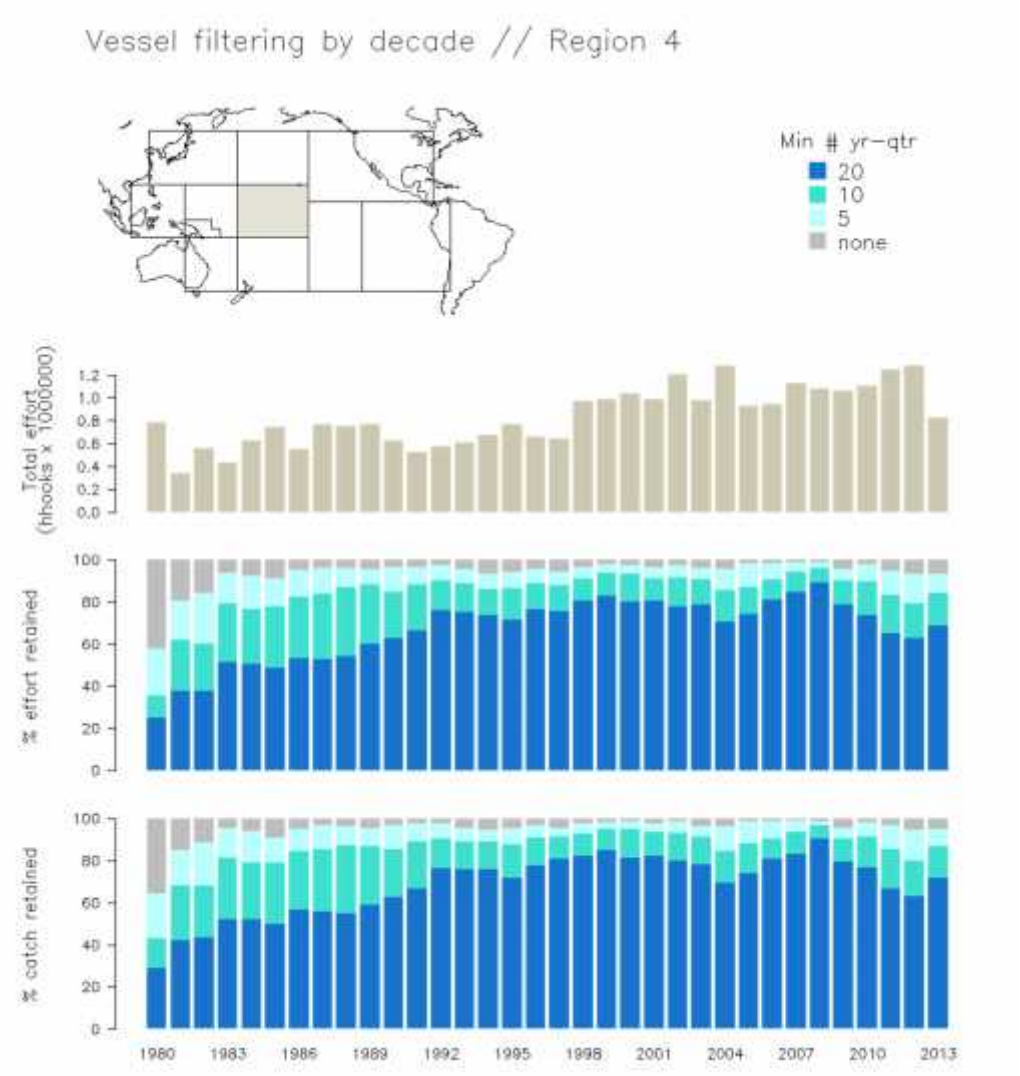

Figure A5.3: Example of a panel plot used to demonstrate how different vessel filtering rules impact on data through time.

