**2nd MEETING OF THE FAD MANAGEMENT OPTIONS INTERSESSIONAL WORKING GROUP**

China Gymnasium, Palikir,
Pohnpei, FEDERATED STATES OF MICRONESIA
**28 – 29 September 2016**

**SUMMARY REPORT**

**WCPFC-2016-FADMgmtOptionsIWG02[1]_rev2**
**22 November 2016**

## Contents



[1] Rev2 includes some editorial corrections. Rev 1 was issued on 17 November 2016, and replaced the draft report that was circulated to CCMs on 19 October 2016

## 1. Welcome and opening

1. The Chair, Mr Brian Kumasi, called the meeting to order at 9.10 am. After welcoming participants to the FADMgmtOptions-IWG meeting, the Chair asked the secretariat to offer a prayer.

2. The Executive Director, Mr Feleti Teo OBE, in his opening remarks welcomed the participants to this FADMgmtOptions-IWG meeting and to Pohnpei, the home of the Commission Secretariat. Noting that there has been a very long series of meeting – the CDS WG, the Strategic Planning consultation, TCC and now the FADMgmtOptions-IWG. This is the second meeting of the FADMgmtOptions-IWG. The first meeting was held prior to the 12th Regular Session of the Commission in Bali in December 2015. A workplan was agreed and adopted by the Commission to guide the work of this working group. Most activities have been progressed intercessionally and the Chairs leadership and guidance is acknowledged. The contribution by Ray Clarke, the vice-chair was acknowledged and the Executive Director wished him well in his future endeavours. The Executive Director reflected on the dominance of the purse seine fisheries in the region and catches of juvenile bigeye and yellowfin tuna, against a background of overfishing for bigeye tuna. Managing FADs is key component of tropical tuna fisheries management, hence the work of this IWG is critically important in informing WCPFC13.

3. The Chair echoed the Executive Directors comments and expressed his appreciation of the work of the vice-chair, Ray Clarke. It is expected that this meeting will deliver on three substantive areas of work: i] additional data collection, ii] marking and monitoring and iii] a refined research plan. By the end of this meeting, four out of five of the TOR targets for the FADMgmtOptions-IWG will have been completed. The FADMgmtOptions-IWG is focused on these technical aspects to ensure a good foundation from which to progress to develop recommendations on FAD management options. The outputs of this meeting will ultimately progress and support of the broader objectives of the Commission.

4. The WCPFC Compliance Manager, Dr Lara Manarangi-Trott welcomed participants to the FADMgmtOptions-IWG meeting and detailed the meeting arrangements.

5. The Chair, Mr Kumasi, introduced Rev 1 of the Provisional Agenda (WCPFC-2016-FADMgmtOptionsIWG02-01 Rev 1), rescheduling the agenda to present research related items together and to include an additional presentation by FAO. There being no objections the amended agenda was adopted and is inserted as Attachment A.

6. The following members, cooperating non-members and participating territories (CCMs) attended FADMgmtOptions-IWG02: Australia, China, European Union, Federated States of Micronesia (FSM), Fiji, Indonesia, Japan, Kiribati, Korea, Republic of the Marshall Islands (RMI), Nauru, New Zealand, Palau, Papua New Guinea (PNG), Samoa, Solomon Islands, Chinese Taipei, Tonga, Tuvalu and United States of America (USA), Vanuatu.

7. Intergovernmental organisations representing the Food and Agriculture Organisation of the United Nations (FAO), Pacific Islands Forum Fisheries Agency (FFA), the Parties to the Nauru Agreement (PNA) Office, and the Secretariat of the Pacific Community (SPC) attended FADMgmtOptions-IWG02.

8. Observers representing International Seafood Sustainability Foundation (ISSF), PEW Charitable Trusts, and World Wildlife Fund (WWF) also attended FADMgmtOptions-IWG02.

9. A list of FADMgmtOptions-IWG02meeting participants is provided as Attachment B.

10. The Secretariat introduced the staff supporting the meeting, and it was noted that the Secretariat would be rapporteur for the meeting. The meeting arrangements were announced.

## 2. Review of activities

11. Dr Lara Manarangi-Trott updated the working group on the current state of play. Working paper 2 was referenced "Review of activities 2015/16 - FAD Management Options IWG". As agreed in the 2016 workplan, progress has been duly made on most of the working group TORs, including award of a consultancy on FAD Marking (the report is presented in working paper 4). The Chair presented 2 papers to the SC. The first SC12-ST-WP-06, a draft FAD Research Plan and the second paper, SC12-ST-WP-08 presents data fields that would be collected by vessel operators based on work that had been undertaken by the Chair, Secretariat and SPC. In the workplan it was proposed that a small consultancy would be needed to prepare the FAD data fields proposal, but was able to be progressed by the Chair, Secretariat and SPC. Subsequent to these papers being presented at SC12, a PNA paper, DP-01 "Comments on FAD-IWG paper on FAD data fields (ST-WP-08)" has been submitted to this FADMgmtOptions-IWG meeting.

### Reports from CCMs

12. **PNG** has conducted a lot of development work in terms of FAD management including marking and monitoring, FAD tracking, FAD registration and consideration of management option. A useful paper is available on the PNG fisheries website at: http://www.fisheries.gov.pg/

13. Japan, noting that PNG has advanced work on Management Options, queried how anchored FADs are managed in PNG waters. In response, PNG informed the group that since 2001 with the advent of a FAD management policy there is 1] a limit on the number of fads per vessels, and 2] FAD locations are pre-notified, and the position is relatively easy to check because they are anchored. When there is FAD attrition, pre-notified FADs may be replaced.

14. **Indonesia** working with CSIRO has been conducting hydro-acoustic studies to determine the behavior of tuna on FADs. Indonesia has submitted papers at SC12, detailing FAD operation in WCPF and archipelagic waters. However, estimating the total number of FADs is difficult due to the commercial confidentiality of FAD locations; there may be 100s or 1000s of fads unaccounted for. It is noted that Noted that a large number of yellowfin, bigeye and skipjack tuna landed from the FAD fisheries are juvenile.

15. **FSM** reminded the working group that 90% of FAD fishing occurs under areas of national jurisdiction, PNA has considered FAD management options and is conducting FAD tracking trials, and to that end PNA has looked for cooperation with the fishing partners to obtain direct data from buoys. Next year fishing companies will have to provide improved FAD data upon registration for the PNA VDS.

16. **NZ** corrected an item in the Summary Report of the previous WG meeting; this was in relation to para 65 which stated that FADs in national waters are marked, however there are **NO** FADs in NZ waters and this comment referred to FADs in non NZ national waters. The Secretariat undertook to work with NZ to make the necessary correction in the version of FAD-MgmtOptions-IWG01 summary report that is posted on the WCPFC website.

## 3. Presentation on recent research initiatives and updates on relevant international developments

### SPC

17. SPC [Graham Pilling] presented some ongoing scientific research that could inform FAD management options, including: bigeye hotspots; oceanographic influences on catch rates; and BET and YFT behaviour in relation to vertically migrations (Presentation 3.1). A bigeye hotspot paper was presented in SC11 MI WP 07 – and subsequent European Union funding is supporting a more detailed analysis of hotspots – especially in relation vessel characteristics and spatial analysis with the intention of informing potential mitigation options. Challenges were listed – vessel characteristics are not necessarily reliable in fishing vessel registers, variability in CPUE between vessels and between sets by individual vessels can hamper analyses by fleet, spatial separation of fishing activity can limit analyses between vessels since differences may be driven by spatial factors, and oceanographic influences such as El Nino conditions are another confounding factor. Changing fishing patterns in El Nino were described and in particular how the depth of thermocline within the WCPO may affect catchability where for example deeper thermoclines in the eastern central Pacific during El Nino conditions may reduce their availability to shallow purse seine gears, compared to the shallower thermocline in La Nina years. Archival tag data have been used in modelling to analyse the vertical migrations/behaviours of skipjack tuna and how this behavior may be modified at FADs. The residency of tuna on FADs prior to capture appears to be short, suggesting that limiting the number of FAD sets may be a straightforward option to reduce catches (although clearly that would require further analyses). An additional concern, especially for skipjack, is the development of a standardized CPUE abundance series - pole and line is used currently but as those fishery operations decline the use of these data are becoming more challenging. In turn, contribution of the work in understanding effort creep is considered important.

