

PACIFIC TUNA TAGGING PROJECT

Phase 2 (Central Pacific)

Cruise CP-10: 1st to 25th August 2014

SUMMARY REPORT

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INTRODUCTION

The Central Pacific (CP) tagging cruises are part of the Pacific Tuna Tagging Programme (PTTP) that started in August 2006 with the objective of tag and release of tropical tunas throughout the WCPO and concentrated in the latitudes where the tuna stocks are mostly harvested, approximately between 10° N and 10° S. These CP cruises were designed to catch and tag tuna in areas where pole-and-line fishing gear is not efficient due to the absence of suitable bait grounds. Using specific trolling gears developed in Hawaii and targeting the NOAA TAO oceanographic buoys anchored east of the Date Line, the CP tagging cruises have improved the overall spatial coverage of the PTTP tag releases and increased the number of tagged bigeye tuna that are not commonly caught by pole-and-line gear in the western part of the WCPO.

Nine CP cruises have already been achieved, using Hawaii and Tonga-based fishing vessels; these have tagged and released other 37,000 tuna, mostly bigeye (90%), on the TAO buoys anchored along the meridians 140°W, 155°W, 170°W and 180°W and between 5°N and 5°S latitudes.

This report summarizes activities during a tenth CP cruise, named hereafter CP-10, during a 25 day cruise on the Tonga-based FV Pacific Sunrise. This longliner was chartered during CP-5, CP-6, CP-8 and CP-9 to extend tag release coverage westward from the preceding Hawai'i based CP cruises, targeting the TAO buoys deployed along the 170° and 180° W meridians.

New:

CP-10 has been designed to also cover some data collection for a study on tuna movements, exploitation rates and fish aggregation device (FAD) association dynamics. This study is issue from cooperation between SPC, Tri Marine and ISSF and will be detailed in a chapter further in this report (see Acoustic tagging).

Crew and scientific personnel onboard Pacific Sunrise during CP-10 is listed in Table 1.

Table 1: Personnel onboard Pacific Sunrise during CP-10

Name	Title/affiliation	Nationality
Etimoni Palu	Captain	Tonga
Bruno Leroy	Cruise Leader/SPC	France
Jeff Muir	Scientist/ISSF	U.S.
Hopoate Fakatoumafi	Crew-Bosum	Tonga
Viliami Talakai Fifita	Crew-engineer	Tonga
Ataisi Oe Moui Taufu	Crew	Tonga
Lousinimani Veituna Potoi	Crew	Tonga

GENERAL DESCRIPTION OF VESSEL

The F.V. Pacific Sunrise is a 22 metre fibreglass multi-purpose commercial fishing vessel built in 2003 by Westcoaster International, Australia. Owned and skippered by Etimoni Palu, it is equipped with longline gear used for fishing pelagic fishes (mainly tuna, swordfish) and deep dropline gear for demersal fishes (deep sea bluenose and snapper) around the Tongan EEZ. The vessel is fitted with one 600hp main engine (John Deer), one 57 KVA generator, one water maker (116 l/h) and a hydraulic system which powers the longline winch, the dropline reels and the main davit. Electronic equipment includes VHF and HF radios, Furuno radar and sounder (Picture 5), autopilot, two Furuno GPS, a vessel monitoring system, a water temperature gauge, a longline master system, a Taiyo radio direction finder and one desktop computer for navigation. For email communication the scientific team brought onboard an Iridium phone linked to the Skyfile software. Complete boat specifications are detailed in Appendix 1.

The operational range of Pacific Sunrise is 2,500 nm with a 14 ton fuel tank capacity. This range was increased for the CP-10 cruise by refueling tanks in Pago Pago after the first 500 nm coming from Tonga and also by taking fifty 200 litre drums which were stored in the vessel's fish holds.

FISHING GEAR

For the purpose of this tagging cruise the vessel was fitted with four "danglers". This gear consists of galvanized steel davits which extend at right angles from the hull for 1.5 meters and deploy two short trolling lines skipping the surface. This type of gear has been successfully used during the nine previous CP cruises as well as in Hawaii for other tagging programs and initially for commercial fishing of offshore seamount tuna aggregations.

Three danglers were placed on the starboard side (two fore and one aft) and one on the aft port side. The troll lines hanging from the danglers consisted of a 2m length of 6mm rope spliced with loops at both ends to which a 80cm length of 2mm monofilament line was fitted with tube squid-like lure, one 45g lead weight and a 7.0 Mustad galvanized barbless hook.

Three conventional troll lines were also attached from the stern of the vessel. These consisted of a 12m by 6mm rope spliced with a loop at one end to which a 5m by 2mm monofilament line was attached and rigged with a tube squid jig bearing three 45g lead weights and a 7/0 Mustad galvanized barbless hook.

During CP-10, the encountered tuna schools response to dangler fishing method was exceptionally poor and imposed the use of rods and reels associated with heavy metallic jigs to catch the tuna dedicated to receive an archival tag. The rods and reels and hand lines have also been used to capture the different species that were targeted for the ISSF project.

TAGGING OPERATIONS

Three tagging stations were set up on the deck of the vessel. The fish holds protrude from the floor and take a large part of the aft deck, restricting the choices for tagging cradle placement. Two cradles were dedicated to conventional tagging and were of the same design although slightly different dimensions to those previously used for pole-and-line tagging. One was placed at the stern of the vessel (behind the fish holds) while the other one was positioned in the centre of deck (between the fish holds and the cabin). The third cradle was set up specifically for archival/sonic tagging and supplied with a saltwater hose for irrigating the tuna during surgery. This tagging station was also used to deploy the sonic tags in the species targeted by the ISSF project. The archival cradle was placed directly in front on the fish holds. All cradles were marked with one cm graduations from 30cm to 120cm.

