

# **PACIFIC TUNA TAGGING PROJECT**

## **Phase 2 (Central Pacific)**

**Cruise CP-8: September 26<sup>th</sup> to 17<sup>st</sup> October 2012**

### **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.

Seven CP cruises have already been achieved, using Hawaii and Tonga-based fishing vessels; these have tagged and released almost 27,000 tuna, mostly bigeye (93%), 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 an eighth CP cruise, named hereafter CP-8, during a 21 day cruise on the Tonga-based FV Pacific Sunrise. This longliner was chartered during CP-5 and CP-6 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. CP-8 has followed the same track as the 2 previous cruises i.e. ascending the 170W meridian (south to north) and descending the 180W meridian.

Crew and scientific personnel onboard Pacific Sunrise during CP-8 are listed in Table 1.

**Table 1: Personnel onboard Pacific Sunrise during CP-8**

<b>Name</b>	<b>Title/affiliation</b>	<b>Nationality</b>
Etimoni Palu	Captain	Tonga
Bruno Leroy	Cruise Leader/SPC	France
Tony Lewis	Research consultant	Australia
Hopoate Fakatoumafi	Crew	Tonga
Nikola Kaihau	Crew-engineer	Tonga
Sioeli Mailau	Crew	Tonga
Ataisi Oe Moui Taufa	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 (Detroit), 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 3,600 nm CP-8 cruise by refueling tanks in Pago Pago after the first 500 nm and also by taking sixty 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 seven 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.

One hydraulic reel was rigged on the starboard stern corner with a trolling line equipped with a jet-head type lure but was only occasionally used.

The spray system that was rigged for CP-5 and CP-6 was also used during CP-8. This consisted of a 25mm diameter PVC pipe attached on the outside of the hull at deck level and drilled with 1mm holes facing downwards directly beneath the danglers. Sea water was circulated through the pipe using three pumps (3KW each). The use of this powerful spray system has probably increased the efficiency of dangler fishing significantly.

## **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 tagging and supplied with a saltwater hose for irrigating the tuna during surgery. The archival cradle was placed directly in front on the fish holds. All cradles were marked with one cm graduations from 30cm to 120cm.

Each crew member was assigned to a dangler station. Two crewmen were hauling fish for the port and starboard stern dangler stations as well as taking care of two to three stern troll lines. Fish were handed to Tony (ADL) manning the stern tagging cradle. Two other crews were hauling fish from the two forward starboard danglers to feed the other conventional tagging cradle manned by cruise leader (BML) or the captain (ETP). The crewman at the first starboard dangler station was also in charge of the chumming. The captain was driving or, if CL was deploying archival tags, tagging from the centre deck cradle. In the latter case the boat was circling the aggregation on its autopilot. Suitable size fish for archival tagging were sourced from all four dangler stations.

