SCIENTIFIC COMMITTEE
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Port Moresby, Papua New Guinea

REPORT OF THE PTTP STEERING COMMITTEE

WCPFC-SC4-2008/ GN-WP-7

Prepared by

PTTP Steering Committee

1 Preliminaries

1.1 Background

The Pacific Tuna Tagging Programme (PTTP) is a joint research project being implemented by the Oceanic Fisheries Programme (OFP) of the Secretariat of the Pacific Community (SPC), the PNG National Fisheries Authority (NFA) and the members and participating non-members of the Western and Central Pacific Fisheries Commission. The goal of the Pacific Tuna Tagging Programme is to improve stock assessment and management of skipjack, yellowfin and bigeye tuna in the Pacific Ocean. The specific objectives of Phase 2 are:

1. **To obtain data that will contribute to, and reduce uncertainty in, WCPO tuna stock assessments.** Conventional tagging data are an important component of tuna stock assessments, providing quasi-fishery-independent information on various biological and fishery processes, such as exploitation rates, natural mortality, movements and growth rates, and their spatial and temporal variability.

2. **To obtain information on the age-specific rates of movement and mixing of skipjack, yellowfin and bigeye tuna in the equatorial WCPO, between this region and other adjacent regions of the Pacific basin, and the impact of FADs on movement at all spatial scales.** This information is important for understanding the relationship of tuna stocks in the tropical WCPO with those in the sub-tropical WCPO and the EPO. Movement rates are particularly important for assessing the potential for interaction between fisheries operating in different areas. The comparison of tagged fish movements from areas of high FAD density with tagged fish movements from the same areas in the early 1990s (before extensive FAD deployment) will provide important new information on the meso- to large-scale effects on tuna movement of high-density FAD arrays. This will allow various hypotheses regarding the impact of FADs on the movements of small tuna, to be tested. The movement data will also provide critical information on appropriate spatial structuring of stock assessment models.

3. **To obtain information on species-specific vertical habitat utilisation by tunas in the tropical WCPO, and the impacts of FADs on vertical behaviour.** Vertical habitat utilisation plays a large role in determining vulnerability to all major gear types operating in the fishery. This objective seeks to characterise the effect of FADs (anchored and drifting) and other possible impactors (e.g., seamounts) on tropical tuna vertical behaviour and habitat utilisation This information will allow better estimation of abundance indices and standardised effort for the main fisheries and possibly contribute directly to the design of management measures for FAD fishing.

4. **To obtain information on local exploitation rates and productivity of tuna in various parts of the WCPO.** Knowledge of local exploitation rates, productivity and movements is important for understanding the impact of fishing at more local scales and to estimate optimal exploitation of tuna resources within EEZs. In particular, it allows estimation of the extent to which current catch levels may reduce the standing stock of tuna and the catch-per-unit-effort of the fisheries, a phenomenon commonly known as “local depletion”.

The PTTP Steering Committee[1] was established by SC2 to provide guidance and oversight in the development of firstly the project document (WCPFC-SC3-GN-WP-10) and subsequently of operational plans, implementation and analytical work. The second meeting of the PTTP Steering Committee was held at the Crowne Plaza Hotel, Port Moresby on 16 August 2008.

1.2 Review and adoption of agenda

The provisional agenda was adopted without revision (Attachment 1).

2 Review of PTTP Phase 1 (SC4-GN-IP-3)

Summary

PTTP phase 1 was completed in April 2008 and involved 2 cruises in the Papua New Guinea EEZ and 3 cruises in the Solomon Islands EEZ. The pole and line FV Soltai 6 was chartered for the first 4 cruises and FV Soltai 105 for the last Solomon Island cruise to assess its suitability for the next PTTP phase.

Phase 1 of the PTTP has been demonstrably successful, with all of the operational objectives of the cruises achieved, with the exception of the conventional tag release numbers for bigeye. Efforts to increase the bigeye tag numbers were hampered by the apparently low abundance of the species of a size vulnerable to pole-and-line and FAD-associated night hand line fishing. Overall, 63,055 skipjack, 38,614 yellowfin and 1,244 bigeye tuna were tagged during Phase 1.