Table 3 resumes the number of tag type release per species

Conventional tagging

Conventional tagging (CT) consisted of using the 13cm yellow dart tag manufactured by Hallprint Ltd. After checking if fish did not present any severe injury¹, the tag was inserted between the pterygiophores of the second dorsal fin of fish using a sharp stainless steel applicator tube. Used applicators were collected then immersed in a bucket containing fresh water and bleach, rinsed in fresh water and dried for re-use. Prior to each tagging operation, tags were placed inside the applicators and mounted in numbered tagging blocks each holding 100 loaded applicators. There were seven 100 tag blocks in total.

A total of 239 tropical tunas was tagged and released during the cruise, comprising 165 bigeye (69%), 4 skipjack (1.7%) and 70 yellowfin tuna (29.3%).

¹ Typical injuries, incurred by the quite large hooks and the wrench of hookset, included mouth/lower jaw damage, eye damage (from inside the mouth cavity) and bleeding from various locations, and ranging from superficial to heavy. Bites from cookie cutter sharks and wounds from sharks and billfish were also noted.

Archival tagging

57 Wildlife Computers MK9 archival tags and 1 Lotek Lat2810 were available for deployment during the cruise. 24 tags were deployed in bigeye tuna and 8 on yellowfin. Mk9 tags were configured to sample all likely depths, sea and internal fish temperatures and light intensity every 30 seconds (10 seconds for the Lat2810). Archival tagged tuna were externally marked with an orange 13 cm conventional tag. Suitable size tuna (generally > 60 cm) were placed belly up on the V-shaped central tagging cradle, the eye covered with a synthetic chamois and irrigated via the mouth by a seawater hose. All archival tags were implanted into the peritoneal cavity and secured with one or two sutures. All archival tagging was conducted by the cruise leader (BML).

Acoustic Tagging

ISSF's component of the CP-10 cruise consisted of instrumenting 3 drifting fishing aggregating devices (dFADs) with VR4 Global satellite communicating acoustic receivers manufactured by Vemco. Tagging then commenced with tuna (SKJ, YFT, BET) and non-tuna species (silky shark: FAL, rainbow runner: RRU, spotted oceanic trigger fish: CNT, oceanic white tip shark: OCS, wahoo: WAH) at these dFADs with coded, pressure sensitive acoustic tags (maximum 24 per dFAD) to investigate:

1. Vertical behavior of species at dFADs to improve processing of echo sounder buoy data, in order to better distinguish different species from echo sounder buoy data
2. The behavior of tuna and non-tuna species at dFADs to better understand the effects of dFADs on these species, including residency, vertical behavior, and daily presence/absence patterns.

VR4 Global Description

Vemco's VR4 Global unit allows the user to remotely monitor tagged fish, and eliminates the need to retrieve the receiver after the study has finished. The unit utilizes Iridium satellite communication to relay detection logs, status updates, and error messages to the user. This part of the unit is housed in aluminum housing, floated by a doughnut shaped float collar which bolts around the housing. The unit utilizes a hydrophone attached to a 5 meter rope, suspended under the main body of the unit. An auxiliary VR2W was attached to each hydrophone rope with plastic tie straps as a redundancy to ensure that data would not be lost in case of a failure of the VR4 Global.

Access to dFADs

TriMarine provided positions of dFADs linked to satellite IRIS buoys owned by them in the areas that the tagging vessel operated during the cruise. A tracking system from the French company Thalos was installed onboard prior to the cruise. This system includes an external Iridium satellite antenna linked to a laptop via a cable and a connection box. The software "Buoy Tracker" allowed us to pilot and visualize on a global map the IRIS buoys attached to the dFADs. Having the possibility of requiring anytime a buoy position or triggering a flash light was essential to steam to and find a dFAD. Without such tracking system it is almost impossible to retrieve a dFAD in the open ocean.

A total of 11 different dFADs were visited and tagged fish have been released in association with 6 of them.

See Figure 2 for an overview of dFAD locations.

Experiment 1

Tagging and deployment of the VR4 Global unit no. 200081 commenced on 4th Aug in the Tokelau EEZ. Twenty-three animals were implanted with V13 and V9 coded pressure sensing acoustic tags (table 2). Vemco technicians notified us soon after deployment that the unit was not working correctly (not detecting transmitters properly). The station was revisited on 24th Aug to retrieve equipment and download data from the auxillary VR2W, and then abandon the dFAD.

Experiment 2

Tagging and deployment of the VR4 Global unit no. 200065 commenced on 5th Aug in the Cook Islands EEZ. Twenty-two animals were implanted with V13 and V9 coded pressure sensing acoustic tags (table 2).

During deployment, the hydrophone on the VR4 Global unit failed, requiring the vessel to revisit the station to service the receiver and download data. This occurred on 23th Aug. The unit's hydrophone was indeed damaged. The hydrophone was replaced, the auxillary VR2W receiver was downloaded, and the station was re-deployed and abandoned. Eleven of twenty-two tagged animals were detected at the station for 28,635 detections.

It appeared that most of the aggregation had departed the dFAD, and only a small school of YFT, BET, and CNT remained. Only one silky shark was spotted.

Experiment 3

Tagging and deployment of the VR4 Global unit no. 200043 commenced on 6th Aug in the Cook Islands EEZ. Twenty-three animals were implanted with V13 and V9 coded pressure sensing acoustic tags (table 2).

During the time period of the cruise, this station appears to have been functioning properly and communicating via Iridium. The station was abandoned since there were implanted animals still transmitting at the tail end of the cruise.