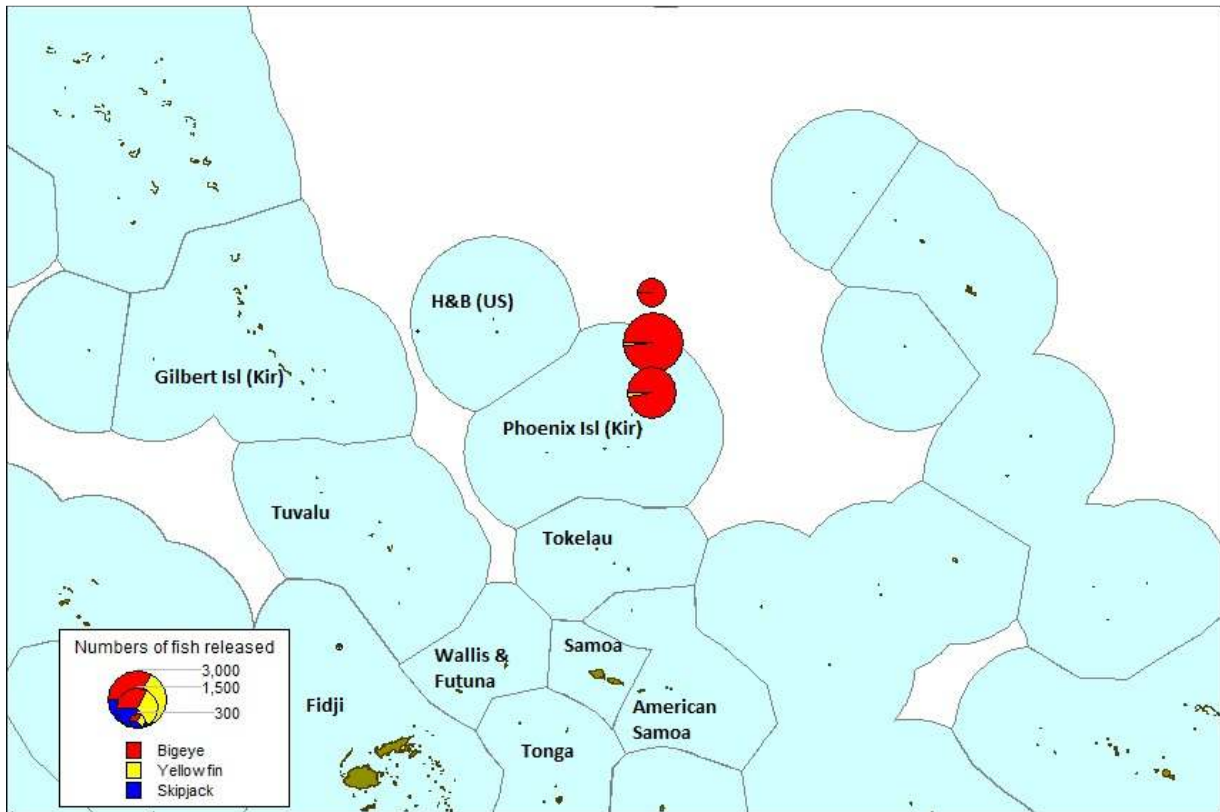
### ***Conventional tagging***

Conventional tagging (CT) consisted of using the 13cm yellow dart tag manufactured by Hallprint Ltd. After checking if fish did not present any severe injury<sup>1</sup>, 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 six 100 tag blocks in total. Conventional tagging was performed by BML, ADL and ETP. Having the captain able to tag with CTs was a big asset, allowing BML to deploy archival tags (ATs) during the fast biting schools without impacting the CT operations (see Table 2, which shows the number of tags released by taggers).

A total of 6174 tropical tunas was tagged and released during the cruise, comprising 6014 bigeye (97%), 20 skipjack (<1%) and 140 yellowfin tuna (2%). Spatial distribution of tag releases is shown in **Figure 1**.

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<sup>1</sup> 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.



**Figure 1: Distribution of tag releases during CP-8**

**Table 2: Number of tags per tagger**

Tagger	Archival	Conventional	Total
BML	18	2790	2808
ETP		357	357
ADL		3009	3009
<b>Total</b>	<b>18</b>	<b>6156</b>	<b>6174</b>

***Comparison with CP-5 and CP-6 cruises***

The current cruise deployed a similar number of tags to CP-5, with a similar spatial distribution – most fish on the 170W meridian, and few on the 180. Table 3 displays a comparison of the number of fish tagged per buoy. On all three cruises, releases along the 170W predominated, though with some success on 180 during CP-6. The 180 meridian was especially unproductive during CP-8. More fish have now been tagged and released on the 170W meridian than all others combined during the eight CP cruises.

**Table 3: Number of tags deployed per buoy**

<b>TAO buoys</b>	<b>CP-5</b>	<b>CP-6</b>	<b>CP-8</b>
2 S/170W	1918	530	2215
00/170W	2081	2121	3084
2N/170W	1760	-	855
2N/180	568	-	-
00/180	29	946	14
2S/180	-	332	6
<b>170 line</b>	5759	2651	6154
<b>180 line</b>	597	1278	20

### ***Archival tagging***

Only 17 Wildlife Computers MK9 archival tags and 1 Lotek Lat2810 were available for deployment during the cruise. Unfortunately the Mk9 tags ordered 3 months prior to the cruise did not arrive in time due to some sensor provider failure. All tags were deployed in bigeye tuna. 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).

In the same way as on the 2 previous cruises, the large numbers of suitable size fish being caught on the dangles/troll lines and the captain being able to deploy conventional tags allowed all archival tags to be deployed during the day and none during jigging fishing at night as it was found necessary during previous CP cruises.