18. Points raised in the discussions following the presentation included:

- The extent to which the fishes' residence time on FADs might affect management, and a view as expressed that if fish are not resident on FADs then setting events are a more important factor for management than the number of FADs;
- Noting the results of the analysis might be important information for the Commission for future management of tropical tunas, especially bigeye;
- A request from Japan that SPC provide information on the proportion of high seas and waters under national jurisdiction about high bigeye CPUE from FAD set area;
- Interest in the factors that affect CPUE on FADs, and the core issue of CPUE with regard to juvenile bigeye tuna mortality;
- Interest in hotspot research, noting that work presented to date is preliminary and further research is expected to be more robust and will be presented to SC13 and is referenced in the draft FAD research plan.
- Whether there were differences in outcomes of bigeye tuna hotspot analysis compared to the SKJ hotspot analysis? SPC responded that the ongoing work will hopefully answer this questions, with the caveat that during El Nino years there is likely to be a greater spatial separation between the stocks
- Noting that it would be useful to expand analyses outside of 2011 – 2014 years including recent years. However in earlier years, species identification is an issue in the data when there was lower observer coverage, but it would be considered

## European Union

19. The European Union [Angela Martini] submitted two information papers to SC12 related to FAD Research. One was on biodegradable twines used in FAD construction. There is additional European Union funded work on biodegradable FADs. A second project is looking at buoy based research on abundance of tuna. Another project, CECOFAD [Catch Effort and eCOsystem impacts of FAD-fishing] [http://www.cecofad.eu/ ] provides insight in CPUE to obtain standardised abundance on uveniles. Another European Union funded project, this one with IATTC is on post-release survival rate in longline fisheries conducted in the EPO. A similar project may be developed with ABNJ to conduct similar research focused on sharks.

20. The Chair acknowledged that research on tuna abundance on buoys is related to future technologies and may be followed up in the research plan. He also noted that a great deal of research is being conducted in relation to the use of biodegradable materials, however consideration must be given to the rate of attrition and replacement of FADs, which were respectively important in relation to marine debris/waste and cost implications.

21. European Union noted that there were several knock on advantages in that recycled biodegradable materials may be utilised and the buoys may be constructed locally and contribute to local employment.

## PNA

22. PNA Office [Maurice Brownjohn] presented to the meeting (Presentation 4.2). The presentation noted the relatively small amount of basic data related to FADs, against a background of rapidly developing FAD technology. FADs are monitored with associated data from purse seiners. Tracking and sonar data collected by industry will be provided to PNA and shared with SPC for detailed analysis. Some vessels fish on FADs which were deployed by other vessels. FADs are stolen and re-buoyed and so there are several black holes in terms of data, hence improved monitoring of FAD to better manage them is critical. Hawaiian research on anchored FAD tuna residence was referenced, noting that tuna may behave differently elsewhere and on other types of FAD. Areas of potential future research were presented. Differing fishing methods and gear were described and how this core data is important in terms of research. Lost FAD impacts include ghost fishing, reef damage and marine debris. The data gathered from FADs e.g SST and current data would add considerably to existing data sets. Sonar on FADs may indicate species by depth and size on FADs. This data can be used to monitor FAD activity over time and analyse potential movement of FAD associated fish. All of this information can be useful in terms of conducting stock assessments. Where sonar is used it is possible to guide fisheries to take larger schools with a lower proportion of bycatch. The presentation concluded with a summary of PNA FAD research aims.

23. Points raised in the discussions following the presentation included:

- A query about how PNA distinguishes free school fishing and FAD fishing under the MSC. The response was that MSC free school certification is premised on chain of custody, not on reports by the captain nor the observer. There is an increased market demand for free school caught tuna, hence purse seiners are increasingly targeting free schools.
- A query about the extent to which consideration is given to fish that are carried by drifting FADs into different zones; noting that some of zones may be non-fishing. The response was that PNA recognised the need for more research on the issue of fish residence on ‘lost’ FADs and referred

to existing work on geo-fencing. There is evidence to indicate that FAD based fish are of a lower weight and poorer condition when compared with free school fish.

- Noting that PNG has done considerable work with SPC on tuna tagging and the data is still being analysed; and
- A suggestion that another potential topic for future research might include the impacts of high density FAD fishing.

## SPC Pacific Tuna Tagging Project [PTTP]

24. SPC presented work detailed during the PTTP Steering Committee meeting in the margins of SC12 (Presentation 3.3). Future research was described including further deployment of FADs, modelling individual skipjack to include fishery and oceanographic factors; this will include the fishes' behaviour in terms of diet and interaction with FADs. The outcomes of this work should inform future tagging activities.

25. The Chair recalled the animations presented through this PTTP modelling which showed a marked school move through various areas. This work was informed by environment drivers. Similar animations showing the impact of FADs would be very useful in developing management options. Some of the FAD spatial data presented by PNA could be applied to the model to provide more useful outputs, and ideally could be used by SPC to Ground truth some of the model outputs.

## IATTC

26. European Union on behalf of IATTC detailed the activities of the IATTC FAD WG (Presentation 3.5). The mandate of the IATTC WG comes partly through an existing IATTC FAD Measure. The current status of the following activities were presented:

a. Collect and compile info on fads in the EPO,
b. Review fad data collection requirements
c. Compile information on developments in other tuna RFMOs
d. Compile information on the latest scientific information on FADs including non-entangling FADs – and identifying research priorities for research
e. Prep annual reports for the SAC including recommendations
f. Identify and review possible FAD management measures and make recommendations to the Commission.

The FADMgmtOptions-IWG meetings attention was drawn to a paper drafted by IATTC staff "Management options for FADs", noting that although the fishery environment is different in the EPO, some of the options may be worth considering by WCPFC. A key area of work relevant to WCPFC is the agreement of FAD related definitions.

27. The Chair recognised the assistance of IATTC in the provision of suggested FAD data fields in discussion during SC12. There was considerable synergy from the cooperative dialogue.

28. Points raised in the discussions following the presentation were related to the definition of FADs:

- Korea suggested that the IATTC FAD definition is more appropriate and suggested that WCPFC might reconsider its current FAD definitions;

- Japan stated that it had no intention of requesting the Commission consider a change of definition for FADs. Instead Japan sought a more practical implementation of the definition to be introduced into the work of this group.

29. The Chair directed that the subject of definition of FADs could be raised for further discussion under Agenda Item 8, Management Options.

### ISSF

30. ISSF [Claire van der Geest], presented on ISSF's FAD research, referencing observer paper OP-02 "ISSF FAD-related research and the FAD IWG FAD Management Plan" (Presentation 3.6/7.1). She presented preliminary research results of biodegradable FADs; research is investigating different construction materials and the lifetime of the subsequent FADs; other studies related to mitigation including live release from the deck and also from nets. In relation to non-entangling FADs, she highlighted that it has been an area of research for some years with results showing an increased tangling expectancy when mesh is used and different mesh sizes have varying impacts. Surface and sub-surface structures are considered noting that turtles sometime climb onto FADs. Tuna mitigation research is preliminary, focusing on acoustic discrimination, tuna behavior including related to residence times and vertical migration. Diurnal migration patterns vary between species, noting the importance of crepuscular movements. Acoustic tagging shows similar directions of vertical migration across all tuna species. It was interesting to note that some research indicates setting shallow may not mitigate catches of bigeye. Research continues on mixed schools of key tuna species 7ehavior. There are promising results from acoustic work, with good results for skipjack and bigeye but it is not yet possible to distinguish yellowfin tuna from yellowfin. Future research will include work on the impact of technology creep on CPUE.

