WCPO Purse Seine BET Management Workshop II
August 19-21, 2015
Marshall Islands Resort
Majuro

Summary Report

I. Overview

1. The workshop was convened by the Marshall Islands Marine Resource Authority (MIMRA) and the Western Pacific Fishery Management Council (WPFMC). It was held August 19-21, 2015 in Majuro, Republic of the Marshall Islands.

2. The goal of the workshop was to identify potential purse seine bigeye management options that could make the existing measure more effective in terms of bigeye conservation. Other topics that were considered included: a) the contribution of the longline fishery to bigeye fishing mortality reductions, b) the need to avoid a disproportionate conservation burden on Small Island Developing States and Territories (SIDs), c) compliance-related considerations in achieving bigeye fishing mortality reduction, and) key research needs. The Workshop agenda is at **Attachment 1.**

3. Workshop participants included representatives from Asian, Pacific Island, United States purse seine and longline fishing industries, government officials of Pacific Island countries, and personnel from the Forum Fisheries Agency, Parties to the Nauru Agreement, Western and Central Pacific Fisheries Commission (WCPFC), Secretariat of the Pacific Community, European Union, and non-governmental organizations. The Participants List is at **Attachment 2.**

II. Introduction/Workshop Opening

4. Drew Wright (chair) opened the workshop and welcomed participants.

5. Kitty Simonds and Glen Joseph provided opening remarks noting that the workshop builds on a precursor workshop held in Honolulu in April which had commenced the process of considering a range of potential management options. The objective was to continue consideration of options in a relatively informal setting in the Majuro Workshop so as to advance the discussions required to support the adoption of more effective measures for reducing bigeye fishing mortality in WCPO tuna fisheries at the 12th session of the WCPFC scheduled for Bali in December 2015.

III. Background Information

6. Wright identified that the information and main outcomes from the Honolulu Workshop should be the starting point for discussion. A report of the Honolulu Workshop is at **Attachment 3.** The Honolulu Workshop focused on five themes related to bigeye measures:
    - FAD-based
    - Temporal-spatial
    - Catch Limits
    - Technological/Gear modifications
    - Market-based

7. Regarding FAD-based measures, the existing seasonal FAD closure has reduced potential purse seine bigeye catches by an average of 25% since 2009; however, total annual purse seine catches remain at near record levels.
    - There is considerable uncertainty on how many FADs are deployed in the WCPO, with some estimates ranging from 45 000 to 90,000 deployed annually.
    - FADs equipped with echosounder buoys may be contributing to higher purse seine catches.
    - Access to echosounder buoy and vessel sonar information for scientific purposes could be transformational for stock assessments and lead to a better understanding of bigeye stock dynamics.

8. Regarding temporal-spatial measures, total purse seine bigeye catch peaks at longitudinal regions between 140º E and 170º E, which corresponds to the main purse seine fishing grounds. Purse seine bigeye CPUE is higher in the central Pacific than in the Western Pacific, but total effort and catches are much higher in the Western Pacific.

9. Preliminary analysis suggests that, in any one year, there are around 15 vessels that are responsible for 25% of the purse seine bigeye catch. These vessels typically have a higher reliance on FAD sets than the other 237 purse seine vessels fishing in the WCPO and included in the analysis (60% vs 42 %), and have a higher percentage of FAD sets that are comprised of more than 50% bigeye (9% vs 3%).

10. Regarding technological modifications, there is currently no identified gear modification solution that would serve to reduce the incidental purse catch of bigeye.
    - In trials, Japan vessels have upgraded their winch power and increased the mesh size of their nets to increase pursing speed and improve non-associated, free school fishing efficiency.

- Echosounder buoy technology is rapidly improving, but it is still unreliable for long-distance species identification.
- If a disincentive to catch bigeye existed, echosounder buoy technology may evolve more rapidly.
- Technology on-board vessels do allow a general understanding of species composition and is used before a set is made.

11. Regarding market-based measures, it is recognized that a single processor cannot alone change the price structure to serve as a disincentive for catching small bigeye. That requires a substantial initiative in the major global markets for all bigeye product types.
    - Bigeye is blended with skipjack and yellowfin in the US and Africa markets. Other specialty markets for canned bigeye exist in Japan and Chile.
    - Currently, there are varying price premiums for FAD-free fish, and often the price premium does not reach the captain and crew (who must receive the incentive to be effective) – especially during the FAD-closure when there may be an over-supply of free-school fish and fish prices are down. Even if payments reach the crew, credible verification is difficult.

IV. Update on bigeye status and management-related considerations

a) Preliminary review of relevant outcomes from SC11

12. Berry Muller (MIMRA) provided a preliminary review of relevant outcomes from SC11, which was held August 5-13, 2015 in Pohnpei.
    - The total 2014 tuna catch in the WCPO was the highest on record at 2.86 million metric tons (mt), of which 71% was caught by purse seine vessels, 13% by Indonesia and Philippine artisanal fisheries, 9% by longline vessels, and 7% by pole and line vessels.
    - Total tuna catch by species was:
        - Skipjack- record catch of 1.95 million mt (68% of total);
        - Yellowfin- record catch of 608,000 mt (21% of total);
        - Bigeye- 161,000 mt (6% of total);
            - Purse seine = 67,000 mt (6^{th} highest);
            - Longline= 73,000 mt (lowest since 1996); and
        - Albacore- 132,000 mt (5% of total).
    - SC11 noted the total bigeye catch in 2014 was a 5% increase over 2013 and 5% increase over the average for 2010 –2013.
    - SC11 noted that the bigeye catch in 2014 was 48% above the estimated MSY (108,520mt), although those two numbers are not directly comparable because MSY is calculated on the basis of historical average recruitment.
    - SC11 concluded that the dynamics of bigeye tuna in the WCPO estimated using the Pacific-wide model are not substantially different from those estimated using

the WCPO-only model, especially with respect to the main stock status indicators used by WCPFC. Therefore, SC11 recommended that it is reasonable to continue to provide management recommendations to WCPFC on the basis of WCPO-only regional stock assessment models.