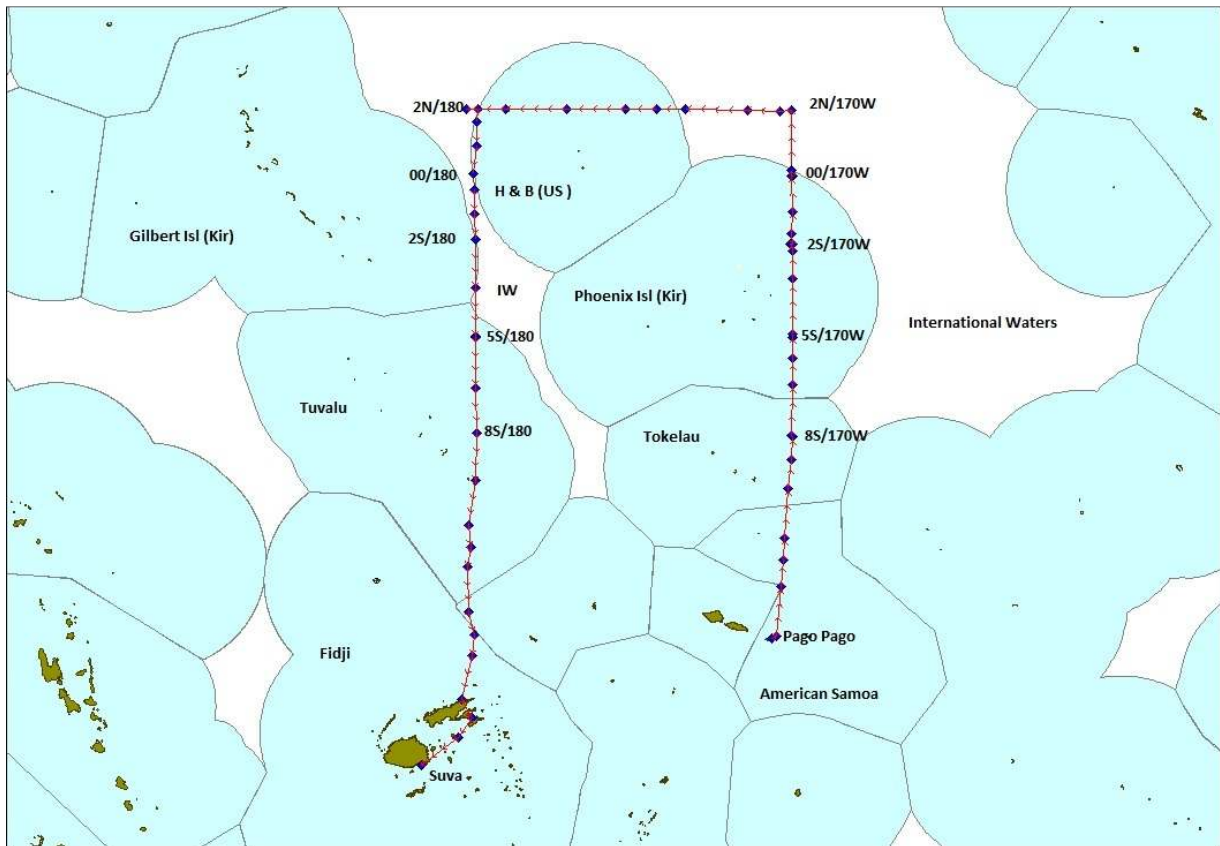
### ***Data recording***

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-8 is shown below in **Figure 2** and can be summarized by the following schematic:

*Pago Pago → 170W TAO line (8S, 5S, 2S, 00, 2N, 00) → 180W TAO line (2N, 00, 2S, 5S, 8S) → Suva*



**Figure 2: Cruise track during CP-8**

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

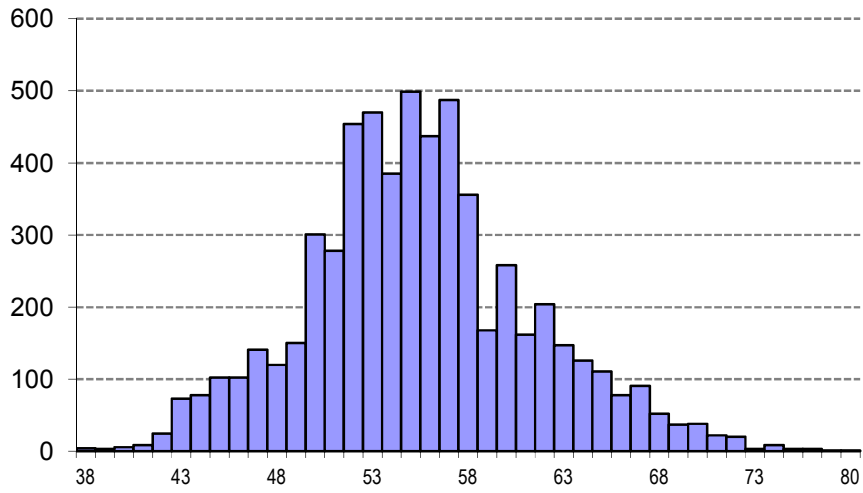
Daily log extracts that provide detailed written descriptions of daily activities are provided in Appendix III.

Of the 21 days of charter during CP-8, 12 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 8 days were spent fishing and tagging.