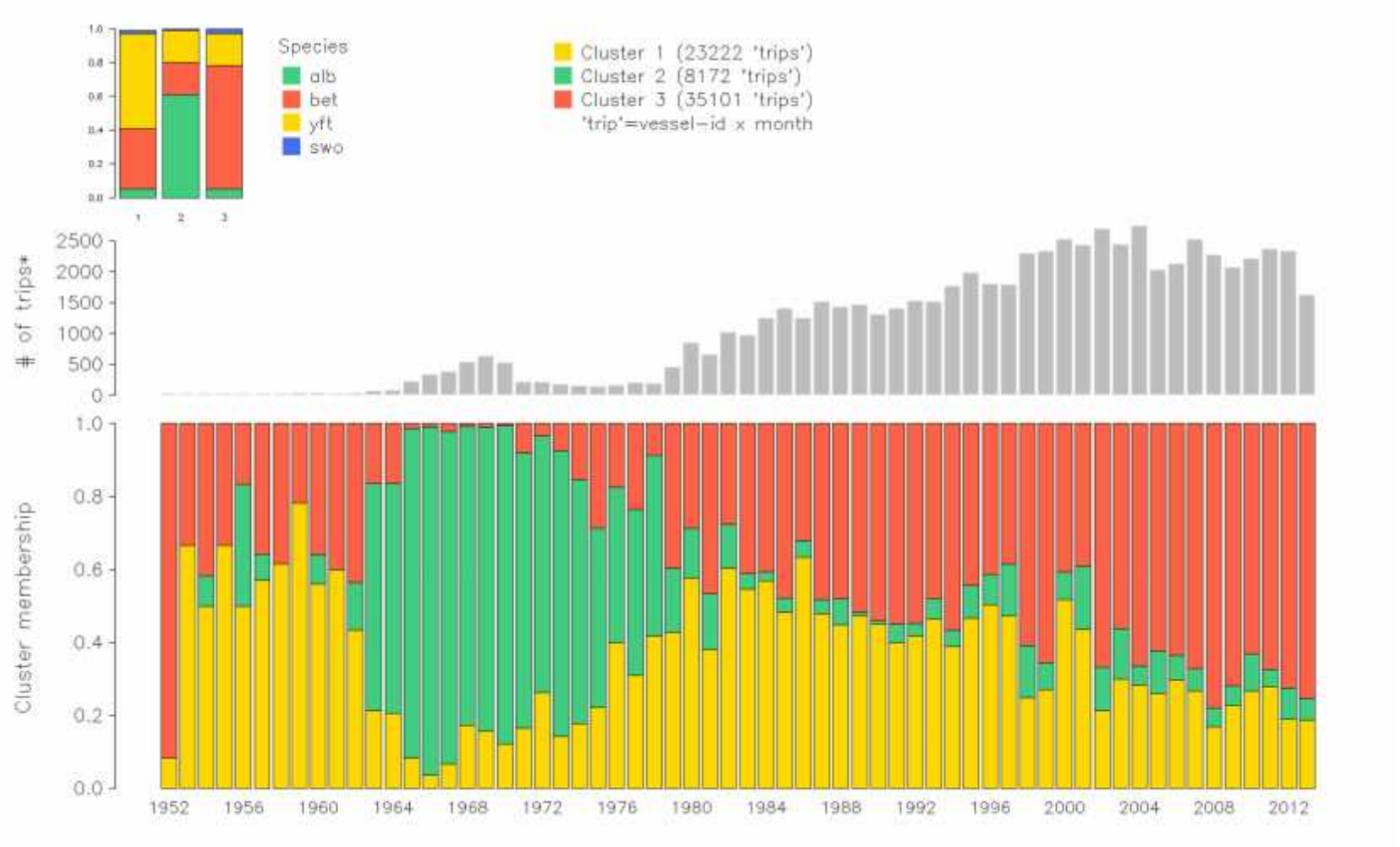

Figure A5.4: Example of a panel plot used to demonstrate the results of a clustering analysis.