Table 2: Summary of animals implanted with acoustic tags at each receiver station

Species	Exp.1	Exp.2	Exp.3	Total
YFT	6	7	7	20
SKJ	2	0	6	8
BET	3	3	0	6
FAL	5	5	3	13
RRU	2	0	2	4
TRI	5	5	5	15
WAH	0	1	0	1
OCS	0	1	0	1
Total	23	22	23	68

Lessons learned about Dfads:

The following should be considered for future acoustic tagging experiments on dFADs:

1. More transmitters should be deployed at each station, even if the theoretical maximum number of tags is exceeded (limits on detections because of collisions with too many tags transmitting at once). We found that at each station, nearly half of the animals with implanted tags were never heard from. High mortality can be ruled out because tag implantation was performed by an experienced scientist with low mortality and tag loss. We believe that many animals either departed the dFAD immediately as a result of the tagging, or may have been associated with the dFAD but out of the receiver's detection range.
2. Redundant receivers placed at each station ensure data will be collected. In this case, without redundant VR2W units, data would have been lost on 2 of 3 stations due to failures from VR4 Global units.
3. It would be better to maximize the possibilities for the tagging vessel to visit different dfads within its cruise range capabilities in getting access to more than one type of satellite buoys. Only IRIS type buoys were accessible during this cruise and no such buoy was available during the cruise around the equator where bigeye tuna usually aggregate in large numbers under TAO moorings. Access to Zunibal and Satlink buoys equipped Dfads would greatly improve the cruise chances of success.

Spatial distribution of all tuna tag releases is shown in **Figure 1**.

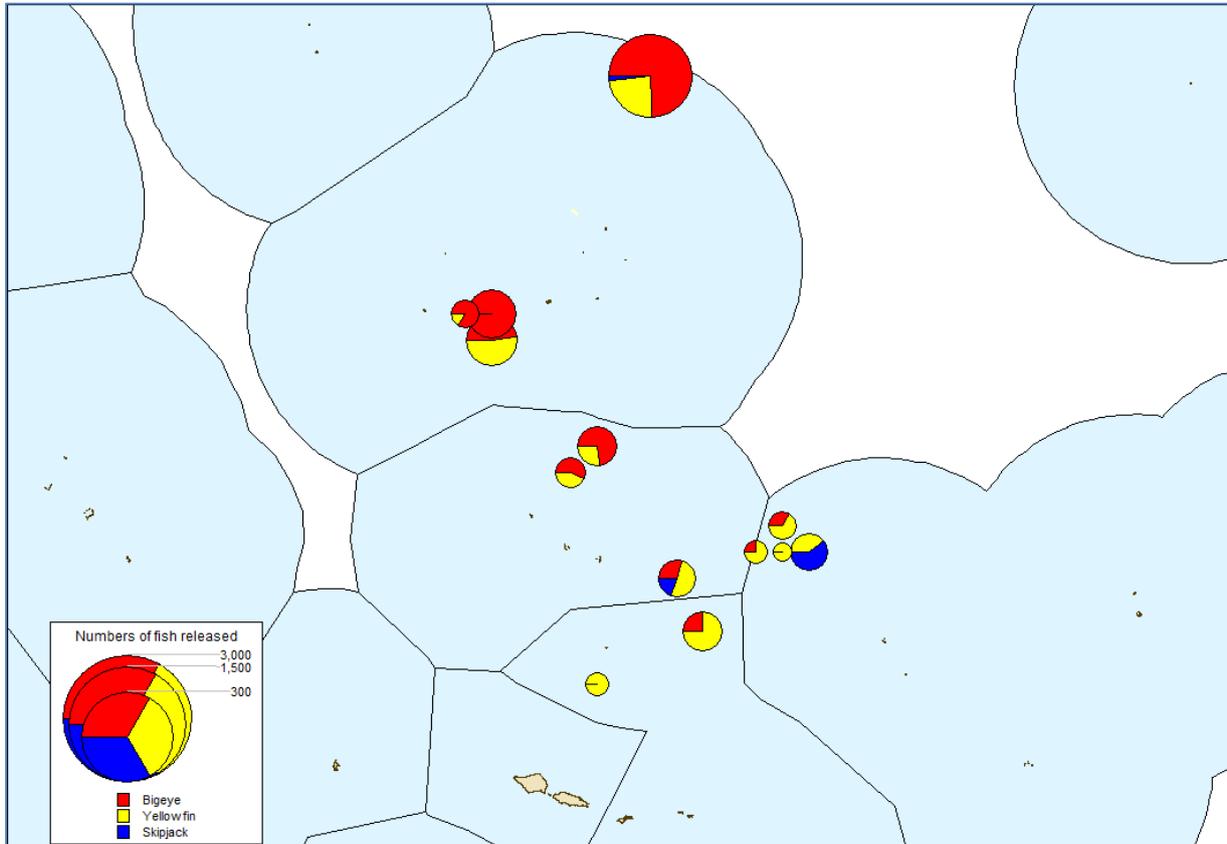


Figure 1: Distribution of tag released in tropical tunas during CP-10

Table 3: Number of tag type per species

Tag type	BET	YFT	SKJ	others	Total
Sonic	6	20	8	34	68
Archival	24	8	0	0	32
Conventional Y13	165	70	4	0	239
Total	195	98	12	34	339

Comparison with previous cruises

The current cruise deployed only a small number of conventional tags. The cruise has been hampered by a lack of large enough bigeye aggregation under the TAOs along the 170 W longitude line and especially the equator buoy where more than 2000 fish were tagged during each of the previous cruises (see Table

4). Furthermore when some fish were associated with TAO or DFADs they have been almost not responding to chumming. Only one fish was seen caught on the dangles! All other fish were caught on the stern long troll lines or on rod and reel, mostly at night. One possible explanation could be the presence of great quantities of natural baits (anchovies were found in fish stomachs and actively feeding schools were seen at the surface during day time) in the area.