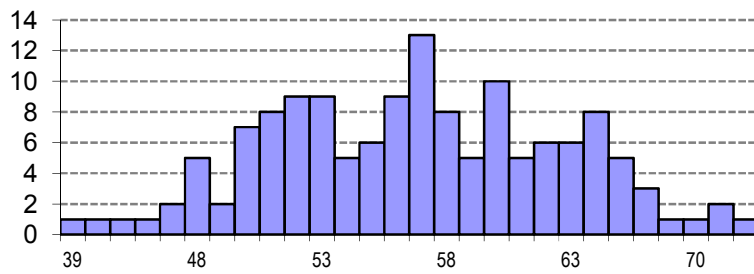
### **SIZE DISTRIBUTION OF TAGGED FISH**

The size distribution of bigeye and yellowfin tuna conventionally tagged during the cruise is shown in **Figure 3** below. For comparison, the size distribution of bigeye tagged during CP-5 and CP-6 is also displayed with the CP-8 size distribution on the following page (**Figure 4**).

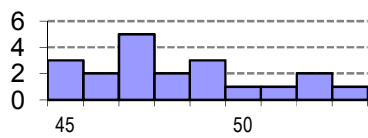
**Figure 3** Size distribution of fish conventionally tagged during CP-8



Bigeye (n=6014)

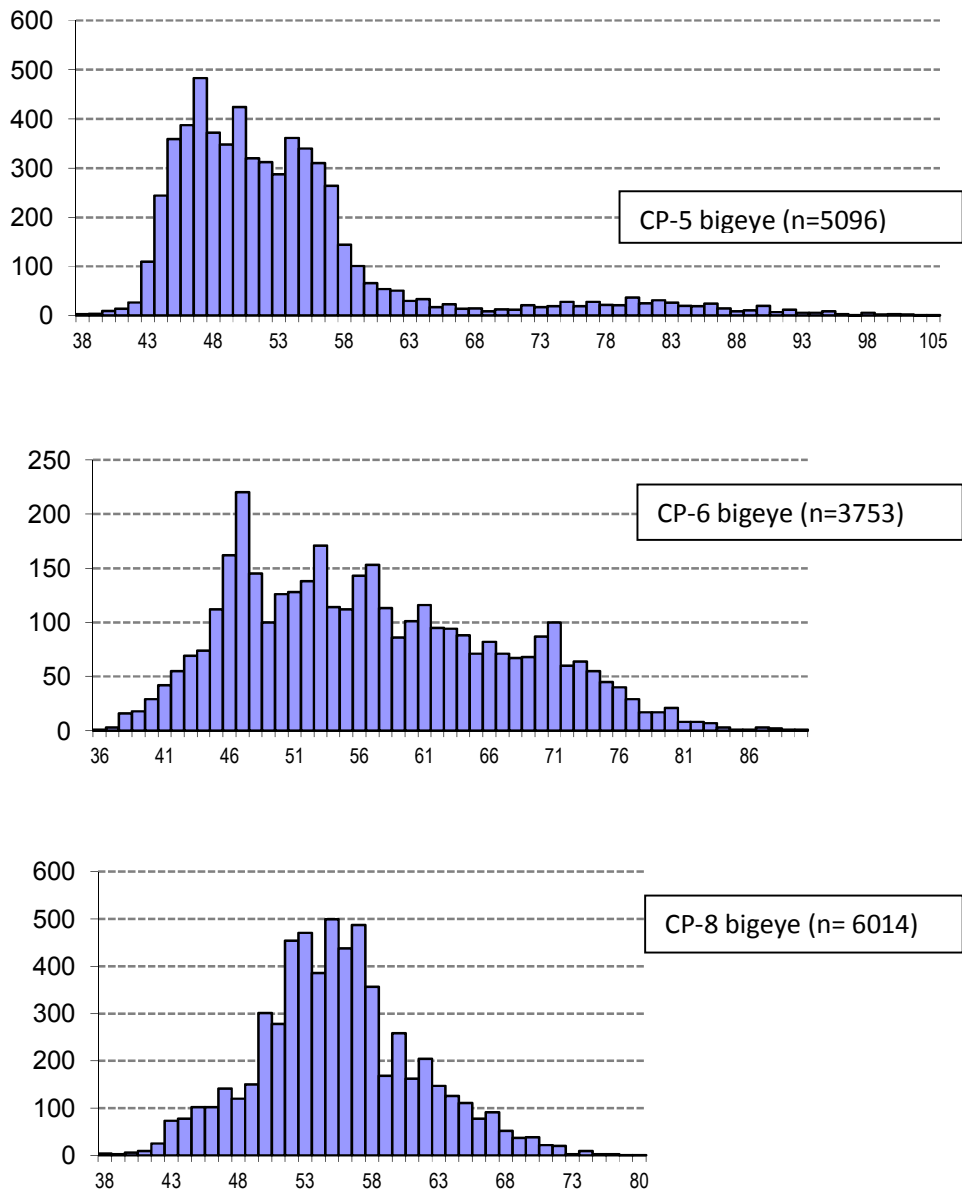


Yellowfin (n=140)



Skipjack (n=20)

**Figure 4: Length frequency of bigeye conventionally tagged during CP-5, CP-6 and CP-8 for comparison.**



The size range of bigeye tagged during the three cruises was similar (mostly 40-80cm), with comparable size distributions, although with proportionally both fewer smaller (~ 46cm modal length) and larger fish (70cm plus) seen during CP-8, with the tail of larger fish (80cm plus) taken during CP-5 in particular completely lacking.