31. Points raised in the discussion that followed the presentation included:
- Noting the importance of proposed research on the impact of technology creep on CPUE;
- A comment that catchability and price were likely to be important considerations for the spread of non-entanglement FAD among fishermen. In response, ISSF confirmed that catchability is the same on non-entangling and traditional design FADs; and industry advised that the cost of non-entangling FADs is not significantly higher.
- Indonesia noted that it is conducting similar acoustic tagging work in the Indonesian Ocean, using different frequency transponders to distinguish species. Indonesia suggested that there may be an opportunity to do cooperative research with ISSF. In response, ISSF is happy to discuss potential cooperation outside the meeting and will put Indonesia in contact with the appropriate ISSF researcher.
- In response to a query about whether there was any other relevant work in the pipeline, ISSF said that there was an intention to conduct x-ray studies to inform species identification for acoustic studies.

## 4. Marking and Monitoring of FADs

### Presentation on development of FAO guidelines for fishing gear marking

32. FAO (Francis Chopin) gave a brief overview of FAO member driven processes, describing the activities of the Committee on Fisheries (COFI) and FAO Fisheries and Aquaculture Department which is

effectively the secretariat to COFI (Presentation 4.1). Marking of fishing vessels and their gear has been on the FAO agenda for many decades. Outside of areas of national jurisdiction there is very little registration of fishing gears, this makes it difficult to identify owners of gear, abandoned lost or discarded at sea with a range of potential associated issues, including interactions with wildlife or with other fishing gear or shipping. Lost fishing gear may be subject to MARPOL regulations with regard to discard of plastics in the ocean. FAO undertakes expert consultations, the experts must have wide global representation but most important they must be established experts in the field. Guidelines prepared for the marking of gear are:

a. intended for guidance
b. not over prescriptive
c. developed as a minimum criteria which may be further developed by enacting agency
d. in line with existing instruments [e.g. MARPOL]
e. based on risk assessment dependent upon need and cost effectiveness

The purpose of the draft guidelines and the scope and principles were described. The implementation of the guidelines is the responsibility of the States RFMOs and the fishing sector. The technical consultation on FAD Marking should be completed in time for the next meeting of COFI.

33. The Chair thanked FAO for the presentation, and noted the importance of keeping abreast of global processes when developing regional initiatives.

## Presentation of Consultancy Report on FAD Marking and Monitoring

34. The Chair reminded participants that there are three of five terms of reference for the FAD-MgmtOptions-IWG which relate to the topic of marking and monitoring of FADs, and that the Commission had agreed in the 2016 FAD-MgmtOptions-IWG workplan that a consultancy would be undertaken early in 2016 to produce a report on options and considerations for Marking and Identification of FADs to be deployed, for consideration at SC12 and TCC12 (paragraph 594 of WCPFC12 Summary Report). The Chair introduced the consultant who would be presenting the report (Report on marking and monitoring of FADs consultancy: FAD-MgmtOptions-IWG 02-WP04).

35. Duncan Souter presented on the key outcomes of the consultancy report on FAD Marking and Monitoring (Presentation 4.3). WP04 is a draft report and feedback was welcomed, noting that the document may be updated for WCPFC13. FAD types were described, anchored, drifting and natural. He detailed the reasons for uniquely marking FADs, including legal, scientific, management & compliance and economic. Inability to track individual FADs is an impediment to research. He then detailed marking options, physical and/or electronic. FAD marking may be industry based and pros and cons with associated costs were listed with some suggested important compliance requirements. Pre-printed tags are an option. RFID and Acoustic Tags were considered but RFID operations are constrained in sea water, whereas acoustic is more promising with a range of up to 1 km. Satellite buoy based ID is an efficient option and provides information in real time and can carry biological information collected via sonar, however a notable challenge is buoy swapping. Physical and satellite buoy options could be combined. Information was presented on how other organisations/agencies have progressed marking of FADs, reviewing actions by IATTC, IOTC, PNA and PNG. Leaving aside ecosystem benefits, if stock management objectives are considered against cost benefits, then for the purse seine sector and for yellowfin & bigeye tuna, results showed a range of positive benefits from FAD marking. The proposed way forward was presented:

a. Introduce a manual marking scheme
b. Secure access to sat buy information [noting PNA has large swathes of this data]
c. Further investigate and trial alternative options

36. The Chair thanked the consultants for the report and opened the floor for comments and questions.

37. Japan asked if WCPFC introduced a FAD tracking system, would that make FAD marking redundant. In response, the consultant noted that marking using satellite is an efficient option, but as detailed earlier, if the buoy is transferred to another FAD then the information on individual FADs is compromised, hence the FAD also needs to be marked.

38. Chair noted that captains and observers will not necessarily have access to electronic information hence there is a need for other means of identifying FADs.

39. Chinese Taipei asked, given that a FAD could be any size, if a FAD was very small how it would be marked. In response, the consultant acknowledged that there are practical issues around a universal industry based marking system, and a range of designs needs to be trialed/field tested to identify which systems would work best.
The Chair added that there are a variety of marking types available, dependent upon the FAD type. A key consideration is that it should be visible from a distance and should have a radar reflective surface. Semi-submerged FADs should be marked in such a way that the mark is permanently visible.

40. European Union noted that with regard to some FADs e.g. pole and line, an observer isn't carried so fishing would be banned in that instance; and any small floating object is a FAD, so would there be a ban on natural FADs. In response, the consultant clarified that where natural FADs are set on, then a satellite buoy would have to be attached first.

41. Japan's expressed that in their view the priority in FAD management was to improve the management of tropical tuna, especially for the reduction of bigeye bycatch. Japan requested an explanation on how introduction of FAD marking would contribute in this area; the information would be beneficial for the Commission's discussion on the tropical tuna measure. In response the consultant noted that FAD Marking and monitoring identifies individual FADs and it may be possible to identify which type of FAD construction catch more or less bigeye tuna, and leading from that, FAD design may be restricted to those FADs which attract less juvenile bigeye tuna.

42. The Chair noted that there are many unaccounted FAD in the ocean and marking and numbering would help to quantify and eliminate these 'loose' FADs.

43. Chinese Taipei, sought clarification that the proposal would mean that setting would not be permitted on FADs which do not have authorized marking and given that there is a high percentage of FAD swapping, if it is not possible to set on one's own unmarked FADs that might lead to more setting on other FADs. In response the consultant noted that marking will help to identify the total number of FADs, but yes the regulation that it is not possible to set on unmarked sets might encourage fishermen to deploy more FADs.

44. Indonesia explained that it is common practice for FADs in Indonesia have a small hut which is occupied, and these FADs collaborate with fishing vessels or fishing groups. These FADs may drifting or be anchored, and these types of FADs would need to be catered for in any marking and monitoring scheme.

45. The Chair referencing the FAO presentation, noted that there are many considerations in terms of control and management of FADs and clearly there are specific regional considerations.

46. Nauru thought that it would be sensible to review IATTC activities and trials before committing to implementation here in WCPO.

47. The Chair agreed that it does make sense to keep an eye on other developments, but recognised the need to move the process forward here in the WCPO.

48. European Union informed the working group that IATTC and ICCAT have an identifiable buoy number system. It is anticipated that there will be a joint RFMO FAD WG and it makes sense to have a similar approach to that of IATTC.

49. Japan informed the FADMgmtOptions-IWG about a proposal for a FAD management resolution discussed at IATTC90 (PROPOSAL IATTC-90 A-2); this was a proposal that vessels should authorize the companies operating the satellite systems used to track FADs to provide to the IATTC the positions of each FAD from deployment to recovery with a time lag to protect the owner's proprietary information, in replacement of FAD marking scheme.