Also there is may be a seasonal effect with CP10 happened during August when all other cruises were done between end of September and mid-December.

Table 4: Number of tags deployed per TAO

TAO buoys	CP-5	CP-6	CP-8	CP-9	CP-10
8S/170W	2	0	0	104	0
5S/170W	0	0	0	334	0
2 S/170W	1918	530	2215	586	0
00/170W	2081	2121	3084	3340	185
2N/170W	1760	-	855	No buoy	No buoy
2N/180	568	-	-	4	No visit
00/180	29	946	14	No buoy	No visit
2S/180	-	332	6	92	No visit
170 line	5759	2651	6154	4364	185
180 line	597	1278	20	96	-

Tuna aggregation dispersion

During CP10, no attempts have been taken to move tuna aggregation away from buoys after tagging operation. No large schools were tagged and the fad fishing closure was not ending before the end of October.

Data recording

Each tagger was equipped with a digital voice recorder enclosed in a waterproof sleeve. The first and last tag in each new block was read out before commencing tagging, and tag numbers were intermittently recorded and checked. After each fish was tagged, its length was recorded from the graduations on the cradles. Data were later transcribed onto hard copy release log sheets at the end of each tagging session. Data were subsequently entered into the Microsoft SQL Server data base 'TagDager'.

GENERAL DESCRIPTION OF CRUISE TRACK AND FISHING ACTIVITY

The track of Cruise CP-10 is shown below in **Figure 2**

The 8S, 5S, 2S and equator TAOs on the 170 W line were visited along with 11 dFADs

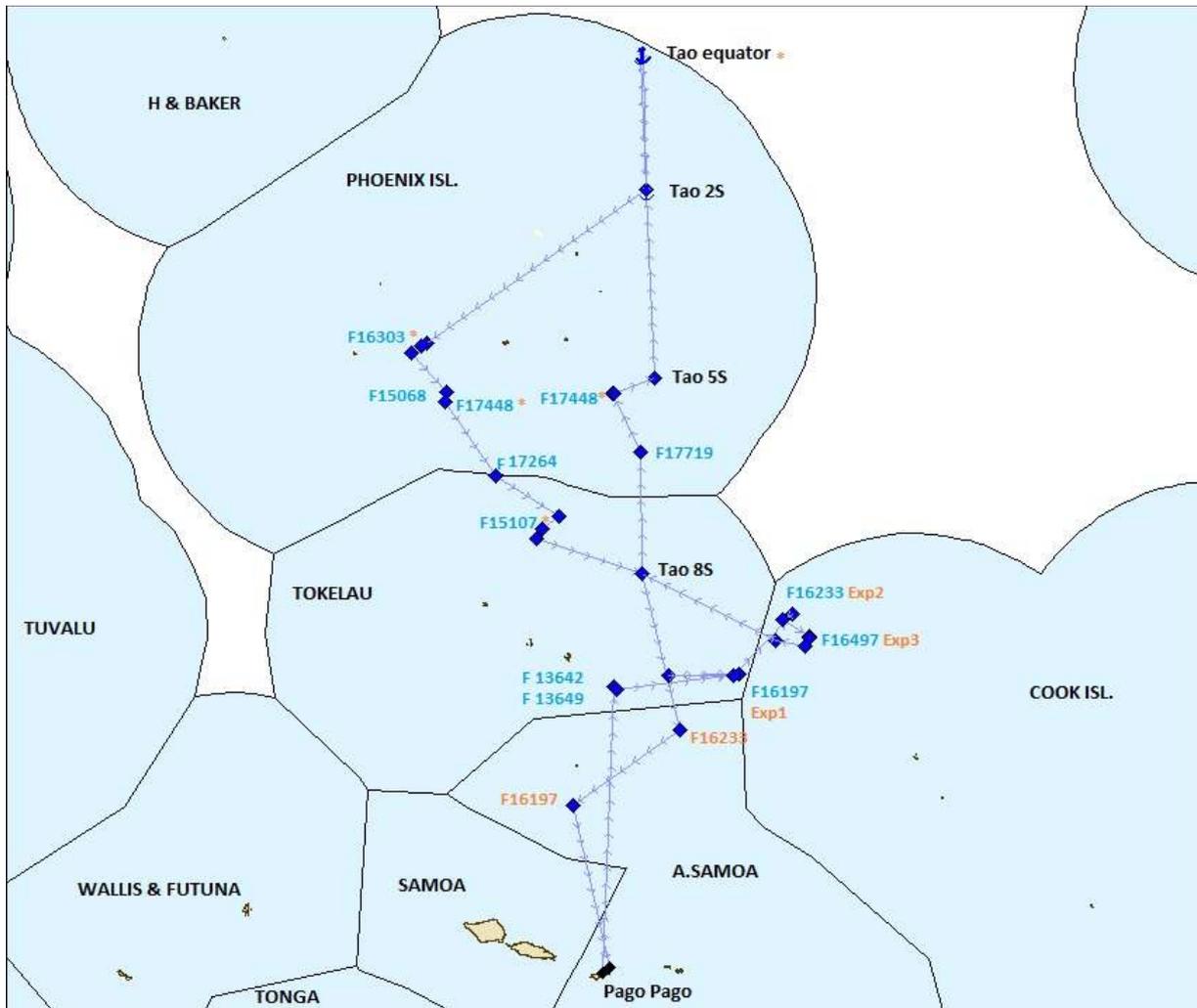


Figure 2: Cruise track during CP-10 showing position and name of each visited dFAD. Fish have been tagged on the fads with * or with orange color writing.