The size distribution of yellowfin taken during CP-8 was similar to that of bigeye (Figure 3), with most fish taken on the troll lines and in noticeably lean condition.

The 18 bigeye tuna tagged with archival tag size range was 60 to 82cm (mean size 65cm).

### **BIOLOGICAL SAMPLING**

As part of a large study undertaken at SPC to describe the trophic interactions of the pelagic ecosystem, 38 fish across four species were sampled (stomach, muscle, liver) during this cruise (see Table 4). Otoliths were also taken for age and growth studies of bigeye tuna. Sampling was conducted after tagging operations. Fish that were unsuitable for tagging were put aside in the shade on the port side of the aft deck. Once sampling operations were over, the samples were placed in the freezer located in the galley as this one was more efficient at freezing the samples than the freezers on the aft deck.

**Table 4: Summary of biological samples collected during CP-8 (O: otolith, S: stomach; M: muscle; L: liver).**

<b>Species</b>	<b>Number</b>	<b>O</b>	<b>S</b>	<b>M</b>	<b>L</b>
BET	33	21	29	29	29
YFT	1		1	1	1
RRU	1		1	1	1
DOL	3		3	3	3
<b>TOTALS</b>	<b>38</b>	<b>21</b>	<b>34</b>	<b>34</b>	<b>34</b>

### **CONCLUSION**

This eighth in the series of Central Pacific (CP) cruises saw a large number of releases (6174) during the 21 days of the cruise, exceeded in number only by the CP-5 cruise (6359 releases). The cruise was shorter than previous cruises in the same area, with the almost complete lack of fish along the 180 meridian, and no other options available to expand fishing opportunities. On this occasion, the vessel returned to Suva rather than Wallis and Futuna, to fit in with a subsequent deepwater snapper research charter cruise.

The amount of downtime (12 out of 21 days steaming or checking buoys with no fish) was higher than previous trips, and although much of this is unavoidable because of the spatial configuration of the TAO array, consideration has been given to improving this situation, with a series of operational guidelines proposed for consideration on future cruises (see Appendix 4).

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.

#### **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:	Detroit MTU 600 hp
Cruising:	10 knots
Auxiliary:	Cummins 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), IW (International Waters), HB (Howland and Baker – US), GL (Gilbert Islands-Kiribati) and TV (Tuvalu).**

Date	General area	Principal activity	Conventional tags			Archival tags		Total tagged
			BET	SKJ	YFT	BET	YFT	
<b>2012</b>								
26-Sep	Pago Pago	Fuel, provisions, left at 16:40						
27-Sep	Am Samoa EEZ	Steaming, fish gear rigging						
28-Sep	TAO 8S/170W-TK	Steaming, checking buoy						<b>0</b>
29-Sep	TAO 5S/170W-PX	Checking buoy-steaming						<b>0</b>
30-Sep	TAO2S/170W-PX	Fishing	144	5	8			<b>157</b>
01-Oct	TAO2S/170W-PX	Fishing	1102	7	27	4		<b>1140</b>
02-Oct	TAO2S/170W-PX	Fishing & steaming	893	4	15	6		<b>918</b>
03-Oct	TAO 0/170W-PX	Fishing	1695	2	39	6		<b>1742</b>
04-Oct	TAO 0/170W-PX	Fishing & steaming	1315	0	27			<b>1342</b>
05-Oct	TAO 2N/170W-IW	Fishing& steaming	841	0	12	2		<b>855</b>
06-Oct	IW and US EEZ	Steaming						
07-Oct	US EEZ and IW	Steaming (date changed midnight)						
09-Oct	TAO 2N/180-IW	Checking buoy-steaming						<b>0</b>
10-Oct	TAO Eq/180-HB	Fishing and steaming	5	2	7			<b>14</b>
11-Oct	TAO 2S/180-GL	Fishing and steaming	1		5			<b>6</b>
12-Oct	TAO 5S/180-HB	Checking buoy-steaming						<b>0</b>
13-Oct	TAO 8S/180-TV	Checking buoy-steaming						<b>0</b>
14-Oct	TV and WF EEZ	Steaming to Suva						
15-Oct	WF and Fiji EEZ	Steaming to Suva						
16-Oct	Fiji EEEZ	Steaming to Suva						
17-Oct	Fiji EEZ	Arriving in Suva						
<b>Total</b>			<b>5096</b>	<b>20</b>	<b>140</b>	<b>18</b>		<b>6174</b>

### **APPENDIX III: Daily activities summary from Daily Log entries**

#### **26<sup>th</sup> September            Leaving Pago**

FV Pacific Sunrise arrived in Pago Pago harbor at 0715 am. Everything went smoothly at the fuel dock, loading fuel started quickly, clearance done at 08:30. After checking what was already onboard, ADL and BML went shopping for topping up the food. Loading the fuel drums took time and the boat moved to the main dock at about 14:00. After a good lunch at the nearby chinese (Fia Fia) and saying goodbye to Madame Palu, we waited a bit to get the ordered 500 kg bait and managed to leave Pago Harbour at 16:45 in moderate seas.