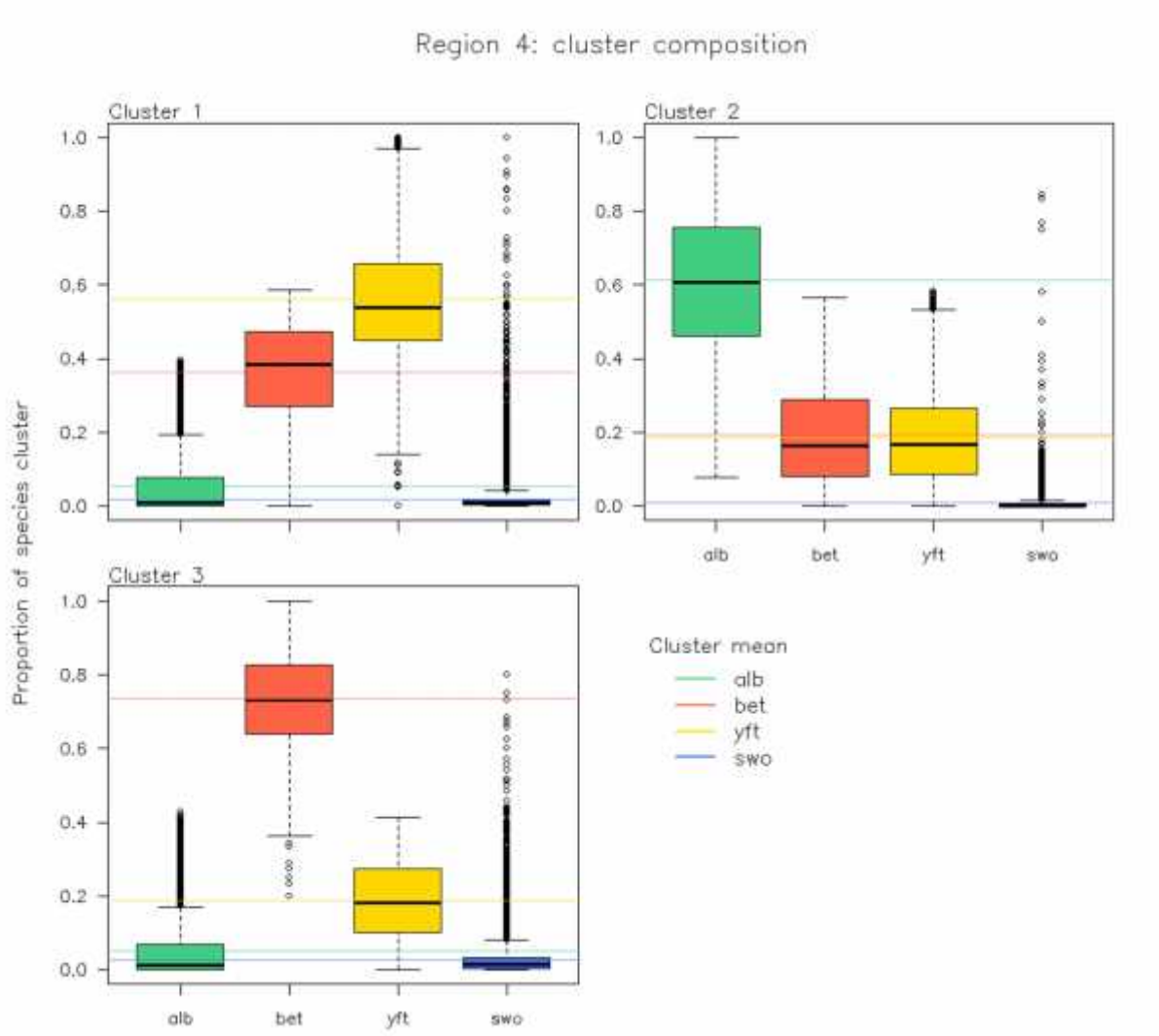

Figure A5.5: Example of a panel plot used to demonstrate the variation in catch composition within clusters.