Archival and sonic tag release numbers were significantly increased during the second cruise in PNG by the incorporation of two purpose-built sonic/archival tagging cradles into the general tagging strategy. The small sized archival tags (Lotek LTD2410) proved to be unreliable and their use suspended for Phase 2 until a new model is released by the manufacturers. PNG National Fisheries Authority (NFA) counterparts were trained in surgical procedures necessary for archival and sonic tagging providing the possibility of continuation of sonic tagging experiments beyond the PTTP in PNG.

The two week trial cruise of the Soltai 105 as a tagging platform for Phase 2 was successful and confirmed its suitability. This vessel has more extensive working space, greater vessel speed, better fuel consumption, increased bait carrying capacity, and greater operational flexibility. During Phase 2, it likely that 5 scientific personnel will be carried on most occasions, including an observer from the operational area/country. The number of vessel officers and crew is likely to be between 28 and 30, as opposed to 25 on the Soltai 6, with additional crew needed to support both the hauling of the larger net and the additional tagging cradle.

Tag recoveries from Phase 1 are currently above 10% with recoveries distributed according to tagging locations, fishing effort and vessel unloadings. Reported recoveries however are lower than expected in American Samoa and Thailand. The PTTP recovery officer has recently visited these locations to identify the reasons for the low recovery rates.

[1] The current composition of the PTTP Steering Committee is: John Hampton (SPC, Chair), Chiguk Ahn (Korea), Noel Barut (Philippines), Keith Bigelow (USA), Steven Brouwer (NZ), Shui-Kai Chang (Chinese Taipei), Alain Fonteneau (EC), David Itano (USA), Pierre Kleiber (USA), Antony Lewis (SPC), Lara Manarangi-Trott (FFA), Augustine Mobiha (PNG), Dae-Yeon Moon (Korea), Victon Nikijuluw (Indonesia), Ambrose Orianihaa (FFA), Kurt Schaefer (IATTC), John Sibert (USA), SungKwon Soh (WCPFC Secretariat), Koji Uosaki (Japan) and Andrew Wright (WCPFC Secretariat).

Achievements of Phase 1 include:

- Successful implementation of 5 cruises.
- A total of 61, 751 tuna were conventionally tagged in the 2 Papua New Guinea cruises and 41,162 tuna conventionally tagged in three Solomon Islands cruises.
- A total of 222 tuna were tagged with sonic tags and the successful use of sonic receivers on FADs
- A total of 318 tuna were tagged with archival tags to understand fine scale movement and FAD-associated behaviour.

Discussion
The Committee expressed satisfaction with the results of Phase 1 and encouraged a stronger focus on bigeye tuna in Phase 2. Two methods we suggested: (1) expansion of the geographic range of the project, particularly towards the central Pacific (north of French Polynesia) where bigeye are thought to be more abundant; and (2) possible implementation of approaches developed in the Atlantic and Indian Oceans whereby tuna schools containing high proportions of bigeye have become associated with the tagging vessel and maintained and fished over extended periods. The latter approach involves creating an association with an existing school (for example aggregated under a TAO buoy) with the assistance of one or more bright above-surface lights, moving the school around at slow speeds, and actively feeding the fish over a period of 1-2 weeks. It was suggested that the Project might seek the services of an experienced Spanish skipper during the October to May northern hemisphere low season to assist with this.

PNG acknowledged that the training of NFA staff in Phase 1 has been extremely valuable. The cooperation by both the domestic and bilateral fishing partners in PNG in returning tags has been instrumental in the success of Phase 1. The Chair thanked all members of industry and Government agencies who have assisted the Programme in this regard.

3 Phase 2 Planning and Implementation

3.1 Progress on Funding

The Chair reported that since SC3, two major funding commitments had been confirmed: (1) an allocation of approximately USD2.4 million towards tropical tuna tagging from a new EC-funded project (SCIFISH) being implemented by SPC; and (2) a contribution of NZD5 million (approximately USD3.6 million) to the project by the New Zealand Agency for International Development (NZAID). Other smaller contributions have also been made by the French Pacific Fund, PNG NFA and the Government of Taiwan. Currently, the total project contributions stand at approximately USD6.4 million of a total planned budget of USD9.8 million. The impact of recent fuel price increases on the budget was noted.