### Recommendations and next steps

50. In the discussion about next steps, the following points were raised by participants:

- A view that the working group should not specifically endorse the report and the report's findings at this stage, as a more thorough review of the report is needed;
- A suggestion that the report should still be sent to SC and TCC for their review and perhaps there could be an intercessional process for this group to more fully consider the report;
- A view that it was premature to recommend the implementation of a marking system at this time.

**51. RECOMMENDATION 1: The FADMgmtOptions-IWG recommends to WCPFC13 that it consider the consultant's report on options and considerations of implementing a marking and identification system for FADs in the WCPO (FADMgmtOptionsIWG-02 -04) be forwarded to SC13 and TCC13 for further consideration.**

## 5. Collection of additional data on FADs and their use in WCPO fisheries

### Consideration of a proposal for an initial list of FAD related data fields to be reported by vessel operators

52. The Chair provided background on SC12-ST-WP-08, noting that the paper was prepared as per the agreed workplan that set out a task "to develop an initial list of FAD related data fields to be reported by vessel operators based on ROP minimum standard data fields, and the data fields (collected by other RFMOs)." The Chair noted that the Commission decision from WCPFC12 should be bourne in mind:

"WCPFC12 Summary Report paragraph 596. The Commission agreed that vessel operators should provide data on FADs covering the following two major areas:

a. FAD design and construction of FAD to be deployed or encountered (materials, electronics, size etc)
b. FAD activity (deploying, retrieving, setting, visiting, loss etc)."

53. In response to the task and in accordance with the WCPFC12 decision, the list of data fields was developed through joint work by SPC, Secretariat and FAD IWG Chair and was based on ROP Minimum Data fields which are collected by ROP observers. Three sets of data are required: 1. Trip level data – FAD data log to be completed by vessel operator; 2. Describe FAD – to be completed by vessel operator (based on GEN5 form); 3. Set of data on FAD activities provided by observer (to verify vessel operator reporting). This list is not exclusive and there may be additional fields that may be pertinent and there may be existing complimentary ROP Data Fields. The Chair noted that there were also some synergies with IATTC form, consider fields and possibly activity codes. Comments received following SC12 from PNAO and this has been posted as FAD-IWG02-DP01.

54. Referencing the paper, and specifically page 3, Japan asked when 'the number of FADs on board the vessel' is counted given that the number may vary on a trip. In response, the ROP Coordinator explained that this is intended to enumerate the number of FADs at point of departure with an observer on board. In response to a suggestion from Japan that this be clarified on the data listing, the Chair agreed and clarified that within the proposal the data fields will be with respect to vessel logs not observers collecting data.

55. Chinese Taipei queried if the data field requirements were proposed to be specific for FADs or if it refers to Buoys. In response, the Secretariat outlined that the collection of these data fields would apply to the FADs, whereas the Buoys would be considered an attachment to the FAD. The Chair concurred.

56. In response to a request from the Chair to elaborate on their delegation paper, PNA referenced the paper which offers some refinements to the fields proposed in SC12-ST-WP-08. An agreed set of fields might be forwarded to the SC and TCC for possible further refinement. It was recognised that if some information/data recording operations are transferred from the observer to the vessel operator, the observer's role would be more focused on verification. It was noted that there were upcoming meetings which may also feed into this process

57. The Secretariat noted that there are some upcoming Pacific Island regional meetings at which observer collected data will be discussed. Where it is agreed that certain data fields would be collected by the vessel operator, then the observer requirement to collect that same data fields would likely be redundant. The Secretariat confirmed that the usual process was that recommendations of changes to the ROP data fields, are usually first considered by the SC and TCC and if agreed recommended to the Commission for their consideration.

58. PNA suggested a way forward with a recommendation to forward selected data fields to SC12 and TCC for their review and for them to then make recommendations to WCPFC14. At the request of the Chair, PNA agreed to draft recommendation text for participants review.

59. The European Union explained that IATTC form has been developed in a wide consultation with scientists, managers and the industry and that it would be adequate to consider this form when developing the WCPFC one. The EU believes that there is the need to somehow harmonize FAD logbook data collection and reporting formats among tuna RFMOs.

60. PNA agreed that IATTC data fields could also be part of that recommendation.

61. Subsequent discussions confirmed that the Pacific Island regional meetings referenced by the Secretariat were the PIRFO and DCC committees, which were noted to be FFA/SPC processes. Noting that not all CCMs are familiar with these organizations, the Chair proposed that perhaps the appropriate next step would be for an SPC/FFA CCM to submit relevant recommendations on any subsequent changes to the ROP minimum data fields, to SC and/or TCC under a delegation cover. This approach was supported by the working group.

**62. RECOMMENDATION 2: The FADMgmtOptions-IWG endorsed in principle the fields in the table on page 3 of the Working Paper to be provided by vessel operators and recommended that the fields be referred to the SC and TCC for further consideration (Attachment C).**

**63. RECOMMENDATION 3: The FADMgmtOptions-IWG recommended that the issue of data to be provided by observers be referred to SC13 and TCC13, and CCMs were encouraged to provide delegation papers on this aspect.**

**64. RECOMMENDATION 4: The FADMgmtOptions-IWG recommended that the elaboration of the data fields to be provided by vessel operators should take into account the data fields for provision of FAD data by vessel operators by the IATTC.**

### Next steps for data Standards for Paper-based and e-forms

65. Chair explained that the ROP was used as a basis for this work because it already existed, they are already used for paper and electronic reporting and they are used for both logsheets and observer forms.

66. FSM how will these developments be implemented, to ensure that existing data isn't compromised and the matter of training new staff to collect data? How will all these initiatives be operationalized?

67. The Secretariat noted that this work is directed by the Commission, and is at an early stage within the Commission Process, and any working group recommendations would be reviewed next year at SC and TCC. At that time there would be consideration of how the proposed data fields would be operationalized.

68. SPC commented that it is already the case that logsheets provide the data to SPC.

## 6. FAD Research Plan

### Consideration of a proposed FAD Research Plan

69. The Chair referencing SC12-ST-WP-06 explained the background of the research plan and its further development prior to and during SC12. At FADMgmtOptions-IWG01, it was recognized that it was important for further research and data collection to be undertaken to support/inform further discussions on candidate FAD management options within the WCPFC context. During the meeting a presentation was provided by SPC of some ideas for a research plan, and this formed the basis of a consultation

document containing an outline of a draft research plan on FADs was developed during the 2015 meeting. The outline contains broad categories including FAD design and tuna behaviour, hotspots, acoustic FAD information, and fleet behaviour on which specific analysis would be done to inform discussions about and the management of FADs. At WCPFC12 the Commission tasked the Secretariat and Scientific Services Provider to work with the FADMgmtOptions-IWG Chair and Vice-Chair to further develop the draft outline of a research plan in 2016, directing that it should incorporate some consideration of costs and benefits of various research and data collection activities to assist with prioritizing the work, and consider target and non-target species. The outcome of this work was presented to SC12 as ST-WP-06. The Chair asked the floor to consider the proposed priority research areas and provide input.