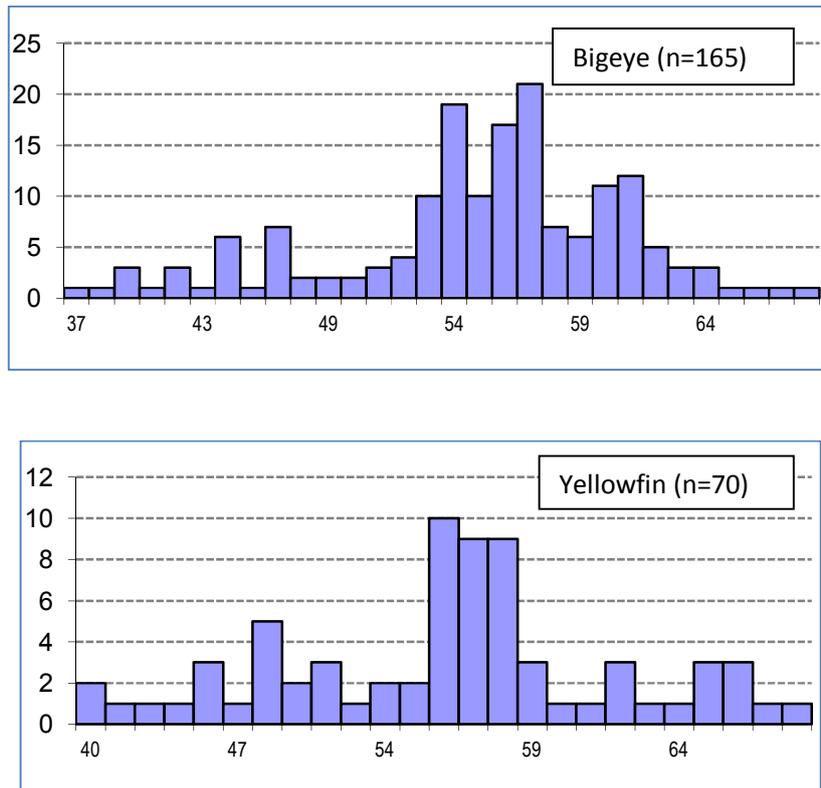
A summary of general movements during the cruise and daily tag releases by area/buoy is given in Appendix II

Daily log extracts providing detailed written descriptions of daily activities are provided in Appendix III. Of the 25 days of charter during CP-10, 8 days were spent steaming and/or checking buoys with no fish, 1 day was spent in Pago Pago to take fuel and provisions, and part or all of 16 days were spent fishing and tagging.

SIZE DISTRIBUTION OF TAGGED FISH

The size distribution of bigeye and yellowfin tuna conventionally tagged during the cruise is shown in **Figure 3** below.

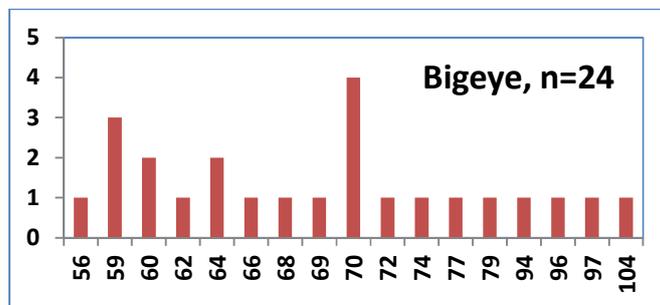
Figure 3 Size distribution of fish conventionally tagged during CP-10



ARCHIVAL TAGS

The 24 bigeye tuna tagged with archival tag size range was 56 to 104 cm as displayed in Figure 5.

Figure 5: Length frequency of bigeye tagged with archival tags



BIOLOGICAL SAMPLING

The low number of fish caught didn't allow us to collect large quantities of samples. Table 4 resumes the nature and number of those.

Table 4: Summary of biological samples collected during CP-9 (O: otolith, S: stomach; M: muscle; L: liver).

Species	Number	O	S	M	L
BET	16	11	16	16	16
YFT	17	15	17	17	17
SKJ	9		9	9	9
DOL	6		6		
RRU	5		5		
Totals	53	26	53	42	42

CONCLUSION

CP10 has been an unusual cruise amongst the other Central Pacific tagging experiments. The cruise was hampered with the lack of large bigeye aggregation under the TAOs along the 170 meridian and with the presence of natural baits in the area making the fish not biting our fishing gears.

On the other hand, the first attempt to release tagged fish around drifting fads has been successful. The collaboration between SPC, Trimarine and ISSF proved to be working well. This new experience will, no doubt, be followed by more research cruises in a next future.

The professionalism of the crew was once again on display, and the Pacific Sunrise has proved to be a very successful platform for this and other types of fishing.