#### **27<sup>th</sup> September            Steaming north**

Not very comfortable passage overnight with sea on the side. The boat is doing about 8 knots. Easterly wind increased in the morning up to a good 20 kts, making the ride tiring in 2m+ side waves. Boat speed dropped to 7 knt due to some current in the afternoon. Started setting the outriggers and making trolling lines, but have to wait for the fuel drums to be cleared from the deck before setting the cradles. Wind dropped in the evening but not the sea and swell ...

#### **28<sup>th</sup> September            Steaming north**

Steaming conditions improved during the night; the wind will decide if this will continue during the day...and it was, turning NE making the road bumpy again...set the cradles in the afternoon and got ready the best we could in this rockn'roll environment..Arrived at the TAO 8S at 18:30 and, as expeted, no sign of life around..Started steaming toward the 5 S buoy at 18:40.

#### **29<sup>th</sup> September            Fishing TAO 5S in afternoon**

Sea conditions greatly improved during the night; arrived at the TAO 5S at 16:30. Small detection at the echo sounder right at the buoy, with a few red spots at 40 m and lighter detection down to 80 meters. It looked like a small tuna school, possibly yellowfin. Chumming was made but bait was from an old carton and looked quite bad. Possibly the cause of the fish not biting...then school disappeared from the screen at about 17:15, reinforcing the feeling that it was not bigeye that would usually stay under the buoy. After consultation between the tuna experts, it was decided to hit the road toward the next buoy, the 2S...

#### **30<sup>th</sup> September            Fishing TAO 2S in afternoon**

East wind picked up a bit again during the night, and reached a good 15 kts at midday... back to the bumpy road...arrived at the 2S 170W buoy at 1350 hrs; good trace down deep (100m plus) and were going to wait but fish started biting on first pass - several Chinese longline floats nearby, probably entangled; fished for 30 mins with 134 tagged (5 YF) then opted to wait until 1600 hrs; started fishing again 1600 hrs but minimal bite, with fish staying down; SJ school nearby and some tagged - 23 total (5 SJ, 3 YF, 15 BE), with most trolled; 157 for the day. Will steam up current (strong from east at 2.2 kts) then drift until 0530 hrs tomorrow.

#### **1<sup>st</sup> October                Fishing TAO 2S**

Started steaming to the buoy at 0450 hrs, retracing the comfortable drift overnight; fish under the buoy and began fishing 0535 hrs - good first bite for 70 minutes, with 476 tagged (6 SJ, 19 YF 451 BE); second episode 0750-0844 hrs for 467 tagged (4 YF, 463 BE) and final morning pass for 30 minutes at 0924 hrs for 125 tagged (1 YF); over 1,000 for the morning's work, with 3 Ats; few large fish, 40-75 cm with modal size ~ 56 cm; rested until 1600 hrs when tried a short afternoon pass, which yielded 72 fish before

calling it a day - daily total 1140 (7 SJ, 27 YF and 1106 BE including 4ATs); opted to drift for the night and give TAO 2S one more try in the morning before heading for TAO Eq 170W; steamed up current until 1830 hrs then drifted well for the night under bright moon, slight seas and with some fine roast duck sitting comfortably in ample bellies.

**2<sup>nd</sup> October                      Fishing TAO 2S then steaming towards TAO Eq**

Steamed towards buoy 0403 hrs and started fishing 0520 hrs - good bite for almost one hour produced exactly 500 tags then we stopped for about 30 minutes to reload the blocks. Then 418 fish were tagged in 1h20 before fish suddenly stopped biting. Decided to hit the road for the next TAO at about 08:30. 918 tagged for the day, 899 BE, 15 YF and 4 SJ including 6 At bigeye. Total tagged on the 2S buoy was 2215 fish (97% bigeye) including 10 Ats - possibly a record for one buoy; steaming north all day in choppy NE conditions at around 6 kts with ETA at TAO Eq 0400hrs 3rd October.