70. The subsequent discussions focused on the research priorities and some changes were made onscreen to the priority level and scope of work within Table 1 in the document and to the cost-benefit discussion section in the document. Points raised in the discussion were:

- Japan recalling its intervention at the SC12 plenary meeting, supported research priorities especially for research on fleet behaviour and hotspot analysis;
- NZ recognizing limitations of data to support SPC research, queried whether there needs to be some reference to this issue in the research plan. In response, SPC reiterated key areas of uncertainty are vessel characteristics, observer data on FAD design marking and tracking. Improved support of this information would be valuable;
- Nauru and Kiribati, on behalf of PNA members, identified high and low priority areas for PNA members and proposed approaches to advance these recommendations. The PNA intervention was applied to the research priority table onscreen for review by the group;
- European Union noted that the hotspot analysis should include modelling related to climate/environmental change. Non-entangling FAD design is another important area of research. European Union requested that Hotspot Analysis be given at least a medium priority, given its importance even though the work is already funded and noted that Acoustic FAD research is already being done so perhaps this should be a low priority;
- SPC mentioned that there was some FAD design work in IATTC, the results from which were not promising at the moment. That work may not be progressed in the WCPO. SPC also pointed out that existing contracts would be delivered regardless of the prioritization of research by this group;
- In response to a query, the Chair clarified that the support column in the table refers to whether there is existing funding to support the proposed research, and noted that changes in ranking may now help to ensure that resources tagged for work which might otherwise fall under the radar;
- In response to a query, the Chair clarified that desktop studies refer to areas where SPC already has data and this is detailed in the body of the report, two of the studies would require field work;
- In response to a query on the timelines for FAD design, the Chair explained that previous studies using ROP data recognised issues related to identification and tracking of individual FADs, and so that work and associated data gathering needs to have taken place before the FAD design study can progress.
- ISSF reminded the group of the non-entangling FAD research results as outlined in OP01 on FAD design, and collaborative research should be encouraged including implementing precautionary management using research results to date.

71. The Chair noted that there could be some merit in including some indicative costings for the various proposed research tasks, into the version of the draft FAD research plan that is to be tabled at

WCPFC13. The Chair undertook to work with the SPC and the Secretariat to see what might be possible to be completed in advance of WCPFC13.

**72. RECOMMENDATION 5: The FADMgmtOptions-IWG recommends that WCPFC13 considers the revised draft FAD research plan proposal (Attachment D – ST-WP-06 as amended onscreen)**

## 7. Presentation on current management initiatives

### ISSF – FAD Entanglement research

73. ISSF reiterated that their research on non-entangling FADs has been conducted with industry and the risk ranking for non-entangling FADs was considered to be a non –prescriptive, but precautionary, way for tRFMOs to consider their use against a background of ongoing research. (Presentation 3.6/7.1)

### PEW – Summary of existing measures

74. PEW made a presentation (Presentation 7.2) summarizing existing measures, first considering that the goal of FAD management should be to enable their use within safe biological parameters. A chart compared FAD related measures across tRFMOs. Each RFMO has a different approach to FAD management; WCPFC has the least FAD measures against a background of having the largest number of FAD deployments, compared to other tRFMOs. None of the tRFMOs have a systematic approach to FAD management. There was an overview of the FAD management plans presented on the WCPFC website, concluding that no CCM plans met minimum criteria, the plans range widely in format and detail, some plans are out of date and the plans are not suitable as an information gathering tool. The FAD closure has not met its aim of reducing catches of juvenile bigeye. Options for FAD management options were listed, noting that FAD set limitation may be an effective measure. A recommended approach was presented including data collection and protocols to minimize ecosystem impacts, FAD tracking to provide information for scientific research, and establishing set limits as a measure to manage bigeye mortality that can be adjusted upon receipt of research results.

75. USA with regard to FAD national management plans, where decisions are devolved to the membership, there is an incentive for members to do the minimum amount of work. If the minimum requirements of those plans were met – how useful would those plans be?

76. PEW the plans could benefit from additional items, such as information on the use of support vessels, but even the current minimum requirement would be useful.

77. Japan noted that it would be interesting at results of the next stock assessment of bigeye scheduled to be conducted in 2017 to see how the introduction of FAD Management measures may help to recover this stock, which is now below the LRP.

### PNA

78. PNA presented (Presentation 7.3) FAD sets over time, both PNA and non-PNA, showing reduced use of FADs in recent years and then considered FAD catches for the same period. Existing FAD management and legislation in PNA waters were listed including national laws and PNA measures. VDS

effects were presented showing an overall decline in the fleets since 2010 plus a redistribution of FAD use over time and between fleets. Over the last few years, fleets with a high dependence on FADs are losing the bids for VDS. The presentation detailed the key factors in managing the fishery under the PNA. In concluding, additional FAD management options on the PNA Agenda were described, including FAD charging, MSC certification, and extension of catch retention and FAD deployment limits. Actions under consideration in the longer term include, zone based FAD limits, FAD ownership and rental, tighter legal control and other industry based arrangements. Finally management options **NOT** on the PNA agenda include, national FAD management plans, hotspot and time area closures and flag-based/vessel FAD set limits.

## 8. Management options

### Consideration of a discussion paper

79. The Chair presented 'A discussion paper to inform FAD management options for the WCPFC' [FADMgmtOptions-IWG02-05]. In preparing this paper, the author considered UNCLOS, the UN Fish Stocks agreement, especially UNFDA Articles 5d and 7. He iterated some key questions, the options available to manage FADs and in proposing a way forward suggested the following:

a. Change the suggested guidelines for preparation of FAD Management Plans to become the "Requirements for the Preparation of FAD Management Plans"
b. The completeness of existing FAD management plans should be consistent with agreed guidelines and specify the number of FADs to be deployed per year per fishing vessel.
c. Consistent with recommendations with the FAD marking and monitoring consultancy report for CCMs to develop an identification and monitoring system for FADs as part of the FAD management plans

80. Japan appreciated the work of the Chair, made a general comment to add another element – the purpose of FAD Management. For this CCM, that is the improvement of tropical tuna especially the stock health of bigeye tuna. Japan also mentioned decrease of amount of bycatch of other species for example sharks, which was presented by ISSF.

81. Some CCMs noted that the paper was received during the meeting and certain aspects in the paper would need further review and consideration back at capital before these CCMs were in a position to provide detailed comments. The Chair confirmed that the paper is intended to provide a starting point for discussions.

82. Japan recognized importance of one key question raised by the paper: does a FAD in the water constitute fishing? This CCM explained the reason that this question might challenge the definition of FAD used cuurently. A chop stick in water does not constitute fishing although it is defined as FAD in accordance with paragraph 3 of CMM2009-02. Reiterating that it doesn't dispute the definition of FADs, Japan considered that was useful question for consideration of practical implementation of the definition..

83. Korea reiterated his earlier comments where a small item [plastic bag] was found in the set would be considered a FAD set. Hence Korea would like to revisit the definition of FADs, and perhaps reviewing definitions applied by other RFMOs

84. Secretariat referred participants to CMM2009-02 para 2 which provides the agreed definition of FADs as it applies during the FAD closure in high seas waters of the Convention Area. The definition was developed noting the definition of FADs used by the PNA through the 3IA.

85. Indonesia understands that FADs attract fish, and improve the efficiency and productivity of fishing operations. But there are many types of FADs, and often purse seiners may apply a light to attract more fish under FADs. Indonesia noted that using light as an attractant hasn't been addressed in this FADMgmtOptions-IWG meeting.

86. USA noted that with regard to the suggestion in the paper to modify guidelines for FAD management plans, perhaps the current guidelines already have some mandatory elements given that the word 'shall' is used.

87. Japan suggested that management of FADs may be incorporated in the CMM for tropical tuna. Japan asked for more information on how the existing paragraphs of FAD management plan (paragraph 37 and 38 of CMM2015-01) were drafted.

88. PEW expressed their view that the Commission should improve the collection of data on FADs, the number deployed, their locations and fates, their composition, the use of support vessels, and recommended that the Commission establish mechanisms that assure timely and updated reporting of this data. PEW continues to urge that the Commission establish measures that directly control bigeye mortality in the purse seine fishery, and supports improving controls on a gear that can currently be deployed in unlimited numbers.

89. Noting that there were no further participants seeking the floor, the Chair thanked the participants for their views on the paper.