Discussion points

- Clarification was sought on why MSY is not directly comparable to current catch levels. It was explained that the MSY is estimated in the bigeye stock assessment using long-term average recruitment, which for bigeye, is calculated over the last 65 years. The last 10-15 years of bigeye recruitment is estimated to be higher than the long-term average. The WCPFC has moved away from using MSY as a reference point, and uses the stock depletion ratio of $SB_{current}/SB_{F=0} < 0.2$ as the limit reference point.

- The Workshop discussed recent oceanographic conditions and the potential effects on bigeye stock status. The current El Nino event may be one of the strongest in recent history. During El Nino years, the purse seine fleet moves eastward to the central equatorial fishing grounds within the WCPO, which has already been observed. This area typically sees higher purse seine bigeye CPUE than the fishing grounds in the West. There is not a good understanding of the effects of varying oceanographic conditions on bigeye stock dynamics. It was noted that SC12 could consider the effects of El Nino and other oceanographic conditions on tuna stocks.

- It was noted that, given current modeling techniques, it is not possible to undertake a Pacific-wide bigeye assessment because the biology of fish (e.g., growth rates) in the east and the west are different. However, it is apparent from tagging data that there is an exchange of bigeye between WCPFC and IATTC convention areas.

b) Effectiveness review of CMM 2013-01

13. Shelton Harley (SPC) presented the evaluation of CMM 2013-01 that was conducted by the SPC for consideration by the WCPFC at its 11th meeting in Apia in December 2014 (see Attachment 3).

14. The SPC analysis suggests that, taking into account uncertainties associated with exemptions, particularly in relation to the high seas FAD closure in 2017, implementation of CMM 2013-01 would lead to 4 % risk of spawning biomass falling below the 0.2SBF=0 in 2032. Without full implementation of CMM 2013-01, the risk of spawning biomass being below 0.2SBF=0 is 32%. The SPC analysis did assume implementation of the 5th month FAD closure in combination with longline limits being fully utilized, and

further that SIDs longline fleets would continue catching bigeye at 2012 levels, purse seine effort in EEZs and the high seas would remain at 2010 levels, and that purse seine effort in archipelagic waters would remain at 2012 levels. The analysis did not take into account the scheduled 2017 high seas FAD closure.

15. It was noted that considerable uncertainty is associated with a change in purse seine vessel logsheet reporting, with a trend towards more vessels reporting transit days than was historically the case. However, overall purse seine fishing effort appears to be reduced in 2015.

16. Longline bigeye CPUE increased in 2014 within the core tropical area (20ºN -10ºS) across major fleets compared to previous years.

Discussion Points

- It was noted that the 2017 high seas FAD closure has been estimated to equate to approximately the same impact as a 1-month FAD closure. Therefore, even if the implementation of a 5-month FAD closure does not occur, the pending high seas FAD closure would make a positive contribution to bigeye conservation.

- It was suggested that future evaluations show the results for 5, 10 and, 15 year projections, and not just 20 year projections to present intermediary steps and so demonstrate to managers the effect of the measure over time.

- It was recognized that the measure appears to be working, as future projections of stock status are positive. However, improved compliance, additional measures and the removal of exemptions would provide more confidence in it achieving its bigeye conservation objectives.

c) Compliance Review of WCPFC tropical tuna conservation and management measures

17. Lara Manarangi-Trott (WCPFC Secretariat) presented an overview of findings from the Commission's past reviews of the implementation of CMM 2013-01 and its predecessors. Integral to the compliance review of tropical tuna measure is the WCPFC Technical and Compliance Committee (TCC). The TCC is charged with reporting the extent of compliance by CCMs to the Commission. The Compliance monitoring scheme has been implemented for five years, and a revised compliance monitoring review process is currently being developed by the chair of TCC.

18. In September 2015, in accordance with CMM 2014-07, the TCC will review 36 draft Compliance Monitoring Review (CMR) reports that apply to 26 members, 4 participating Territories, and 6 cooperating non-members.

19. For purse seine provisions of CMM 2013-01 applying in 2014, this year's compliance review will focus on:
    - FAD closure (3-4 months)
    - Annual FAD limits (for some CCMs)
    - Purse seine catch retention
    - 100% observer coverage
    - Vessel limits on large scale purse seine vessels (except SIDS and Indonesia)

20. Longline measures of CMM 2013-01 applying in 2014 to be reviewed for compliance include:
    - Flag-based bigeye catch limits with monthly reporting (SIDS exempted)
    - Limits on longline vessel numbers targeting bigeye (SIDS and Indonesia exempted)

21. In previous years (2012 – 2014), through the Compliance Monitoring Scheme, the WCPFC has agreed that issues of non-compliance by one or more CCMs existed in relation to the implementation of various provisions of the tropical tuna measures during the years 2011 - 2013, including:

Table 1: Examples of non-compliance with the WCPFC tropical tuna measure (based on the agreed public version final Compliance Monitoring Reports attached to the annual WCPFC Summary Reports covering implementation in years 2011 - 2013)