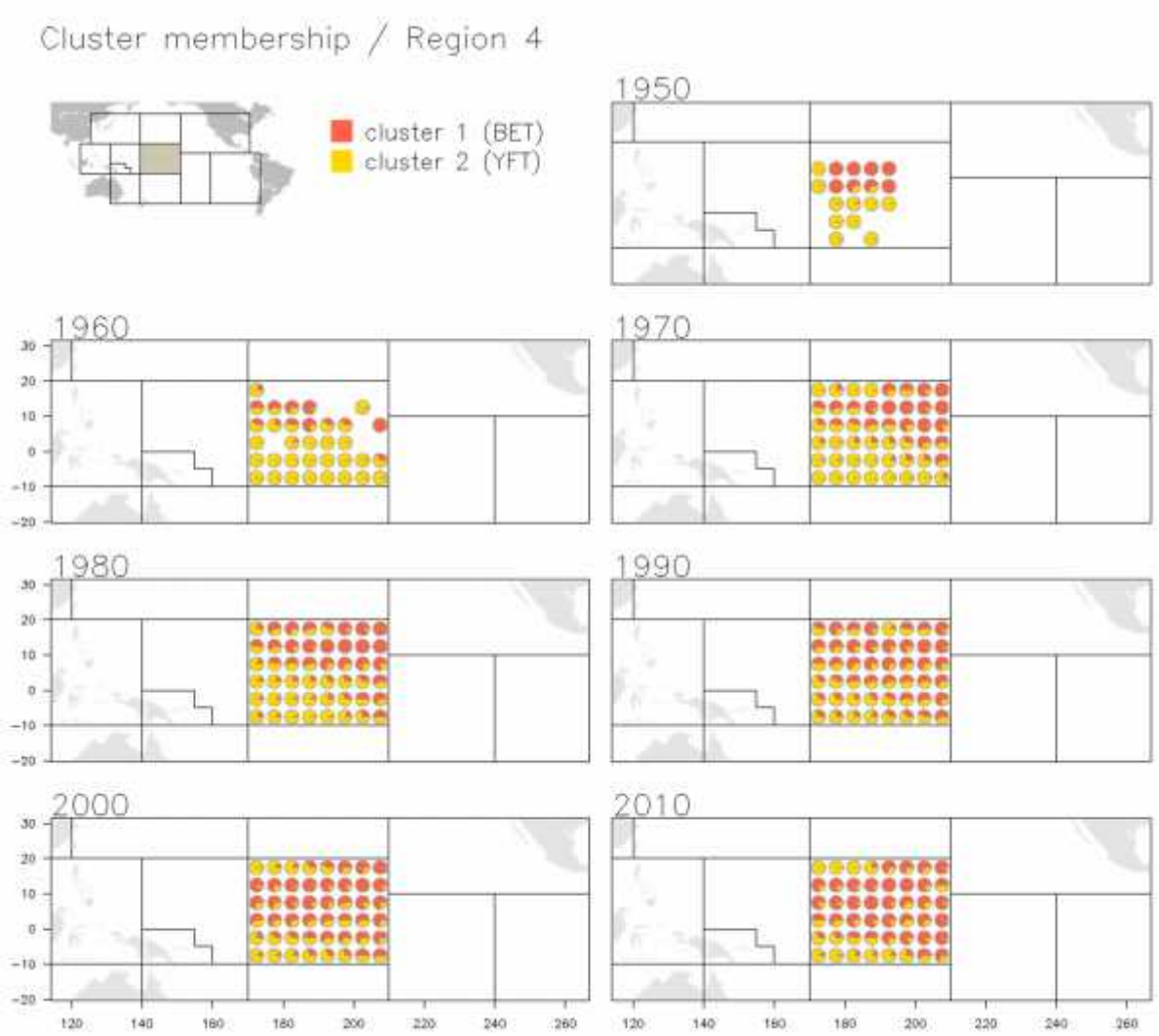

Figure A5.6: Example of a panel plot used to demonstrate the spatial / temporal distribution of clusters.