## 9. General Discussion and Next Steps

90. The Chair noted that the priority work for the Commission next year would likely be around the bridging measure for tropical tuna. The Chair asked meeting participants to consider whether the issues tasked to the FAD IWG have been progressed far enough, e.g. FAD marking and tracking and the research plan, that they can be forwarded to the SC and TCC to further the process? With regard to the agreed workplan 4 of 5 of the terms of the reference are complete. The final area of the TORs is on management options, and the question for participants is whether this is better discussed in the context of the tropical tuna measure.

91. Japan thought that this working group should be continued for the collaborative work of IATTC FAD WG. This CCM suggested that FAD management options should be discussed in developing the tropical tuna measure.

92. The Secretariat referred participants to the Terms of Reference for the FADMgmtOptions-IWG and noted that the working group through the two meetings has produced outputs on all five terms of reference that are listed as tasks for the IWG, presently it would not appear that there are any other task The suggestion from the Chair was that further work on the items in the terms of reference could perhaps be continued through existing bodies such as SC, TCC and the Commission.

93. Nauru supported the suspension of this working group next year. Communication of the group may be intercessional and electronic.

94. The Chair then suggested that if there is no immediate appetite to hold a meeting of this working group next year, then the working group may be suspended until and unless there is a reason to re-establish it.

95. European Union support the continuation of the working group, noting that there is a joint tRFMO working group next on FAD management. It was also queried whether the WG or the Commission would determine whether the WG would stay active.

96. The Chair indicated that the decision to maintain the working group was the Commissions. The group could operate electronically without having a formal meeting as suggested by Nauru. The secretariat has not been advised of a joint tRFMO FAD management meeting.

**97. RECOMMENDATION 6: The FADMgmtOptions-IWG recommends that a formal meeting of the working group is not envisaged during 2017.**

98. The Chair brought up the issue of elections for a Chair and Vice-Chair. There is a vacancy for the position of Vice-Chair and the participants are asked to consider nominations in time for the Commission meeting if not before.

## 10. Close

99. The Executive Director confirmed that the afternoon tea would be served at the Commission Headquarters.

100. The Chair reiterated his thanks to the previous Vice-Chair, Ray Clarke, for his contributions to the working group, and for presenters and their support at this two-day FAD MgmtOptions-IWG meeting.

101. The Chair officially declared the plenary meeting of the 2nd FADMgmtOptions-IWG closed at 3pm on 29 September 2016.

## Attachment A: Agenda

**2nd MEETING OF THE FAD MANAGEMENT OPTIONS INTERSESSIONAL WORKING GROUP**

Pohnpei, Federated States of Micronesia

**28 – 29 September 2016**

**AGENDA**

| | |
|---|---|
| **AGENDA ITEM 1.** | **WELCOME AND OPENING (Wednesday 28 Sept 2016)** |
| 1.1 | Opening |
| 1.2 | Adoption of agenda |
| 1.3 | Meeting arrangements |
| | |
| **AGENDA ITEM 2.** | **REVIEW OF ACTIVITIES** |
| 2.1 | Review Terms of Reference and intercessional activities |
| 2.2 | Updates from CCMs |
| 2.3 | Updates from other organizations |
| | |
| **AGENDA ITEM 3.** | **PRESENTATION ON SOME RECENT RESEARCH INITIATIVES** |
| 3.1 | SPC-OFP |
| 3.2 | European Union (EU) |
| 3.3 | PNA |
| 3.4 | Pacific Tuna Tagging Project (PTTP) - SPC |
| 3.5 | IATTC |
| 3.6 | ISSF |
| 3.7 | Others |
| | |
| **AGENDA ITEM 4.** | **MARKING AND MONITORING OF FADS** |
| 4.1 | FAO – development of guidelines for fishing gear marking |
| 4.2 | PNA – Report on FAD tracking trial |
| *4.3* | Presentation of Consultancy Report |
| 4.4 | General discussion |
| 4.5 | Recommendations and next steps |
| | |
| **AGENDA ITEM 5.** | **COLLECTION OF ADDITIONAL DATA FIELDS AND THEIR USE IN WCPO FISHERIES** |
| 5.1 | Consideration of a proposal for an initial list of FAD related data fields to be reported by vessel operators |
| 5.2 | Next steps for data Standards for Paper-based and e-forms |
| | |
| **AGENDA ITEM 6.** | **FAD RESEARCH PLAN** |
| 6.1 | Consideration of a proposed FAD Research Plan |
| 6.2 | General discussion |
| 6.3 | Recommendations and next steps |

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| **AGENDA ITEM 7. PRESENTATIONS ON CURRENT MANAGEMENT INITIATIVES** |
| 7.1 ISSF – FAD Entanglement research |
| 7.2 PEW – Summary of existing measures |
| 7.3 PNA |
| 7.4 Other CCMs |
| |
| **AGENDA ITEM 8. MANAGEMENT OPTIONS** |
| 8.1 Consideration of a discussion paper |
| 8.2 General discussion |
| 8.3 Recommendations and next steps |
| |
| **AGENDA ITEM 9. GENERAL DISCUSSION AND NEXT STEPS** |
| 9.1 Finalize Recommendations and adopt report |
| 9.2 Election of Chair and Vice-Chair |
| |
| **AGENDA ITEM 10. CLOSE** |
| |

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## Attachment C: FAD related data fields to be reported by vessel operators based on ROP minimum standard data fields, and the data fields (collected by other RFMOs)

| **FAD Fields seen as basic to collection for Vessel logs for individual FADS** | |
|---|---|
| Vessel IRCS | **MATERIALS FAD IS MADE FROM**<br>**Codes for FAD Main Materials**<br>1 Logs / trees / branches<br>2 Timber / planks / pallets / spools<br>3 PVC or plastic tubing<br>4 Plastic drums<br>5 Plastic sheeting<br>6 Metal drums (i.e. 44gal)<br>7 Philippines design drum FAD<br>8 Bamboo / Cane<br>9 Floats / Corks<br>10 Other (Describe) |
| WCPFC VID | |
| IMO Number | |
| Page Number | |
| Captain/Vessel Master Name | |
| Vessel Owner or Company | |
| Number of FADS onboard Vessel (at commencement of trip) | **Attachments**<br>**Codes for FAD Attachments**<br>11 Chain /Cable rings /Weights<br>12 Cord/Rope<br>13 Netting hanging underneath FAD<br>14 Bair containers<br>15 Sacking /Bagging<br>16 Coconut fronds/Tree branches<br>17 Other materials (Describe) |
| Number of FADs Deployed by Vessel (Current) or previous trip. | |
| FAD Number/s and/or Markings | |
| Date/Time – Lat. & Long when FAD Deployed | **Electronic Associated With FAD**<br>1 Radio buoy (with identification)<br>2 Radio buoy -unidentified<br>3 GPS buoy (with identification)<br>4 GPS buoy - unidentified<br>5 Sounder buoy (with identification)<br>6 Sounder buoy - unidentified<br>7 Light buoy<br>8 Other (describe) |
| Date/ Time –Lat. & Long when FAD if Retrieved | |
| Date/Time – Lat. and Long of FAD if Investigated only | |
| Date/Time – Lat. and Long of FAD if Fished. (Set Made) | **HOW FAD IS Found/Detected**<br>1 Seen from vessel (No other Method)<br>2 Reported by Helicopter<br>3 Marked with Radio Beacon<br>4 Using Bird Radar<br>6 Information from other vessel<br>7 F A D i s Anchored (GPS)<br>8 Marked with Satellite/GPS beacon<br>9 Navigation Radar<br>10 Lights |
| Date/Time – Lat. and Long of FAD if Serviced | |
| FAD – Drifting or Anchored (Circle) | |
| List all Main Construction Materials FAD is made from using Codes | |
| List all Construction Attachments to FADS using Codes | |
| Size of Main FAD. – Record the width, breadth, depth of the main body of the FADs deployed by the vessel | |
| Depth of Netting bait boxes etc or Materials hanging from Main FAD | |
| List FAD Electronic Attachments using Codes | |

| | |
|---|---|
| List Electronic Attachments numbers and or markings | 11 Flock of Birds sighted from vessel<br>12 Other - please specify |
| How was FAD Located use codes | **FAD ACTIVITY**<br>Codes for FAD Activity<br>1 Setting on FAD<br>2 Deploying FAD<br>3 Servicing FAD<br>4 Retrieving FAD<br>5. Vessel drifting beside FAD<br>6. Vessel setting close to FAD<br>7 Vessel using lights of boat or light boat<br>8 Other (Describe)<br>9 Investigate FAD using sonar/sounder |
| List any vessel activity involving FADS use codes | |
| | |
| | |