Purse seine	Longline	Other fisheries
• Alleged incidents of non-compliance as reported by observers during FAD closure • Notification of FAD measure choice • Notification by non-PNA coastal States of effort limits established for their EEZ • 100% observer coverage on purse seine vessels • Non-submission of high seas FAD management plans • High seas purse seine effort limits • Meeting agreed reporting deadlines	• Agreed reductions in annual bigeye longline catches • No increase in yellowfin longline catches • Meeting agreed reporting deadlines	• Limit on other commercial fisheries for tropical tunas • Reporting of fishing effort for reporting year

22. In previous years (2012 – 2014), through the Compliance Monitoring Scheme, no matters of non-compliance have been noted and applicable CCMs have been scored by the Commission as compliant for the following provisions of the relevant tropical tuna CMMs:
    - PNA VDS limit
    - Purse seine effort increase north of 20 N or south of 20 S
    - Purse seine catch retention requirement
    - High seas pocket 1- special arrangement for the Philippines
    - Annual 2000 mt bigeye longline catch limit that applies to some CCMs

23. The tropical tuna CMM has been and is likely to remain a focus of the WCPFC Compliance Monitoring Scheme. It would assist if the Commission could work towards more clearly specified catch and effort limits, and ensuring that implementation of provisions within measures are able to be monitored by both the Secretariat and CCMs.

24. The WCPFC Compliance Monitoring Scheme continues to evolve and be refined each year through the combined efforts of both the TCC/Commission and the Secretariat. The challenge for the WCPFC Compliance Scheme will be in achieving a better balance between "policing" implementation by CCMs and in providing mechanisms through the scheme that better support CCMs implementation of measures, particularly through provision of assistance to SIDS.

Discussion points

- It was acknowledged that approximately 60-70% of Regional Observer Program (ROP) data for the previous year has been available to the Secretariat for consideration in the preparation of draft compliance monitoring reports in advance of each TCC. It is the ROP data, and not the observer logbooks that are the basis for the Secretariats preparations of draft Compliance Monitoring Reports. Flag States were advised that they can obtain copies of the observer logbooks through a request that they make to the observer provider.

- It was noted that observers play a dual role within the ROP: scientific data collection and compliance monitoring.

- It was recognized that compliance issues are the "Achilles heel" of most RFMOs, due to reliance on self-reported information.

d) Disproportionate burden and bigeye conservation

25. Transform Aqorau (PNA) provided a presentation on the topic of disproportionate burden with regards to bigeye conservation and management from the PNA perspective.

26. Article 30 of the WCP-Convention provides the legal basis for avoiding a disproportionate burden on SIDS, and the WCPFC has incorporated the issue within the organization's rules of procedure in terms of its regular consideration in meetings of the commission and its subsidiary bodies.

27. In terms of the WCPFC tropical tuna measure, addressing disproportionate burden has to be thought of in terms of:
    - Who are the beneficiaries of the conservation measures?
    - Who bears the costs?

28. The PNA is of the view that the existing WCPFC measure, i.e. the 4th-month FAD closure, results in disproportionate conservation burden on SIDS from lost potential revenue that could be derived by PNA members from the PNA VDS. In their view, the WCPFC is in breach of its own Convention requirement. To address the matter, the PNA suggests that

the conservation burden must either be removed, or measures must be adopted to reduce the burden of bigeye conservation on SIDS in other ways.

Discussion Points

- The Workshop recognized that the application of 2013-06 to assess the potential disproportionate burden of a Measure prior to its consideration by the Commission was followed by the Commission at its 2014 regular session of the Commission.
- It was recognized that disproportionate burden is not evenly distributed among SIDS.

V. Evaluation of BET management options for WCPO purse seine fisheries

29. Drawing on the outcomes of the Honolulu workshop, participants considered new or supplemental purse seine management options offering the potential to strengthen the contribution of existing CMMs to reducing bigeye mortality in the WCPO tuna fisheries.

a) FAD-related options- operational considerations

30. Wez Norris (FFA) presented on management options within two categories: a) minor changes to the operation of the FAD closure, and 2) major alternatives/additions (See Attachment 4).
    - Minor options included:
        i. Prohibiting FAD servicing during the FAD closure
        ii. Prohibiting support vessel FAD deployment throughout the year
        iii. Prohibiting FAD deployment before FAD closure
        iv. Prohibiting the setting of purse seine gear prior to local dawn
    - Major alternatives/additions:
        i. Splitting the FAD closure into two blocks of 2-months each
        ii. Total seasonal closure
        iii. Combination of FAD and total closure
        iv. 2016 high seas FAD closure

Table 2: Potential Minor FAD-related management options (taken from the paper presented to the Workshop by Wez Norris)