3.2 Report on the 1st Central Pacific Tagging Cruise (SC4-GN-IP-2)

Summary
Tagging cruises in the central Pacific utilizing handline fishing techniques have been incorporated as an integral component of the PTTP design. The first central Pacific tagging cruise consisted of a 30 day charter of the Hawaii-based FV Double D to the NOAA TAO oceanographic buoys south of Hawaii along the 155°W meridian and east of the Line Islands of Kiribati. The objective of this cruise and other sub-regional components of the PTTP is to target difficult to access areas of the Central Pacific (including French Polynesia) to improve

overall spatial coverage of PTTP tag releases. The Double D is a Honolulu-based multi-purpose pelagic handline/longline vessel equipped with the full complement of Hawaiian-style tuna handline gears in addition to hydraulic trolling reels. The vessel is also equipped with two mini longline reels for conventional or targeted short-set longline fishing on tuna and pomphret aggregations. A total of 1,909 tropical tunas were tagged and released during the cruise comprising 1,736 bigeye (90.9%), 57 skipjack (3.0%) and 116 yellowfin tuna (6.1%). The majority of tag releases were made on the TAO buoy at 2°N, 155°W (69.3%) with 25.1% released on the TAO buoy at 5°N. Over 90% of total releases were bigeye tuna. Higher percentages of yellowfin were found on the higher latitude buoys, where relatively few fish were tagged. The cruise also deployed 50 Wildlife Computers MK9 archival tags in 45 bigeye and 5 yellowfin tuna. Most of these tags were deployed on the TAO buoy at 2°N (37 bigeye, 2 yellowfin) with 6 bigeye (one recently reported recaptured by the Ecuadorian purse seiner Albacora Uno) and 1 yellowfin implanted with archival tags on the TAO buoy at 5N. Archival tags were also deployed at TAO 8°N, 155°W (1 yellowfin) and NOAA weather buoy 51002 (2 bigeye, 1 yellowfin, the latter recaptured one month after deployment by the Double D). The cruise encountered a large purse seine vessel on TAO buoy 5°N 155°W with intentions of setting on the TAO buoy that were discouraged by the tagging vessel. This encounter emphasizes the importance of drifting aggregations away from the buoys after tagging and the need to equip PTTP tagging vessels with powerful submersible and surface lights to facilitate this process. PTTP tag recovery efforts and publicity also need to be increased in this region, especially with Kiribati Fisheries and port sampling personnel, the IATTC and the large purse seine vessels currently operating in the central Pacific. The cruise proved to be a successful test of the sub-regional tagging approach, releasing good numbers of bigeye tuna in this remote but ecologically important area of the WCPO.

3.3 2008-2009 Work Plan (SC4-GN-IP-4)

Summary

The proposed field operations for the PTTP for the period 2008-2009 include:

- Western Pacific Cruise 1, a five month cruise that will undertake tagging operations in EEZs of FSM, Palau, Philippines, Indonesia, Papua New Guinea and the Solomon Islands, commencing in June 2008. The warm pool of the western Pacific has been restricted to this region of the WCPO in conjunction with the strong La Nina event in 2008, providing an opportunity to sample during conditions when tuna numbers are expected to be high in the region. The chartered pole-and-line vessel Soltai 105 is being used for this cruise.
- Central Pacific Cruise 1 (described in section 3.2).
- Western Pacific Cruise 2, a five month cruise that will undertake tagging operations in EEZ's of FSM, Marshall Is, Kiribati, Tuvalu, Wallis and Futuna, Fiji and Solomon Islands EEZ's for conventional and electronic tagging of bigeye, yellowfin and skipjack. This cruise is scheduled to commence in February 2009 and will potentially include the use of drifting FADs and FAD calling stations.
- Central Pacific Cruise 2, a 6 week cruise that will undertake tagging operations at TAO buoys along the 155°W (Kiribati Line Islands) and 140°W (north of the Marquesas Islands, French Polynesia) meridians scheduled for the first half of 2009. French Polynesia is an important area for understanding the dynamics of tropical tuna movement biology. The area is strongly influenced by ENSO conditions and is geographically suited to examine movement rates between the jurisdictional

boundaries of the WCPFC and IATTC. The cruise is likely to be a joint initiative between PTTP and the IATTC.