Attachment D: Draft FAD Research Plan

# A proposal for a research plan to inform FAD management options for the WCPFC[2]

## Executive Summary

At WCPFC11, the Commission formed a FAD management options working group to review reference papers on FADs as well as any relevant information and advice from the Scientific Committee and Technical & Compliance Committee and provide recommendations on a variety of FAD-related issues.
The IWG recommends that the Commission task the Secretariat and Scientific Services Provider to work with the IWG Chair and Vice-Chair to further develop the draft research plan in 2016,
The IWG considered a consultation document containing an outline of a draft research plan on FADs, which was developed during the 2015 meeting. The outline contains broad categories including FAD design and tuna behaviour, hotspots, acoustic FAD information, and fleet behaviour on which specific analysis would be done to inform discussions about and the management of FADs. WCPFC12 recommended that the draft research plan for FADs would be considered a living document and would go to SC12 and TCC12 for their input prior to WCPFC13.
The research plan proposal presented here incorporates some consideration of the costs and benefits of various research and data collection activities to assist with informing prioritizing the work.

## 1. Foreword

WCPFC12 recommended that the draft research plan for FADs would be considered a living document and would go to SC12 and TCC12 for their input prior to WCPFC13. This paper represents the Chair's initial draft proposal for a research plan taking into consideration work currently being undertaken. Comments and input from SC12 and TCC12 shall be incorporated into the draft for presentation to the 2nd FAD Management Options Inter-sessional Working Group Meeting to be held immediately following TCC12 before consideration by WCPFC13.

[2] Informal discussion has been had with the science service provider in the formulation of this research proposal.

## 2. Introduction

Since the inaugural session of the Commission there has been a strong emphasis on the importance of managing the use of floating objects, including fish aggregation devices (FAD) in relation to the catch of non-target species.
In 2008 WCPFC adopted CMM-2008-01, which to a large extent was the first action the WCPFC had taken to address the use of FADs in the purse seine fishery. A seasonal closure for FAD fishing was an integral part of CMM-2008-01 as well as the development of FAD management plans by WCPFC members. Successive iterations of CMM-2008-01 have been limited, due to various considerations, in improving on the prescribed FAD management arrangements prescribed in Attachment E of CMM-2008-01.
The Western and Central Pacific Fisheries Commission's (WCPFC) responsibilities for managing and conserving target and non-target species caught in relation to FAD sets in the Western and Central Pacific Ocean (WCPO) derive from inter alia Articles 5(d) and 10.1(c) of the Convention, which state that

> *"[the members of the Commission shall] assess the impacts of fishing, other human activities and environmental factors on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks"*
> and
> *"[the functions of the Commission shall be to] adopt, where necessary, conservation and management measures (CMMs) and recommendations for non-target species and species dependent on or associated with the target stocks, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened"*

At WCPFC11, the Commission formed a FAD management options working group to review reference papers on FADs as well as any relevant information and advice from the Scientific Committee and Technical & Compliance Committee and provide recommendations on a variety of FAD-related issues.
The FAD Management Options Inter-sessional Working Group (IWG) first meeting was held on 27-28th November in Bali, Indonesia.
The IWG recognized the importance of further research and data collection being undertaken to support/inform further discussions on candidate FAD management options within the WCPFC context.
The IWG considered a consultation document containing an outline of a draft research plan on FADs, which was developed during the 2015 meeting. The outline contains broad categories including FAD design and tuna behaviour, hotspots, acoustic FAD information, and fleet behaviour on which specific analysis would be done to inform discussions about and the management of FADs. IWG participants could provide any editorial comments on Attachment D to the IWG Chair, for consideration in a revised document to be presented to WCPFC12.
The IWG recommends that the Commission task the Secretariat and Scientific Services Provider to work with the IWG Chair and Vice-Chair to further develop the draft research plan in 2016, based on Attachment D or its revision. The draft plan should incorporate some consideration of costs and benefits of various research and data collection

activities to assist with informing prioritizing the work. Consideration should also be given within the plan to addressing both target and non-target species.

## 3. Research Focus

This research proposal seeks to expand on the elements presented in Attachment D or its revision of the IWG report to WCPFC12. The focus of the research shall be to mitigate the catch of non-target species, characterise effort creep due to FAD use, improve biomass estimates using instrumented FADs iinvestigate and assess the extent of the interaction between non-target species with the purse seine fishery and the effects of FAD density on target species catch rates in order to develop options for improvements to the current management measures in place for FAD use in the purse seine fishery.
The findings from this research proposal shall be used to design future management measures that mitigate the catch of non-target species caught in association with FAD sets and minimize the impact on the fishery for the target species.

## 4. Work Programme

The work programme is comprised of a combination of desktop activities and, field activities.

### 4.1 Desktop Activities

The desktop activities shall consist of one data collation and compilation activity and possibly four analyses activities.

*I. Construction of a species specific set level catch data set*

In order to assess this a historic catch records need to be collected and species composition of principal target species determined. Observer species composition data have been shown to exhibit some bias so they data will have to be corrected using spill sampling data. Consideration will also need to be given to the early misidentification of frozen bigeye and yellowfin. In addition bycatch data will also need to be collected and species composition determined for the same time series as the target species.
The kind of work to be carried out can be found in working paper SC12-ST-IP-03.

*II. Characteristics of top purse seine vessels catching non-target species*

Once completed, the species-specific set level catch data set can be used to build on the work done by Harley et al. (2015). They found that some vessels caught significantly higher volumes of non-target species compared to others. A vessel league table could be then constructed to identify and compare the factors underpinning the performance of the top, intermediate and bottom vessels in terms of non-target species catch.

*III. Spatial management considerations*

The catch of non-target species differs spatially in the WCPO region, both in terms of longitudinal and latitudinal differences. Blunt management instruments like seasonal FAD closures do not account for these differences. As such spatial management consideration should be given to extend the work of Harley et al. (2015) to identify ‘hotspots’ for non-target species as well as for effects of FAD density on catch rates of target species based on various criteria.

## 4.2 Methodology

I. *Construction of a species specific set level catch data set*

The construction of the data set(s) will be an extension of that described in Harley et al. (2015), which covered the period 2010-2013. The construction of the data set(s) will link all available observer records and the fishing vessel logsheets. The pertinent observer records are the vessel activity report (PS-2), catch record (PS-3), and length and species composition sampling observer forms (PS-4).

To fulfill the objective of research on FAD design on mitigating the catch of non-target species as recommended by the IWG a link between the observer form for species of special interest (GEN-2) and the FAD monitoring forms (GEN-5) needs to be made to further the work of Abascal et al. (2014). This work will however require the unique identification of FADs to track the success of FAD designs in mitigating the catch of non-target species as well as the effective soak time and the attrition rate of different FAD designs. There is a parallel discussion of FAD marking and identification that shall not be entered into here.