Minor FAD-related Options				
Prohibiting FAD servicing during the FAD closure	**Prohibiting support vessel FAD deployment throughout the year:**	**Prohibiting support vessel FAD deployment throughout the year**	**Prohibiting FAD deployment before FAD closure**	**Prohibiting the setting of purse seine gear prior to local dawn during FAD closure**
• Already established for PNA EEZs • Unlikely to produce much bigeye conservation <u>Conclusion</u>: To support compliance, compatibility, and simplicity, the WCPC should require this option for the high seas.	• Already established for PNA EEZs • Could have some minimal positive bigeye conservation effects by limiting the number of FADS deployed throughout the year. • Supports compliance monitoring efforts <u>Conclusion</u>: WCPFC should mirror option for the high seas to promote compatibility, simplicity, and small conservation benefit.	• Already established for PNA EEZs • May have some, but likely minimal, bigeye conservation benefit by limiting number of FADS deployed throughout the year <u>Conclusion:</u> WCPFC should mirror option for the high seas to support, compliance, compatibility, simplicity, and small conservation benefit.	• Minimal conservation benefit • FAD life extends beyond 4 months • If option led to fewer FADs - Decreased catch rates - Potentially increased fish price from less catch - Potentially greater disproportionate burden <u>Conclusion</u>: probably not worth pursuing	• Potential minimal conservation benefit by removing small number of FAD sets • Implementation of option could assist in compliance monitoring <u>Conclusion:</u> this option should be adopted by WCPFC due to minor conservation benefit, compliance, and does not transfer disproportionate burden to SIDS

Table 3: Potential Major FAD-related management options (taken from the paper presented to the Workshop by Wez Norris)

Major FAD-related Options			
Splitting the FAD closure	**Total Closure**	**Combination of FAD and Total Closure**	**2016 high seas FAD closure**
• Could have moderate negative effect on bigeye conservation - Existing FAD closure period is best time for benefits to bigeye • Reduced FAD loss could increase skipjack and yellowfin catches • Uncertain disproportionate burden impacts - Could be favorable to SIDS if timing could be tailored to reduce existing impacts • Trade-off between conservation effectiveness and vessel efficiency Conclusion: effects would depend on when the two FAD closures periods would occur.	• Unlikely to have greater conservation benefit as current exemptions during FAD closure would remain • The option ignores FAD fishing outside the closure, so to be effective, it would need ongoing FAD limits during the rest of the year • Benefits to skipjack and yellowfin due to reduce production unlikely to occur • Likely to increase disproportionate burden as SIDS domestic vessels and their on-shore facilities feel supply disruptions earlier and to a greater degree. Conclusion: not worth further consideration.	• Reduces negative implications of a total closure, particularly on SIDS disproportionate burden. • Benefits to skipjack and yellowfin unlikely to occur Conclusion: not worth considering further	• Already agreed to commence in 2017 • Would address the 150% growth in high seas catch and effort • Bigeye catch rates in Eastern High Seas are higher than in EEZs • Estimated to be equivalent to a 1 month FAD closure • Supports bigeye conservation without additional disproportionate burden on SIDS • Benefits could address current impasse with commission regarding disproportionate burden Conclusion: should expedite the high seas FAD closure for 2016

Discussion points

- Further consideration of the pre-dawn set prohibition would be facilitated by further analysis by SPC of the percentage of sets during the FAD closure that occur prior to pre-dawn hours. It was also noted that the time of any prohibition needed to be carefully examined so as not to interfere with school setting.

- It was noted that some vessels use oceanographic information (e.g. currents) to plan for FAD deployments, such that the FAD will drift into more productive waters during its "soaking" period.

- It was recalled that the servicing and deployment of FADs by tender vessels was prohibited in the EPO by the IATTC.

- The Workshop considered that the prohibition of the deployment of FADs one month prior to the FAD closure would be ineffective due a lack of enforcement.

- It was acknowledged that free-school sets continue after sunset.

- The Workshop noted that prohibiting FAD sets on the high seas will not achieve a conservation benefit unless that effort is removed from the fishery and does not transfer into waters under national jurisdiction.

- Discussion on the total closure option included the potential benefits from a compliance perspective. It was noted that the PNA would still sell the same amount of vessel days within a 12-month period and so the benefit to bigeye conservation would be minimal, except for the benefits that would accrue from better compliance.

- Discussion on the high seas FAD closure focused on the apparent recent increase in high seas fishing effort. The price of vessel days under the PNA VDS contributes to the high seas effort increases, with fishing effort increases on the high seas observed from both Pacific Island and DWFN fleets. For US purse seine vessels, the increase in high seas effort was a direct result of loss of access to fishing grounds within Kiribati waters.

- It was also noted that the price per day under the VDS is beginning to take vessels out of the fishery. In addition, it appears that those fleets that rely less on FAD fishing are doing better and can withstand the cumulative impacts of WCPFC FAD-based measures.

- It was recognized that expediting the 2017 high seas FAD closure to 2016 could be politically challenging, especially if exemptions are provided to European Union, Philippines, and Kiribati fleets.

- On the topic of exemptions in general, it was noted that the wide array of exemptions are perceived among the fishing industry to produce in an uneven playing field and provide industry with a general lack of confidence in the WCPFC.

b) Technological considerations

31. Gregory Hamman (Marine Instruments) provided an overview of the current status of echosounder and sonar buoy technology and where the technology may be in 10 years.

32. No echosounder buoy currently on the market is fully capable of distinguishing species; however, recent ISSF funded research has identified that bigeye and skipjack are most detectable at 38 kHz and 200 kHz. More research is needed to find the best target strength frequency for yellowfin.

33. Manufactures are now making multi-frequency echosounder buoys. Research and development is ongoing which includes incorporating technology and new materials that support faster processing speeds, better solar panels, longer battery life, and cheaper communications among others components.

34. Advancing technology will allow for species identification and size distribution from echosounder buoys within the next 10 years, if not sooner.

Discussion points

- The Workshop noted that while species identification is important, disincentives to catch bigeye are needed to influence skipper behavior.