- Tag seeding (tagging dead fish by observers on purse seine vessels) to estimate tag-reporting rates will receive considerable attention during the PTTP. Selected observers will be asked to tag 20 tuna (5 double tagged) during the course of a trip. We hope to cover 34 trips in 2008 and 100 trips annually through at least 2008 and 2009.

Discussion
The following points were raised in discussion:

- French Polynesia indicated its strong support for the PTTP in particular the operations in the central Pacific.
- It was suggested that plastic intra-muscular or stainless steel dart tag attachments, with regular Hallprint streamers, be used for tag-seeding experiments. Such tags are more suitable for implantation in dead fish and are less prone to shedding than regular plastic dart tags.
- Japan noted that some complaints had been received from tuna processors when the sub-surface portions of severed tags have been found in tuna flesh during processing. Such instances cause substantial disruption to processing and pose of risk of contamination of tuna products. It was suggested in response that future tagging posters should clearly indicate that tags should be removed whole from the fish and not severed.

3.4 Tag recovery Issues (SC4-GN-IP-5)

Summary
A summary of the tag recoveries to date, including length, date, location, vessel name, flag, and fishing method was presented. Missing data and/or data of reduced resolution/quality were identified. The current tag recovery rate is 11.4%, comprising the return of 11,908 tags. The majority of tagged fish have been caught by purse-seine (>95%) with greater than 50% of captures occurring within 30 days of the fish being released. Approximately 43% of returns had missing information or information of low resolution. The tag recovery activities planned for 2008 and 2009 were detailed. Key activities include:

- The appointment of a database analyst with responsibilities for data quality control of the PTTP. Duties of the position will involve the regular examination of return data to identify and where possible correct missing and low resolution data.
- Expansion of the current publicity program to increase awareness of the PTTP, the importance of tag returns and ancillary information, the procedures for returning tags, and the rewards provided for verified returns.
- The role out of experiments to estimate the tag recovery rate in the fisheries of the WCPO. This will include high-reward analysis, catch monitoring analysis and tag seeding experiments.

Discussion
It was suggested that observers might conduct shrinkage experiments as a part of tag seeding operations, whereby tagged fish are carefully measured at tagging in fresh condition and later measured following freezing and thawing.

It was noted that obtaining high reporting of recaptures by longliners was critical for tuna tagging experiments. These recoveries are generally for longer times at liberty and could potentially occur in a wider geographical fishing area and would therefore contain important information on growth, movement and mortality. The Chair reported that recent attempts had been made to seek the cooperation of national fisheries agencies in Japan, Korea, China and Chinese Taipei in this regard. In the case of Japan, this resulted in the fax transmission of an information bulletin on the tagging programme to all distant-water Japanese longliners operating in the Pacific. It is hoped that similar information dissemination to other longliners might be possible either directly or via industry associations.

3.5 Other Regional or Sub-regional Tagging Programmes

a. Hawaii (PFRP) (SC4-GN-IP-1)

Summary
Skipjack, yellowfin and bigeye tuna are harvested by a variety of gear types and fisheries in Hawaii from small recreational/subsistence trollers and commercial handliners to large, modern longline vessels. The smaller scale tuna fisheries rely heavily on exploiting schools found in association with bathymetric features (seamounts, ridges and banks), drifting debris or fish aggregation devices whereas the longline fishing grounds change seasonally. Hawaiian tuna fisheries are also highly dynamic, shifting fishing areas and methods in a highly competitive manner. During the 1980s, a new fishery developed to exploit juvenile/sub-adult bigeye and yellowfin found in association with a productive offshore seamount and offshore weather buoys that act like FADs. High catch rates at the seamount prompted local concern that the seamount fishery might negatively impact adjacent fisheries and fishing grounds by intercepting fish that would normally supply these other fisheries (primarily inshore handline and offshore longline fleets). In response to these concerns, the Pelagic Fisheries Research Program funded the Hawaii Tuna Tagging Project (HTTP) that deployed over 15,000 conventional tags on bigeye and yellowfin tuna (1995-2000) to address issues of interaction and movement between geographical areas and different fishery sectors. The project was very effective, quantifying residence times of bigeye and yellowfin tuna on the seamount, exchange rates between major fishing grounds or fisheries and providing size-dependent estimates of natural and fishing mortality. Since the end of the HTTP, the seamount fishery has evolved in new directions while privately set "bigeye FADs" have proliferated closer to shore. These and other developments in the domestic and expanding international fisheries have created a new set of user group conflicts and management concerns. The PFRP is currently funding the HTTP II. The new program will update movement parameters and estimates of F and M derived by the previous program while adding skipjack to the species to be studied. The project will utilize a variety of conventional and electronic tag types and concentrate on tagging in areas or fisheries that were not examined or well developed during the original HTTP. The HTTP II will commence in the third quarter of 2008 and will be considered as an independently funded, sub-regional component of the broader SPC/WCPFC sponsored Pacific Tuna Tagging Programme, using common methodologies with arrangements for integrated data sharing and analysis