*II. Analysis of factors related to the occurrence of non-target species in purse seine catches*

Modern statistical methods will be employed to tease out the particular nature of the interaction between non-target species caught in association with FAD sets and the purse seine fishery. The species-specific set level catch data set will be investigated with statistical techniques such as generalized linear models (GLM), generalized additive models (GAM), and regression trees. This will seek to identify specific variables associated with high non-target species interactions such as season, vessel, location, set type and FAD design,

*III. Characteristics of top purse seine vessels catching non-target species*

The species-specific set level catch data set will be investigated with statistical techniques to generate purse seine catch estimates at the vessel level for non-target species caught in association with FAD sets. The fishing characteristics of these vessels will be compared in the form of simple data summaries as in Table 3 of Harley et al. (2015) and vessels will be assigned a rank of high, intermediate, and low, in terms of their catch of non-target species. This will supplement the analyses carried out in activity II above and provide the ‘vessel league table’ of the top catching vessels for non-target species and the operational characteristics that underpin their performance.

*IV. Spatial management considerations*

Extending the hotspot analysis of Harley et al. (2015) and the use of the species-specific set level catch data set, hotspots for purse seine catches of non-target species, CPUE, and proportion will be identified using statistical spatial analysis techniques which will allow the identification of adjacent hotspot regions.

For these regions the percentage of overall catches of non-target species and total purse seine catch taken in these hotspots will be calculated. The calculations will also be undertaken at the fleet level, and hotspots will also be described in terms of the EEZs that they may occur in or overlap. Changes in temporal stability in terms of occurrence and spread will also need to be assessed.

## 4.3 Field Activities

*I. Tuna Behaviour*

Tagging studies contribute to the understanding of the behavioural dynamics of tunas in terms of movement and fishing mortality.
Tagging operations have been centred on targeting anchored FAD arrays in PNG and Solomon Islands. Getting a significant percentage of tagged yellowfin and bigeye tuna has always been a challenge during all the past tagging experiments in the western part of the Pacific Ocean. From the past tagging experiences, we learned that the TAO buoys anchored in PNG waters are also often associated with yellowfin and bigeye tuna schools. Conventional, archival and acoustic tagging of bigeye tuna associated with the TAO buoys should be considered as part of a larger scale tuna tagging program to get a better understanding of the behaviour of skipjack, yellowfin, bigeye to further this work with floating objects in the western Pacific and for stock assessments.

*II. Acoustic FAD Deployment*

The acquisition of acoustic FAD data has the potential to provide significant insights into the dynamics of the nature of the interaction between FADs and bigeye, skipjack and yellowfin tuna. The information gained from this research can inform FAD design options, FAD deployment considerations and spatial management considerations. Particularly acoustic FAD data can provide ground truthing' for the effective soak time of FADs, biomass estimates from stock assessments and FAD density effects on movement rates and the catch rates of target species or alternatively to limit catches to only FADs with large biomass to reduce proportion of non-target species caught.

## 4.4 Methodology

*I. Tuna Behaviour*

From 2008, specific tagging cruises were designed to catch and tag tuna in areas where pole and line fishing gear is not efficient due to bait ground absence. Using specific trolling gears developed in Hawaii and targeting the NOAA TAO oceanographic buoys anchored between the 180 and the 140 W longitude lines, the Central Pacific tagging cruises improved the overall spatial coverage of the PTTP tag releases.
From the past tagging experiences, we learned that the TAO buoys anchored in PNG waters are also often associated with bigeye tuna schools. These fish have been tagged using pole and line fishing vessel and gear, but rarely in good numbers.
It has been proposed to equip a training vessel with the appropriate fishing gears to assess in PNG the possibility of fish and tag bigeye tuna in the same way than the CP cruises of the Pacific Tuna Tagging Program. The vessel is based in Kavieng which is conveniently situated not too far from and in between the longitudes 147E and 156E where TAO are anchored.
A trial cruise was undertaken in August 2012 (report in Annex1), targeting the 2 TAO situated north of Manus island on the 147E longitude. This should be considered as part of a larger scale tuna-tagging project to extend the utility of tag recovery data for this work and for stock assessments.

*II. Acoustic FAD Deployment*

The Office of the Parties to the Nauru Agreement in collaboration with PEW Charitable Trusts conducted a 'proof-of-concept' trial for FAD monitoring in 2014. During this trial it became apparent acoustically-equipped drifting FADs could provide useful fishery-independent information on tuna abundance in near real time, as well as work on how

long it takes to build up a fishable biomass underneath the FAD, and whether there was evidence of FADs 'competing' for fish (in combination with information on FAD density)

## 5. Cost & Benefit for research prioritisation

In assessing the priority research areas to focus on (Table 1), the IWG recommended that the cost and benefit of the research areas be considered. In that regard, the most cost effective would be the desktop analyses for (i) Analysis of factors related to the occurrence of bigeye tuna in purse seine catches, (ii) Characteristics of top bigeye tuna catching purse seine vessels, (iii) Spatial management considerations, and (iv) FAD Design.

For the fourth desktop analysis, it is important to have a unique marking and identification system implemented for this work to add to the juvenile bigeye catch mitigation discussion as such, until that parallel discussion is completed it would be logical to assign less priority to it than the other desktop analyses. There is currently work being carried out under WCPFC Project 77, to progress these desktop analyses, with funding assistance from the European Union with work proposed to be completed by the fourth quarter of 2017. As such these will logically be assigned high priority.

In terms of the field activities (i) Tuna Behaviour and (ii) Acoustic FAD Deployment, there is support through a collaborative effort between SPC and PNG to conduct tagging of bigeye tuna on the TAO buoys in PNG waters. As the information stemming from these efforts will be realised after 24-36 months, it is logical that this be assigned a medium priority.

**Table 1. Priority Research Areas [ * = funding is available to SPC (science service provider)]**

| Research Area | Management Focus | Supported | Completion | Priority |
|---|---|---|---|---|
| **1. FAD Design** | Mitigation of non-target species catch associated with FADs through FAD design<br>Next steps:<br>Focus: develop separate costings for both:<br>reduce unwanted interactions with SSIs (sharks, turtles), and<br>reduce catch of small bigeye and yellowfin tuna<br>Review paper be prepared for SC13 on design of non-entangling FADs/BET or YFT interaction reduction (2017). Potential $$$? (where practicable draw off existing research in this and other regions)<br>SC13 Agenda Item (EB theme) to define FAD trials<br>SC13 to review draft CMM (non-entangling FAD specifically WCPFC10-DP05, other proposals) and provide scientific advice for consideration by TCC13 and WCPFC14<br>Implementation of FAD trials within the WCPO [deployment and fishing activity] (complete by mid 2018) – REQUIRES $$$ FUNDING<br>Analysis of results and presentation to SC15<br>SC15 and TCC15 to provide recommendations on draft CMM on non-entangling FADs<br>[biodegradeable material trials being undertaken in other RFMOs]<br>[ISSF undertaking trials in this area] | NO | ~24 months | HIGH |
| **2.Tuna Behaviour** | Movement rates of target and non-target species associated with FADs in the western Pacific<br>(Note linkage to tagging work that is underway) | YES* | ~36 months | MEDIUM<br>(PNA suggests HIGH) |

| | | | | |
|---|---|---|---|---|
| **3. Hotspot Analysis** | Longitudinal and latitudinal differences in catch of non-target species to be characterized by way of hotspots. (Project 77 funded by EU until end 2017) | YES* | ~18 months | MEDIUM (PNA suggests LOW) |
| **4. Acoustic FADs** | *Limit catches to only FADs with large biomass to reduce proportion of non-target species caught. SPC, Chair and Secretariat to present costed proposal to SC13 [focus - limited trial be considered] | NO | ~36 months | MEDIUM |
| **5. Fleet Behaviour** | Characterisation of effort creep due to FAD use and fleet specific factors resulting in high catches of non-target species. SPC, Chair and Secretariat to present costed project proposal to assess the impact of FAD use to SC13. | YES* | ~18 months | HIGH |