**3<sup>rd</sup> October                      Fishing TAO Eq 170W**

Arrived at the first buoy position at 0445 hrs; a quick check with the echo-sounder revealed the good news: a big school was underneath...waited for first light to start chumming at 0528, then quite an intensive tagging session in 3 "schools" separated by the unavoidable break for reloading the blocks. The 3 schools ended at 08:50 and brought 485, 495 and 99 fish with 97% bigeye including 3 Ats; Then decided to check the second TAO which was surprisingly not on the position provided the same day by NOAA but about 1 nm north of it; no frame on this one, only the yellow ring. Another school of bigeye, smaller than the first one, was associated with the second buoy and provided 380 tagged fish in about 50 minutes. 1459 fish for the morning - pas mal. Started the afternoon round at about 1515 hrs at the north buoy but no bite; went to the first buoy at 1543 hrs and tagged 283 fish in 3/4 of an hour before checking the second TAO again the biting was decreasing. Still no bite...came back again to the south but time-out at about 1710 hrs...daily total 1742 (98% BE including 6 Ats); cruise total 3957 (97% BE) which starts to look record-threatening ! Nice drift over night with light ESE wind and little current.

**4<sup>th</sup> October                      Fishing TAO Eq 170W then steaming towards TAO 2N**

Drift had turned lumpy by early morning but very little current and stayed near TAO Eq buoy; still good fish underneath, possibly denser than yesterday; started fishing 0530 hrs - good bite for an hour before stopping to load blocks, with 543 tagged; second bite on same buoy lasted just half an hour for 130 fish so moved to flat buoy - good bite in bursts for 295 tagged; returned to TAO buoy for a final pass and managed a healthy 371 fish; total for the day 1342 (98% bigeye with 27 YF and no SJ); have soared effortlessly past the 5000 mark with cruise total now 5299; cruising gently towards the TAO 2N 170W at 6 kts, with expected ETA 0400 hrs tomorrow; seas slight and morale holding well, nine days in; one victim (Taisi) for the crossing the line ceremony, with Eti's blades put to good use - he is a great respecter of tradition ...

**5<sup>th</sup> October                      Fishing TAO 2N 170W the steaming west**

Staged arrival at buoy just before first light and began fishing 0530 hrs with good fish signs under the buoy; 600 tagged in the first hour on a good bite, then the familiar pattern of stopping to reload blocks; second bite more subdued as fish began to spread out and jumpers began showing all around the buoy, possibly feeding on natural bait; just 101 tagged, then stopped to drift for an hour; began fishing again after some fish located with much bait thrown to get them on the bite; 154 tagged including the last of the Ats .. The magical 6,000 passed and the record seems at our mercy with just a tad of luck on the 180 line; headed west with greatly improved ride at 1000 hrs; making a good 9 kts and should be at TAO 2N 180 for fishing at sunrise 8th October Pago time (9th Suva time).

**6<sup>th</sup> October                      Steaming west**

Steamed all night and day in peaceful conditions, with following sea. Crew cleaning the boat; entered US EEZ (Howland Baker) at about 7am.

**7<sup>th</sup> October                      Steaming west**

Another long day of quiet navigation in the Howland Baker zone. Several good patches of rippling fish sighted without even looking - just in front of the boat; one patch with 5 or so whales. Doing report, proposal writing, tag block filling, inventory, grumbling to Noumea....sleeping, eating etc...Will change clock at midnight to be on Fiji time, losing 23 hrs of our sad little lives..next daily log will be for 9th October.

**9<sup>th</sup> October                      Fishing TAO 2N 180W then steaming to TAO Eq**

Started to throw baits at 0515 around the buoy; some detection at the echo sounder showing what looks like a small school; no big dense dark-red mark alas...and the result mirrored the sounder screen: only 14 tags, all fish caught at the stern on the long troll lines (5 BE, 2 SJ, 7 YF) after 45 min...A second attempt a 6:30 didn't bring any fish apart from 2 mahi. Hit the road south at 0700 hrs . Wind turned ENE during the day and stayed under 10 knts making the ride easy.

**10<sup>th</sup> October                      Fishing TAO Eq 180W then steaming to TAO 2S**

Started to throw baits at 0515 around the buoy; some detection at the echo sounder showing what looks like a small school; no big dense dark-red mark alas...and the result mirrored the sounder screen: only 14 tags, all fish caught at the stern on the long troll lines (5 BE, 2 SJ, 7 YF) after 45 min...A second attempt a 6:30 didn't bring any fish apart from 2 mahi. Hit the road south at 0700 hrs . Wind turned ENE during the day and stayed under 10 knts making the ride easy.

**11<sup>th</sup> October                      Fishing TAO 2S 180W then steaming to TAO 5S**

No aggregation present at the TAO 2S buoy. Pretty much nothing on the echosounder...managed to tag 6 fish (5 YF and one BE) and caught 1 mahi and 1 rainbow... no other option than running to the TAO 5S to arrive in good time there tomorrow...