- It was recognized that echosounder buoy technology may not yet be able to distinguish species, but sonar and other systems on-board vessels can distinguish species. In other words, most skippers are likely aware of the species composition of schools when making sets.

d) PNA FAD pricing scheme and FAD tracking

35. Maurice Brownjohn (PNA) presented on the PNA FAD pricing and tracking scheme. The PNA are of the view that FAD pricing and tracking is necessary due to the evolution of

FADs and proliferation of echosounder FADs, which have been "game changer," and have led to increased purse seine bigeye catches.

36. FAD charging provides an incentive to target free schools, which could reduce FAD sets and contribute to reductions in bigeye purse seine catches. Under the FAD pricing scheme, vessels will purchase, in advance, the number of FAD sets they intend to make. Initial costs, which are still under development, may be $1,000 per FAD set. Charges will be reconciled based upon annual observer reports.

37. The PNA is developing an FAD tracking system and database that would apply to all drifting and anchored FADs in the waters of PNA members. The system will serve to better monitor FADs and contribute to understanding their impact in the WCPO purse seine fishery.

38. Participating vessels are required to obtain an annual Fishery Information Management System (FIMS) registration, which would include an authorization for FAD buoy providers to forward FAD-buoy generated data to the PNA's FIMS. The PNA is working with FAD buoy providers to ensure a consistent format for the delivery of FAD-generated data.

39. Since FADs are already tracked through satellite transmission cost paid by the fishing industry, allowing the PNA access to the same FAD tracking information should not come at additional costs to industry.

Discussion Points

- It was noted that the PNA would like to see all FADs deployed in the WCPO registered, and further, that unregistered FADs found in PNA would be considered to be fishing illegally.

- The Workshop was informed that the $1,000 price was agreed on the basis of the benchmark VDS charge and, at this stage, the program is in a trial phase. A higher price will serve as a greater disincentive for fishing on FADs.

e) FAD Management Options Working Group (Brian Kumasi)

40. Brian Kumasi, (Co-chair of the WCPFC FAD Management Options Working Group) provided an update on the work of the group during 2015. The group's Terms of Reference note five key issues, as follows:
    - Collection of additional data on FADs and their use in WCPO fisheries;

- FAD marking, and identification, and use of electronic signatures;
- FAD monitoring, tracking and control;
- FAD management options; and
- Advise on options for FAD marking and monitoring for WCPO wide application

41. The group is currently reviewing available information and is planning on developing a paper/proposal to be presented to WCPFC12 to direct detailed consideration by the Science Committee and TCC in 2016. An opportunity for an informal working group meeting may occur on the margins of the 2015 TCC meeting.

Discussion points

- It was clarified that the main focus of the group was related to collecting FAD data and the group would not be focusing on FAD-related management measures at this stage.

- It was acknowledged that progress to date had been somewhat slower than had been hoped for by most and that this was, at least partially, related to the slow engagement by WCPFC members.

f) Vessel dynamics and industry perspectives

i) The concept of purse seine bigeye "hot-spots"

42. Shelton Harley (SPC) summarized the distribution of bigeye catches in the WCPO tuna fishery using three metrics: total purse seine catch, bigeye CPUE in FAD sets, and the proportion of bigeye in a FAD set.

43. The area with the highest total bigeye catch is where most of the effort is, the Western Pacific warm pool. However, when evaluating areas in terms of bigeye CPUE, the Central Pacific region is higher than in the west. In addition, the Central Pacific region also experiences a higher percentage of bigeye per set than in the west. The bigeye percentage per set in the eastern Central Pacific can range from 25-40% of the set, and as such, it is inappropriate to consider catches of bigeye at those levels to be bycatch.

44. The pattern of bigeye catches in the purse seine fishery differs across the Pacific - from east to west. Developing spatial "hot spot" management options remains a challenge due the various impacts involved; including fisheries production and impacts to Pacific Island countries. For example, prohibiting fishing in a particular "hot spot" in the Western Pacific could result in a 56% reduction in bigeye catches, but also a 57% reduction in skipjack and yellowfin catches. Prohibiting fishing in hotspots of bigeye FAD CPUE

could result in approximately a 14 % reduction in bigeye catch, with only 3% reduction in the catch of other tunas.

Discussion points

- The analysis only looked at hot spots and did not conduct modeling to evaluate the effects of displaced effort.

- The CPUE evaluation did not reveal a size trend in the bigeye catch. It was noted that bigeye caught by purse seine gear in the Central and Eastern Pacific are of larger sizes than those caught in the West.

- The Workshop suggested that future work present the results across both EEZs and the high seas.

ii) Purse Seine vessel dynamics

45. Shelton Harley (SPC) presented on characteristics associated with proportional differences in the catch of BET by different purse seine vessels in the WCPO purse seine fishery.

46. From 2010-2013, between 9 and 14 vessels caught 25% of the WCPO purse seine bigeye catch each year. Approximately 50% of the bigeye purse seine catch was from 34-43 vessels. Only 27 vessels were found to be within the top 10 percent of bigeye catch between 2010 and 2013.

47. The SPC has submitted a proposal to the European Union to continue this work, and to identify how individual vessel catches are distributed temporally and spatially.

Discussion points

- The Workshop considered that an improved understanding of individual vessel dynamics could inform the development of a management measures. For example, a measure could prohibit a certain percentage of bigeye within the total set (e.g. 25%).

- It was noted that “move on” rules exist in other fisheries, whereby if bigeye was being caught above the specified threshold, and with the help of near real time reporting (or with a system of underages and overages), vessels could be required to change fishing locations. However, it was recognized that unless there is a punishment for catching or a reward for not catching bigeye, the purses seine vessels would not have the incentive to move on. It was also understood that any “move on” rules would necessarily be complicated and would present major challenges in terms of compliance.