Some video footage could be seen at : <http://www.spc.int/TAGGING/en/medias>

APPENDIX I: F.V. PACIFIC SUNRISE specifications

Built:	2003
Designer:	Westcoaster (Australia)
Length:	22 m (72 feet)
Beam:	6.2 m
Draft:	2.3 m
Gross tonnage:	80 tonnes
Hull:	Fibreglass
Main Engine:	John Deere 600 hp
Cruising:	10 knots
Auxiliary:	ISUZU 57.5 KVA
Steering Stations:	2
Fuel Capacity:	14,000 litres (2500 nm range)
Radios:	ICOM IC-M45 VHF 57 channels ICOM IC-M710 HF 160 channels
Satellite communications:	Iridium linked to a computer
Chart plotter:	Max Sea
Water:	9,000 litres capacity
Desalinator:	116 litres per hour
Electronics:	Radar, sounder, computer, radio direction Finder, Inmarsat, stereo, plotter, GPS, Auto pilot
Survey:	USL Class 3B

APPENDIX II: Summary of cruise activities, with number of fish released per day. EEZ abbreviations: TK (Tokelau), PX (Phoenix Islands – Kiribati), CK (Cook Islands)

Date	General area	Principal activity	Conventional tags			Archival (red) or sonic (green) tags			Total tagged
			BET	SKJ	YFT	BET	YFT	OT H	
2014									
1-Aug	Pago Pago	Fuel, provisions, Leave port 6pm							0
2-Aug	Am Samoa EEZ	Steaming- gear prep							0
3-Aug	Tokelau EEZ	Fish Dfads-Steam							0
4-Aug	Tokelau EEZ	Fish Dfads-Steam				3	6	12	23
5-Aug	Cook EEZ	Fish Dfads-Steam				2	4	11	17
6-Aug	Cook EEZ	Fish Dfads-Steam				1	10	17	28
7-Aug	Tokelau EEZ	Fish TAO 8S/170W-steam							0
8-Aug	Phoenix EEZ	Fish Dfads-steam			1				1
9-Aug	Phoenix EEZ	Fish TAO 5S/170 W- steam							0
10-Aug	Phoenix EEZ	Fish TAO 2S/170W-steam							0
11-Aug	Phoenix EEZ	Fish TAO equator	59	1	15	12	1		88
12-Aug	Phoenix EEZ	Fish TAO equator	23		17	8	1		49
13-Aug	Phoenix EEZ	Fish TAO equator				2			2
14-Aug	Phoenix EEZ	Fish TAO equator	21	2	9		1		33
15-Aug	Phoenix EEZ	Fish TAO equator	12	1					13
16-Aug	Phoenix EEZ	Fish TAO 2S and steam							0
17-Aug	Phoenix EEZ	Steam and fish Dfad	20						20
18-Aug	Phoenix EEZ	Fish Dfads - Steam	5		1				6
19-Aug	Phoenix EEZ	Fish Dfad- Steam	10		13	2			25
20-Aug	Tokelau EEZ	Fish Dfad	8		2		1		11
21-Aug	Tokelau EEZ	Fish Dfad- Steam	4		1		2		7
22-Aug	Tokelau EEZ	Steam-Fish TAO 8S -steam							0
23-Aug	A.Samoa EEZ	Fish Dfad- Steam	3		7		2		12
24-Aug	A.Samoa EEZ	Fish Dfad -Steam			4				4
25-Aug	A.Samoa EEZ	Arrived Pago 8am							0
Total			165	4	70	24+6	8+20	40	339

APPENDIX III: Daily activities summary from Daily Log entries

logdate	Notes
1/08/2014	Spent the day doing the usual shopping. Boat finally managed to access the fuel dock at 1pm. After we finished to load the fuel, and secured all gears, we left Pago harbor at 18:15 and started to contour the island by the east in quite rough conditions; tried to send email but no success at start only went through at 11 pm. No easy sleep for the first nighth...
2/08/2014	With the SE wind and sea the passage went not too bad overnight although the 2/3 meter waves...The weather started to improve mid-morning as we were progressing up North. Spent the day rigging gears and getting organised. Wind turned NE under some front in mid-afternoon; hopefully won't last...
3/08/2014	Arrived at fad pos at 4.45 and all worked as scheduled. Flash light the 2 buoys separated by 3.3 nm and attached radio beacon on both. Decided to start with 13649 that looked better on the echo sounder; started fishing at 06:43 but no success. Only one small wahoo. Seems only triggerfish and a school of small skipjack associated. Stopped fishing at 0705 and went checking 13642. But alas no fish there. We retrieved the beacons and started steaming to 16197 about 120 nm ENE. Arrive at the buoy at 22:25 and attached a beacon to easily find it in the morning.
4/08/2014	Arrive at dFad 16197 at 0530 and fished till 0904; all fish caught by handline (sharks, RRU) and rod/jigg (tuna, triggerfish). We tried to dangler between 0615 and 0630 but no success, tuna too scarce. Tagged with sonics 5 silky sharks, 2 RRU, 5 triggerfish and 1yft. Caught 3 other yft and 1 bet but too tired or damaged by sharks to be tagged. Biological sampling under the rain on 2 Y, 1 B and 1 RRU; deployed a sonic receiver VR4. Drifted under heavy rain. Started again fishing around 15:50 till 19:30. To be noted that a minky whale stayed around the Fad for a couple of hours. 10 fish tagged with sonic V13P included 2S, 5Y, and 3 B. Head to Dfad 16233 68 nm away NNE, in the Cook eez.
5/08/2014	Arrived at the Dfad 16233 at 0500 and attached our beacon to it. Weather good. Big aggregation on the echosounder and we started jigging; got fish on the jiggs right away but sharks wanted their breakfast.. We then fished for those and deployed 4 sonic tags in silky and one on YF. At day light we came back to the fad but the school was gone and started to feed at the surface about 1 nm from the buoy; tried the dangles but no success, skipjack only at the surface. Come back to the buoy and deployed sonic in triggerfish (4) and one wahoo. Resumed the morning at 08:30. Started the evening session at 16:00 till 17:15. Caught 3 Yf and 2 B jigging and 1 trigger, 1 silky. It seems the big school is gone, possibly chased by pilot whales we saw around. The fad drifted about 5 nm since the morning. We tried again later but again no success. Decided at 19h30 to check dfad 16497 28 nm away in the east. The tracking software still causing grief when stopping and loosing fad positions...
6/08/2014	Attached the beacon to the Fad at 0530 and started jigging in 20 knt NNE wind and 1.2 knt current; not easy to keep with the fad...after a brief jigging session (one Y tagged) we tried to see if the school would bite the dangles; we stopped after 20 minutes, no