Discussion
The spatial extent of the project will be initially focused around the Hawaiian Islands, but extension southwards to Palmyra and possibly westwards might be considered subject to funding.

It was noted that this and other projects would benefit from the tag recovery awareness and procedures developed for the PTTP in general.

b. Eastern Pacific (IATTC)

Kurt Schaefer (IATTC) gave an overview of recent IATTC tuna tagging experiments in the EPO. Since 2000, 19,174 bigeye, 2,234 yellowfin and 3,425 skipjack tuna have been tagged with conventional tags. The overall recovery rates are currently 43%, 18% and 16%, respectively. Most bigeye tuna were tagged to the west of the Galapagos Islands and 95% of reported recaptures had recapture positions within 1,000 nmi of release. Tuna were also archivally tagged, with 323 bigeye, 134 skipjack and 53 yellowfin deployments. Recovery rates of 50%, 5% and 15%, respectively, have so far been recorded. Vertical behaviour observed in archival tag data was classified into three behaviour types – associative, classical (non-associated) and other. Archival tag geolocations also indicate substantial retention of bigeye tuna to within 1,000 nmi of the release locations. Similar site fidelity was observed in yellowfin tuna tagged off Baja California and around the Revillagigedo Islands. However, yellowfin tuna tagged in the equatorial EPO north of the Galapagos Islands showed much greater mobility.

A proposal for a new regional tuna tagging project in the EPO was described. The project is proposed to operate over three years (2010-2012) with 10 months of field work per year. Both conventional and archival tags would be deployed from chartered live-bait pole-and-line vessels. The objective of the project is to obtain data for improving the scientific basis for estimation of exploitation, movement, natural mortality, and growth rates of bigeye, skipjack and yellowfin tuna in the EPO. The project is not yet funded, and has a budget of approximately USD4.5 million.

Discussion

It was clarified in discussion that behaviour types (associative and classical/other) have been confirmed by releasing fish associated with drifting FADs with implanted archival tags, and then removing the FAD at a later time. Changes in vertical behaviour were subsequently observed in recovered archival tags that match with FAD removal. Studies of FAD-associated bigeye tuna using acoustic telemetry have also confirmed these behaviour types.

Apparent retention of bigeye tuna in the region west of the Galapagos Islands was attributed to the extremely high productivity of this region providing an ideal habitat for bigeye tuna. It was noted that it would be interesting to use the SEAPODYM model to examine this issue, and ultimately to use this model as a platform for analyzing conventional and archival tagging data.

c. Others

No other tagging initiatives were presented.

4 Administrative Matters

No administrative or other matters were raised.

ATTACHMENT 1:

AGENDA

Pacific Tuna Tagging Programme (PTTP) Steering Committee

2.00 pm, Saturday 16 August, 2008

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1. Preliminaries

1.1. Review and adoption of agenda

2. Review of PTTP Phase 1

2.1. Conventional tagging

2.2. Electronic tagging

2.3. Data quality review

3. Phase 2 Planning and Implementation

3.1. Progress on funding

3.2. Report on the 1st Central Pacific Tagging Cruise

3.3. 2008-2009 Work Plan

3.4. Tag recovery issues

3.5. Other regional or sub-regional tagging programmes

a. Hawaii (PFRP)

b. Eastern Pacific (IATTC)

c. Others

4. Administrative Matters

4.1. Other matters

5. Adoption of Report to SC 4