- It was noted that skippers of some fleets insist that there is a relationship between the depth of net and the catch of bigeye. While research has been conducted on this issue, further investigations are recommended. Improving observer data collection of net depth should be prioritized.

- It was noted that similar trends are observed in the EPO, where a small number of vessels catch a large percentage of bigeye. This small group of vessels are penalizing the rest of the fleet because their behavior. The issue has not yet been solved in the EPO.

iii) Purse seine industry perspectives

48. Representatives of various industry groups were asked to share their perspectives. Capacity management was common theme identified. The PNA explained their position in relation to capacity management and the application of the VDS as the means applied by the PNA to manage effort in the WCPO tropical tuna fishery.

g) Purse Seine BET catch credit system (Valerie Chan)

49. Valerie Chan (NMFS) presented on by-catch catch credit and risk-pool systems, with a description of case studies from various fisheries. She presented some initial ideas related to possible further consideration of such systems to assist with managing bigeye by-catch in the WCPO tropical tuna fishery.

50. Credit systems are performance standards with the option to compensate between individuals in a market-based system. They have been used heavily in the pollution sector and in some fisheries. Risk pools are used commonly in the insurance sector where groups share premiums and losses of a risk they have underwritten together. Both systems can be used to manage catch and effort of target and non-target species.

51. The Alaska pollock fishery uses a bycatch credit system. Vessels voluntarily form groups to pool their catch together. The entire group is allocated a salmon bycatch that is based on their catch histories and they internally divide how that bycatch is allocated. Areas with higher rates of bycatch can be set up as bycatch avoidance areas – if the vessel is found to have a high percentage of salmon in their catch, they are excluded from fishing that area for a period of time. However, the same exclusions do not apply for vessels with low catch.

52. Conservation credits are applied in Scottish groundfish fisheries for the purpose of reducing cod mortality. The Scottish system applies to effort, not catch. Vessels have a base allocation of days. If cod is a small percentage of the catch, they do not fish in certain

cod-dense areas, and use a certain net type, there is a possibility for vessels to fish extra days at sea. This creates the incentive of having more days to fish, with greater flexibility. Vessels are penalized from fishing in high-cod areas, by reducing their allowed fishing effort.

53. The Workshop acknowledged that the establishment of a bigeye catch credit system is unlikely to occur in the near term in the WCPO. However, ongoing development of technological solutions and standards, and real-time spatial management could one day lend support for such program.

Discussion points

- The Workshop considered that an important issue in the development of a catch credit system is the consideration of appropriate catch limit levels. Further, at high levels of bigeye percentages in the FAD set, this catch is not bycatch, but targeted catch.

VI. Longline bigeye management considerations

a) Options for the contribution of longline bigeye mortality reductions

54. Les Clarke (PNA) presented on additional measures that may be considered to increase or restructure the contribution of the longline sector to reduction in bigeye fishing mortality.

55. Five reasons were identified that offer support for additional contributions from longline the longline fishery.
    - It reflects scientific advice;
    - There is no scope for additional purse seine measures in PNA waters except as part of a package including longline measures;
    - The longline fishery is the major beneficiary of bigeye conservation;
    - Longline bigeye catch limits have been ineffective; and
    - High seas longline fleets are not effectively controlled.

56. The PNA are of the view that effective bigeye conservation requires additional measures as part of a package of contributions between the longline and purse seine fisheries. The package should:
    - Include measures to reduce bigeye fishing mortality from the longline and purse seine fisheries;
    - Address the failure to control purse seine fishing effort outside PNA waters;
    - Improve the effectiveness of measures to reduce purse seine bigeye bycatch outside PNA waters, especially on the high seas;
    - Reduce the disproportionate burden of bigeye conservation on PNA, through:

- increasing the contribution from the longline fishery;
- increasing benefits from the longline fishery to PNA; and
- Improve control of the high seas tropical longline fishery.

Table 4: Example package of additional longline and purse seine measures

Longline	Purse Seine
High seas closure equal to the FAD closure for high seas vessels+	Ban on pre-dawn sets
No transhipment of frozen bigeye at sea 30N – 20S	Ban on FAD deployment by tender vessels during the FAD closure
No manual reporting 30N - 20S for vessels with bigeye catch history	No servicing FADs during the closure
5% high seas independent* ROP observer coverage	Tender vessels servicing FADs to carry independent* ROP observers
Independent ROP observers	Independent* ROP observers

Source: Les Clarke, PNA
+ defined in presentation as transshipping vessels that do not land in their flag ports or in SIDS ports.
* defined in the presentation as not from the vessel's flag national observer program .

57. In addition, the PNA is implementing the PNA longline VDS in hopes of restructuring longline management away from current flag-based catch limits to zone-based effort limits. Five of the eight PNA-member countries are currently part of the longline VDS.

Discussion Points

- The Workshop considered the benefits that would accrue from bigeye conservation. In the long term, ending bigeye overfishing is suggested to benefit longline fisheries to a greater extent than purse seine fisheries; however, concerns were voiced from the longline industry that there is no confidence that longline catch limits will ever increase, thus the benefits may not be realized. Others were of the opinion that longline catch limits would be increased in the future once bigeye overfishing is eliminated.

- The Workshop considered that the role, and management, of tender vessels within the WCP-Convention Area required increased attention. Observer coverage and compliance was also raised with regards to tender vessels.