	<p>success. We then started to handline for sharks and tagged 2 FAL, 1 Y and 1 RRU. We then started to troll for SKJ on the feeding school that stayed about 1 000 m around the fad. Managed to tag 6 Sj with sonic. Came back to the Fad and deployed sonics in 5 triggerfish and 2 YF before stopped for the morning at 0950. Drifted till 15h and came back to the fad at about 1545 for a final jigging session. End at 1620 after 3 Y and a silky tagged with V13P sonics. Put a sonic receiver VR2 on the fad to see what tag were present. At 1710 we started heading back to Dfad 16233 with the goal of releasing the last 5 sonic tags... ETA 15h tomorrow...</p>
7/08/2014	<p>Very good passage overnight with seas in the back and in peaceful mind with part of the work already accomplished. Spent morning cleaning the gears and writing report emails. Arrived at the 8S position at 1700, it's 6 nm south from last year pos...nothing on the echosounder. We took the road to the north at 1725 with a Dfad position to possibly be checked on the road by 6 degree Lat tomorrow morning if we could find it on daylight...</p>
8/08/2014	<p>Rolling passage overnight. Found easily dfad 17719 as the floating part was made with a balloon... No school associated, just a few small YF that didn't respond to the chum/danglers. Caught one with rod and jig. Start steaming to check 2 other dfads on the way to TAO 5S. The tracking system crashed 2 hours before we reached the position. After a while, managed to find Dfad (17448, not sure the buoys is a different type) with the help of birds. A bit of detection, tried the danglers without success, jig a couple of small yf. Troll and sample 1 Y and 2 Dol. The TAO 5S was too far to get there before dark so decided to stay around the fad. Hope the positions of the other one will show-up again on the screen. Started a small dangler session at 18h during 20 min but no joy. Caught one Y on rod and tagged it with a CT . At 19h, with the other fads still not on the screen, decided to steam to TAO 5S (53 nm away) to fish there in the morning.</p>
9/08/2014	<p>Arrived at the given position at 04:45 and no buoy, same scenario as last year...should have read the daily log...but why Noaa is giving this wrong position??? Arrived at the buoy at 07. Nothing there, a desert.... Hit the road up north at 07:20; eta tomorrow morning at 4:30. Crew spent the day cleaning the boat.</p>
10/08/2014	<p>Arrived at the buoy at 4:00. Drifted till 5:30 and approach the buoy for the usual echosounder survey that alas, revealed that no school was associated. Tried to chum but not even a mahi... Start to steam to the equator buoys that are our last hope now (The 2N hasn't been replaced by Noaa).</p>
11/08/2014	<p>Arrived at 4 am and drifted till 5:30. Started by the buoy the more south, nothing there. Went to the second buoy to start chumming at 0613; fish started biting at the troll lines at the stern and stayed there for 20 minutes then stopped. Nothing at the danglers. The school is not a big one looking at the sounder. We then started a jig and rod session and deployed 6 archival tags. Stopped at 0900 as the bites became scarce and for... breakfast. Total CT for the morning: 7 Y and 23 B. Hum, looks like a long way to bonanza...We had an evening dangler session at 16:40 for 40 minutes before throwing the towel. Fish stayed in the deep between 50 and 100m. Tried to troll around some jumping YF, no success. Came back to the buoy and had no success with jiggs and rod although fish between 25 to 80 m under the boat....Wait for 19h and start jigging again with tuna jumping all around the</p>

	boat, chasing small flying fish and also some myctophidae. A productive jigging session allowing the release of 7 AT bigeye and 45 CT (10Y, 1 S and 34 B)
12/08/2014	Started at 0540 to chum but the fish went down and didn't even come at the troll lines. Not interested in our sardine cuts... Tried to jig at 06 but fish stayed at 100 meters and only managed to catch 1...Went to visit the southern buoy, just in case...but nothing there. Big show of tuna and mahi catching flying fish all afternoon. Started jigging again at 1630 but just got a couple of fish. Started again at 19h till 01h in the morning. We deployed 10 AT and 39 CT. The current is stronger and the aggregation seems to be bigger. Mahi and rainbow runners plus a couple of sharks are now present.
13/08/2014	After 3 h sleep, made a small dangler session to check but got same no-response as the 2 previous days... Tie-up again and tried jigging with no result. School under the boat and around. At 13h, a large pod (30 to 50?) of false killer whales came all around the boat and chased the school. Echosounder screen clear til 15h when some small YF seems to come back and started to feed on flying fish. But only just a few detection spots on the screen... At 16:15 went to check the other TAO but nothing there. Back to our mooring at 17:10. Jigged with no success, only small detection...Tide direction changed, against the wind, opposite as yesterday. At 19h still no fish, seems the school will not come back...
14/08/2014	Awaked at 4h15 and saw that the school was back at the echosounder. We started jigging and got 15 CTs (2Y, 13B) plus 1 Y At. We stopped to jig at 05:55 and started the dangles at 0603. Fish came on the troll lines and allowed the release of 17 fish before the false killer whales came back and stopped the game. All school disappeared again...A bit of detection showing again at the end of the afternoon but no bite on jiggs. Wind and sea picked up during the day. Unless miracle happens, it will be our last night at the 00/170....
15/08/2014	The tuna seem to be gone for good, only rainbow runners around the boat, no detection at echosounder. Tried jigging between 3 and 4am and also before 6 for no result. A last tour around the buoy with the troll lines caught 12 B and 1 S before they go in the deep. Went check the second equator TAO but nothing there. Started steaming to the 2S buoy at 0715 in 20 knts SE winds and 2 m seas...eta tomorrow 4 am.
16/08/2014	Arrived at the buoy at 04:30. 2 boats on the radar, one at 3 nm from the tao; may be Korean from the voices we heard at the radio. Started chumming at 0535 but nothing there. Hit the road at 0550 toward Dfad 16303, about 230 nm away. Passed closed to Enterbury island around 15h30.
17/08/2014	Good passage overnight with seas 3/4 at the back and easing. Arrived at dfad 16303 at 10:30, school feeding with bird associated. Started trolling around and started catching bigeye on the long troll lines, then deployed dangles and started chumming. Caught and tagged 19 fish, all B, before they started to spread-out. Caught also a good size SJ, stomach full of anchovies... Stopped fishing and attached the radio beacon to the fad and drifted. Tried again at 15:30, nothing on troll lines. Caught a couple of bigeye and one Skipjack on jig. Decided that the best thing was to wait for the morning when school aggregated under the fad.
18/08/2014	13 nm drifted till 3h; came back closed to dfad 16303 and started dangler fishing at 0601