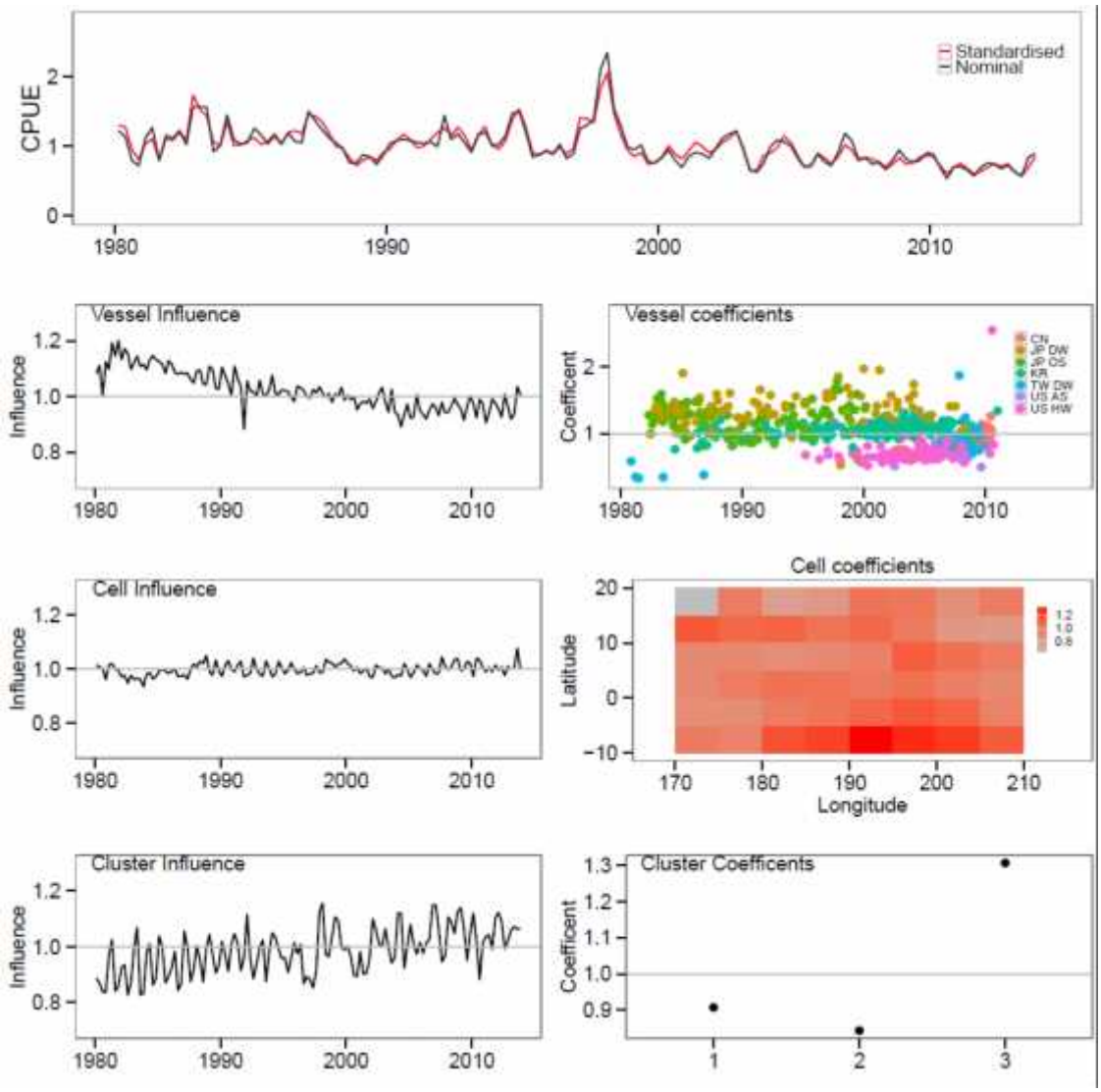

Figure A5.7: Example of a panel plot used to present the results of a CPUE standardisation including an evaluation of the influence of different factors included in the model.

Annex 6: Agreement on the use of data to support the South Pacific albacore tuna assessment

The meeting considered a request from SPC that the operational data that has been provided be also available for use in the South Pacific albacore stock assessment, which is being conducted by SPC for WCPFC in 2015. The use of the data for this purpose would involve the estimation of standardised CPUE indices using methods discussed at this workshop for Pacific-wide bigeye, and the incorporation of those indices into the MULTIFAN-CL model to be developed for the South Pacific albacore assessment.

China, Korea, Chinese Taipei and the United States participants agreed to this request, under the following conditions, which are identical to those agreed in respect of the Pacific-wide bigeye assessment:

i. SPC shall maintain the data in a secure fashion. The security arrangements include the following:
   - The data shall be held in a secure server location that is accessible via login credentials only to the SPC staff who are directly involved in the analysis. These staff are:
     - Dr John Hampton, Chief Scientist & Deputy Director FAME (Oceanic Fisheries Programme)
     - Dr Shelton Harley, Principal Fisheries Scientist, OFP
     - Mr Peter Williams, Principal Fisheries Scientist, OFP
     - Dr Sam McKechnie, Fisheries Scientist, OFP
     - Dr Laura Tremblay-Boyer, Fisheries Scientist, OFP
     - Mr Fabrice Bouyé, Fisheries IT Specialist, OFP
     - Emmanuel Schneiter, Fisheries IT Specialist, OFP
   - Once finalised, one single backup copy of the data will be made to another identically-restricted server location. The purpose of this backup copy is limited to allow the data to be restored in the event of data loss or corruption (e.g. through computer hardware failure).
   - Apart from this single backup, the data shall not be copied or backed up to any other server location or to any portable file storage media.
   - The data shall not be disseminated or uploaded to any internet or email address.
   - All SPC staff have strict contractual obligations in their terms of employment to maintain the confidentiality of information. Severe disciplinary action shall be taken for any breaches of these contractual obligations.

ii. The extended usage of the data is strictly limited to the estimation of standardised CPUE indices for use in the 2015 South Pacific albacore assessment.

iii. Access to and use of the data is strictly limited to the SPC scientists named above.

iv. The data can be used only until the end of SC11. All data, including intermediate products which can restore the data, shall be deleted by the end of the last day of SC11, unless agree otherwise by the Parties.

v. Any report or presentation that documents the results of this work shall be provided to the Fishery Agency of each Party prior to release, allowing reasonable time for comments.

The participant from Japan was not able to agree to this request, as it requires further discussion with Japanese industry. Therefore, the data set to be used for the South Pacific albacore assessment

will exclude the operational-level data provided by Japan, unless they are able to obtain the necessary domestic approval and advise SPC in writing prior to 31 March 2015.