- With respect to longline observer coverage, the Workshop expressed concern that some longline fleets are not meeting the required 5% observer requirement. Some of these fleets also transship on the high seas.

- The Workshop discussed the potential for longline fisheries within PNA waters to provide more economic benefits to local economies than purse seine fisheries, and that a move to zone-based, rather than flag-based, management could facilitate this.

- The Workshop expressed concern that the Philippines and Indonesia are not applying the FAD closure in their national waters. Addressing this will be another important aspect of the package of measures that should be considered at WCPFC12 in Bali.

b) Industry Perspectives on WCPFC longline bigeye management

58. Workshop participants representing longline fishing interests provided views on longline management measures adopted by the WCPFC. Issues raised include the need for capacity management (especially for small-scale longline vessels), exemptions, and compliance with measures.

59. It was noted that longline fisheries have generally experienced reduced bigeye catches since the introduction of CMM 2008-01. It was recognized that some fleets have reduced their number of vessels significantly (e.g., Japan). Concern was expressed about any further potential limit reductions and the potential loss of access to the high seas.

Discussion points

- Capacity management, for both longline and purse seine fisheries, remains a key concern for many associated with the industry in the WCP-Convention Area. The Workshop noted that, although PNA effort limits have been maintained at approximately 45,000 vessel days, the WCPFC in general has a poor track record with consideration of capacity management measures. The PNA has advised it is willing to enter into conditional discussions on this matter. It was also noted that 2014-01 has some specific provisions relating to capacity management.

- A view was expressed that more attention should be paid to the Japanese bigeye market, which consumes most of the longline caught bigeye in the region. There may be potential for market-based measures, for consideration by Japan, that could positively contribute to further reductions in bigeye mortality in WCPO longline fisheries.

- Views were expressed that some high seas large scale longline fleets are not effectively regulated and there is a need for the WCPFC to focus management attention on these fleets.

VII. Detailed consideration of applicable issues

a) Longline Breakout Group Report

60. A small working group met to consider options for additional management of the longline fishery, picking up on the presentation by Les Clarke about the need for a package of measures across both purse seine and longline fleets.

61. The group did not discuss further reductions to longline catch limits given how difficult these were to agree in the first place, and the fact that issues with the longline fishery are wider than the five catch-limited CCMs alone.

62. The small group considered that the Commission has not really given detailed consideration to the management of the longline fishery in the past, compared to the level of purse seine discussion that has occurred over time (e.g., effort limits, FAD closures, total closures, capacity, FAD limits etc).

63. The small group identified two areas of work that CCMs could consider in the lead up to the Commission meeting that could be considered at WCPFC12.

a) Closure of the High Seas to Large Scale Freezer Vessels

- The small group considered a high seas closure could be implemented primarily as a way of reducing effort in the fishery. The group discussed this in the context of the PNA+Japan proposal, which was for a closure that would only apply to vessels that do not fish in/out of either their own port, or a SIDS port.

- Participants were generally supportive of this idea on the basis that it would be a contribution to reducing fishing mortality through a decrease in effort in this part of the fishery (probably affecting a few hundred vessels, but in need of verification). It was felt that the proposal could also contribute to decreasing DB on the basis that it would increase the contribution of the LL fishery to bigeye mortality reduction, and that it would give "preference" to vessels fishing into SIDS ports, thereby providing benefits to SIDS.

- When presented to the plenary, it was noted that such a measure may result in some relocation of effort from the high seas to EEZs. While it may offset some of the disproportionate burden on SIDS, it would mean that the reduction in mortality would not be absolute.

- Next Steps – The PNA+Japan proposal is still on the table. Some work and discussion needs to be done with those CCMs that objected to it.

b) Monitoring – Transhipment reform

- The small group noted a very high level of transhipment of bigeye on the high seas (in the vicinity of 30% of the total catch based on transhipment notifications). This, combined with uncertain observer coverage, lack of operational data to date and no opportunity for boarding and inspection causes concern about the accuracy of information available to the Commission.

- The group agreed that transhipment should be substantially tightened as was anticipated in the Convention, including increased monitoring of transhipment on the high seas. This is primarily a compliance and monitoring-related recommendation to improve the data available to the Commission and give greater confidence in the integrity of management measures.

- While not the primary intention, it could also contribute to decreasing disproportionate burden by greater facilitating a greater use of SIDS ports to tranship.

- Next Steps – Transhipment reform is not currently on the agenda for TCC or WCPFC and would need a champion to propose modification of the existing measure(s).

64. Other useful ideas identified by the group that require further work or research include:
    - The release of small fish caught with longline gear;
    - Identification of times/areas where small fish are more prevalent;
    - Understanding longline capacity;
    - Monitoring and observer coverage; and
    - Market-based measures.

<u>Conclusions and SIDS Issues</u>

65. The group noted that none of the immediate ideas provide a complete solution to either BET conservation or disproportionate burden. However, both of the immediate proposals do move in the right direction and are consistent with the approach of seeking to strengthen what is already in place.

66. In the longer term, a fundamental reform of the main management (flag based limits) is required to remove elements such as the SIDS exemption. From a SIDS perspective, zone-

based measures are likely to be the key to this, as has been seen with the removal of SIDS exemptions in the purse seine effort management provisions of the CMM.

b) Purse Seine Breakout Group

67. The purse seine breakout group noted that any concept involving allocation (explicit or implicit) will be an issue for some WCPFC CCMs, since in-zone management using days is the management unit in the region. Further, management systems, measured in effort, require systematic data collection, analysis and review of management measures against fishing technology and efficiency.