**12<sup>th</sup> October                      Fishing TAO 5S then steaming towards TAO 8S**

Another "absolute desert" buoy, quickly checked at 0520 hrs and sadly abandoned the buoy to hit the road again at 0545 hrs...

**13<sup>th</sup> October                      Checking TAO 8S then steaming towards Suva**

Sea condition deteriorated during the night: back to the southern bumpy road...no fish at the TAO 8S as expected, but minor signs and chummed briefly, for no result...steamed all day between 6 and 7 knts

**14<sup>th</sup> October                      Steaming toward Suva**

Sea eased during the night but wind picked up again in the morning, turning more easterly and putting the sea more on the side...rock n'roll. Dismantled the dangler outriggers and the cradle covers. Repacked the tags that were in the blocks etc; considered some trial snapper fishing in the southern TV EEZ but the chosen seamount not at the location shown on the chart, and abandoned after an hour's search in choppy seas and with darkness falling.

**15<sup>th</sup> October                      Steaming toward Suva**

Some heavy rain permitted the complement to take a quick shower in the morning; that was useful, with the fresh water tank starting to run low (water maker had been out of action for a week)...boat ride still not really comfortable with swell on the side and even wind picking up in the afternoon...

**16<sup>th</sup> October                      Steaming toward Suva**

After the rolling seas, a quite relaxing day steaming through islands (Rabi, Kioa, Taveuni, Koro) doing inventories, packing and having some excellent fish and chips for lunch well prepared by our favorite chief cook.

**17<sup>th</sup> October                      Arrival in Suva and cruise end**

At pilot station 0700 hrs and alongside 0910 hrs after waiting almost 2 hours for the quarantine; inwards clearance, taking on fuel and water, re-provisioning for next trip, and maintenance – cruise end.

**APPENDIX IV:  
POSSIBLE OPERATIONAL GUIDELINES FOR CP CRUISES IN THE MID-CENTRAL PACIFIC**

ISSUES IDENTIFIED FOR CONSIDERATION

- Need for improved efficiency of cruise time – more bang for the buck (~ \$2 million so far, 8 cruises)
- lengthy downtime, with often more than 70% of the trip length unproductive, but recognizing that lengthy transits largely unavoidable
- fishing “blind”, without any prior information on likely fish availability around TAO buoys, and inability to vary cruise plans and itineraries

GUIDELINES

1. Forward planning and preparation

Analysis of previous cruise outcomes to assist planning the timing of trips eg lunar influence on catches, seasonality (if any) ... but limited data so far.

Information on prevailing weather and oceanographic conditions which might influence catches and cruise success eg wind regime, warm pool/cold tongue boundaries, current variations

TAO buoy maintenance schedule (trip not too soon after maintenance)

Purse seine /surface catches seem not to be informative re TAO fishing success for bigeye but useful to know for short term recapture scenarios

2. Tagging

Adequate supply of tags needed – take 10,000 if not 15,000

More needles (and blocks) needed – 800 minimum; good fishing currently stops whilst blocks are reloaded

Cradles OK but need another deck hose for stern cradle

Analysis of fish condition at release on recapture rate, to see if more rigorous rejection justified

Record if fish troll or dangler caught?

### 3. Fishing

Leave buoy only when catches drop to below a certain agreed level, say 100 fish per pass

Consider fishing one meridian only, unless exploratory ie up and down, with breaks in between visits to individual buoys

As an extension of this, for first trip 2013, consider Capricorn Seamount (Tongan EEZ) exploratory trip then up and back along 170W line

Exploratory trip up 180W (from Suva) and down 165E, with fuelling in Tarawa or Santo – but would be long trip – combine with/add on further snapper work if planned

### 4. dFADs – ideas to be explored

(Note that successful dangler-type fishing around dFADs has yet to be proven but is seen as worth investigation as a means of improving efficiency/time utilization of current trips)

Tactic	For	Against
Deploy own FADs and fish later (variation; agencies deploy dFAD for you eg Tokelau)	Some control over operations	Recruitment time to dFADs unknown; reliable current information (for predicting drift of FADs) may not be available
dFADs deployed by cooperating fishing vessels, for vessels to fish	Buy dFAD as used by vessels, who then deploy; maybe at beginning of FAD closure period	Difficulties of coordinating May need to buy compatible GPS for FAD monitoring
Fish dFADs deployed by fishing vessels for their own use (similar to above option)	Feasible during FAD closure if FADs not lifted out of water  ISSF may be interested in funding all or part of such a venture	Difficulties of coordinating  Would need to buy compatible GPS for FAD monitoring  Would need MoU or similar for access to frequencies, codes etc

#### RECOMMENDATION;

Good to discuss possible approaches before end of the year and certainly prior to next cruise