	<p>till 0645. But fish mostly stayed under 50 m deep, never came up except a few baby B and 1 Y (5 B, 1 Y caught on troll lines and tagged). Few fish already at the surface feeding on anchovies. Tried to jig till 0715 but no success, fish stayed mostly under 100 m. Not a big aggregation and mostly small bigeye...Once again not interested by our sardines that can't compete against anchovies...Started steaming to Dfad 15068 (53 nm) at 0720 under the rain. Arrived at the fad at 1515 and it seemed that a decent aggregation was present at echosounder between 50 and 100 m. Started to troll/dangler around without success. 1 mahi, 1 whaoo missed. Tuna stayed in the deep. Tied-up to the fad to see if jigging would bring any good that way. Abandoned at 20:30, let go the fad and checked around. No more detection; maybe the school didn't like the fad to be pull-up by the boat drift. Steamed to next dfad, 17448, 12 nm away. Arrived at 22h30, small detection, tried to jig without success; attached a radio beacon and drift.</p>
19/08/2014	<p>Came back to the fad and started jigging at 04 am. Good detection but deep from 100 to 150 m. A few fish came closer between 5 and 5:30. But sharks took their taxes... just got 2 bigeye released with 2 At. Started the dangles at 06. Some fish came on the stern troll lines, mainly YF and few small bigeye + 3 RRU and 1 DOL. The main school stayed in the deep below 100 and started to go deeper at 6:40. All fish below 150 m at 0640. Tried again e at 08am but the school stayed in the deep. Hit the road at 08:15 to dfad 17264, 85 nm in our SSE. Wind from SE picked up in the afternoon of course...Arrived at the fad just before dark and found it easily with the flash. No detection of any kind, no one home... Started to steam to dfad 15107, 75 nm away still in the SE (Murphy's law).</p>
20/08/2014	<p>Painful night punching in the waves, arrived at Fad position at 05:15. No problem to find it with the flash. Started jigging at 05:35 for 25 min before switching to dangles. Released 2 CT and 1 AT (Y) with the jiggs; 2 bigger fish caught (1Y, 1B) but too damaged to be tagged. Tagged 7 B and 1 Y with CTs during dangler session on the stern troll lines. Small school stayed under 100 m, seem with some good AT size fish. Decided to stay to try deploying more AT on this one. Tried to jig at 4 pm. At least 3 schools actively feeding around. No success. Back and jigged again at 18h ; small patches of detection between 20 and 50 m but no bite. Decided to wait for the morning.</p>
21/08/2014	<p>Steam back the drift to Fad 15107 and arrived at 04:00. Started to jig but heavy drift, sharks and shy fish didn't help. Stopped at 0603 after 2 Ats in 2 YF and 5 CTs (4B,1Y). Tried to troll/chum for 30 min without any success (1 S) Started steaming NE to dfad 15535, 92 nm away...Arrived at 17:45. Started trolling around, no detection, and no bite. Drifted till 19h and tried to jig. Still no detection, no bite. Not worth waiting more we decided to steam back to the TAO 8 S and then to the sonic receiver equipped dfads.</p>
22/08/2014	<p>Another rock n'roll nite. Weather hopefully improved early in the morning. Checked the TAO 8s at 0830. No detection, we just caught a wahoo on a troll line. Started steaming to the Dfad 16233 something like 145 nm away.</p>
23/08/2014	<p>Arrived at fad 16233 pos at 02:30. Attached beacon and jig till 0600; 2 Ats in YF and 10 CT (8Y, 2B). Many jiggs lost with sharks. Small patchy aggregation, mostly small YF. Tried to troll/chum for 20 min but got no taker. Retrieved sonic receiver VR4 and change faulty hydrophone; downloaded the VR2 that revealed to have recorded good amount of data</p>

	then redeployed the whole lot. Started to steam to dfad 16197, 110 nm in our SW. Arrived at 21:10, attached the beacon and drift till morning.
24/08/2014	Weather pick-up during the night; came back to the fad 16197 in rough conditions and started jigging at 4:00 in less than pleasant conditions, rain, wind and...sharks. These one forced us to stop at 05:20 after just 3 Y tagged with CTs. Waited till day light for trolling; only got one Y. Retrieved the receivers VR2 and VR4 and put a new VR2 on the fad. Started steaming to Pago in the rough at 6 knts ETA tomorrow mid-morning.
25/08/2014	After another painful night, arrived at the east corner (cape Matatula) of Tuituila isl at 06. Arrived at the dock at 0800; end of CP10.