68. There were several additional measures that could be implemented quickly, and therefore are ready for discussion at the upcoming 2015 WCPFC Annual Meeting, if CCMs are so inclined.
    - These topics included additional controls on tender vessels, further limits on FAD activities on the high seas, and a night/sunrise set ban.
    - The group also noted the importance of FAD data collection and recognized the ongoing work by the PNA on their FAD tracking program.

69. Other initiatives, while of interest, have a longer time horizon due to current implementation difficulties, data and analysis needs and/or technological improvements that would be required for successful implementation.
    - These include concepts involving annual FAD deployment limits, mandatory FAD set limits, penalizing sets or trips that result in bigeye catch in excess of a set percent of the total catch, regulations for net design, and spatial management/limits.
    - Capacity controls and market measures also may present longer-term solutions.

Disproportionate Burden Breakout Group

70. A small working group met on the issue of disproportionate burden.

71. It was identified that the WCPFC has adopted a framework (CMM 2013-06) to consider disproportionate burden when proposing new conservation and management measures. The group concluded that there is not yet enough information to determine if the measure would benefit from revision and refinement.

72. The group identified examples of mechanisms that may help address disproportionate burden, which included:
    - Consistent application of CMMs (Indonesia and Philippines)
    - Special Provisions [exemptions]

- Measures on the high seas tend to mitigate the burden;
    i. Meeting data obligations on the high seas
    ii. High seas freezer longline closure and transhipment bans

Implementation of CMM 2013-01 Breakout Group

73. A small breakout group undertook an appraisal of CMM 2014-01/2013-01.

74. Positive elements include:
- That the measure includes a hard cap on purse seine effort;
- That the measure has clear bigeye longline catch limits incorporating catch reductions for most major fleets;
- That the measure includes provisions that recognize the importance of provision of operational level catch and effort data to the Commission;
- The evaluation by SPC suggest that the package of measures (if fully implemented) are likely to reduce BET fishing mortality, although this analysis did not include consideration of the potential contribution of the high seas FAD closure which would have an additional impact;
- FAD closures are shown to have some effect on BET fishing mortality, and annual FAD set limits offer potential as further measures; and
- The measure incorporate provisions that might be preliminary work/efforts on capacity limits.
    i. Limits on large purse seine vessel numbers for most CCMs (except Indonesia and SIDS)
    ii. Limits on longline vessels for most CCMs (except Indonesia and SIDS)
    iii. Other commercial fisheries

75. Negative aspects or perceived weaknesses of the measure include that:
- Information from observers is not always available (to the Secretariat and to CCMs) in a timely manner to support checks on the implementation of the FAD closure. Although implementation of E-reporting technologies by vessels and by observers are expected to eventually assist with providing more prompt reporting to CCMs and the Secretariat;
- It can often be unclear to groups outside the flag CCM and Secretariat which vessels are exempt from certain provisions within the measure – for example which vessels are exempt from the 4th month FAD closure (CMM 2014-01 footnote 3);
- Yellowfin measures yet to be clearly defined/established;

- There is a lack of information about the baselines and current levels of effort for "Other Fisheries" which means that we aren't quite sure what contribution this part of the measures are making towards reducing impacts of fishing on bigeye;
- Presently Commission reviews of the implementation of some key CMM provisions rely on flag CCM self-reporting and presently there are few independent sources of verification. For example the monthly FAD set reporting for those CCMs that choose the annual FAD set limit option is self-reported, and the bigeye longline catch limits are also self-reported. In respect of the latter example, for most longline fleets which are subject to a limit in the CMM, there often is low or no observer coverage and operational level data also may not be currently available, both of which could be a source of independent verification of bigeye reported catches;
- Capacity management measures presently lacks specificity of what are the limits for each CCMs fleet, and there is additional work needed by the commission and a notification requirement for CCMs; and
- Conditional provisions contained in the measure (e.g. 5th month FAD closure) create uncertainty about the future impact of the measure in its entirety.

Research Priorities Breakout Group

76. A small breakout group met to discuss key research needs and priorities.

77. The group identified that the critical priority is the development of WCPFC tuna research plan to improve science and management.

78. Research needs to support management include:
    - Further characterization of the nature of the problem of bycatch;
    - Increased research on bigeye population dynamics and mixing;
    - Additional technological research to improve selectivity (echo sounder buoy ability to discern yellowfin/bigeye from skipjack);
    - Improved sampling to reduce uncertainties in the proportion of bigeye in purse seine sets;
    - Factors determining the association of tuna with FADs (school dynamics, residence times, aggregation times, etc.);
    - FAD tracking and monitoring (FAD data, tracking, biomass to characterize hotspots); and
    - Movement and residency (to inform spatial management).

Workshop Conclusions and Next Steps

79. The Chair thanked the participants for their time and effort dedicated to the workshop acknowledging that, although the workshop lacks formal status within the WCPFC, it and the Honolulu workshop had provided a valuable opportunity for industry representatives and officials to exchange views on options for reducing bigeye fishing mortality in WCPO tuna fisheries in an informal atmosphere. In terms of conveying the outcomes of these Workshops to the broader WCPFC community it was suggested that either the Marshall Islands or the United States introduce the workshop report as a background paper to be considered at TCC11 or WCPFC12.

80. The conveners, Kitty Simonds and Glen Joseph, ended the workshop with closing remarks that focused on the need to work together and the importance of keeping the momentum going in advance of WCPFC12.