

**PACIFIC TUNA TAGGING PROJECT**  
**Phase 2 (Central Pacific)**  
**Cruise CP-6: October 03<sup>rd</sup> to 26<sup>th</sup> 2011**  
**SUMMARY REPORT**  
**Bruno Leroy and Malo Hosken**

**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 improved the overall spatial coverage of the PTTP tag releases and increased the number of tagged bigeye tuna that are rarely caught by pole-and-line gear in the western part of the WCPO.

Five CP cruises have already been achieved, using Hawaii and Tonga-based fishing vessels that tagged and released over 18,000 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 a sixth CP cruise, named hereafter CP-6, during a 24 day cruise on the Tonga-based FV Pacific Sunrise. This longliner was chartered during CP-5 to extend tag release coverage westward from the preceding CP cruises, targeting the TAO buoys deployed along the 170° and 180° W meridians. CP-6 has followed the same track as for CP-5.

With the CP-5 cruise experience, the vessel was able to do cruise and gear `preparations on its own in Nuku'alofa.

The crew set up the vessel and embarked all fishing and tagging gears that had been safely stored in captain's house. This allowed the scientific team to join the vessel in Pago Pago, avoiding the 2.5 day steam from Tonga.

Crew and scientific personnel onboard Pacific Sunrise during CP-6 are listed in Table 1 (see also Picture 7).

**Table 1: Personnel onboard Pacific Sunrise during CP-6**

Name	Title/affiliation	Nationality
Etimoni Palu	Captain	Tonga
Bruno Leroy	Cruise Leader/SPC	France
Malo Hosken	Research assistant/ SPC	New Zealand
Hopoate Fakatoumafi	Crew	Tonga
Sokotoume Mafi	Crew	Tonga
Tiueti Kata	Crew	Tonga
Alani Latuselu	Crew	Tonga

## **GENERAL DESCRIPTION OF VESSEL**

The F.V. Pacific Sunrise is a 22 meter fiberglass multi-purpose commercial fishing vessel built in 2003 by Westcoaster International, Australia (Picture 1, Appendix 4). Owned and skippered by Etimoni Palu, it is equipped with longline and deep dropline gear used for fishing pelagic fishes (mainly tuna, swordfish) and 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; the second computer that was normally used for email communication in 2010 was out of order. For this purpose, SPC 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-6 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 surface trolling lines. This type of gear has been successfully used during the five 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 Moldcraft 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 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.

The spray system that was rigged for CP-5 was also used during CP-6. 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 dangles. 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 dangle 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 as 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.

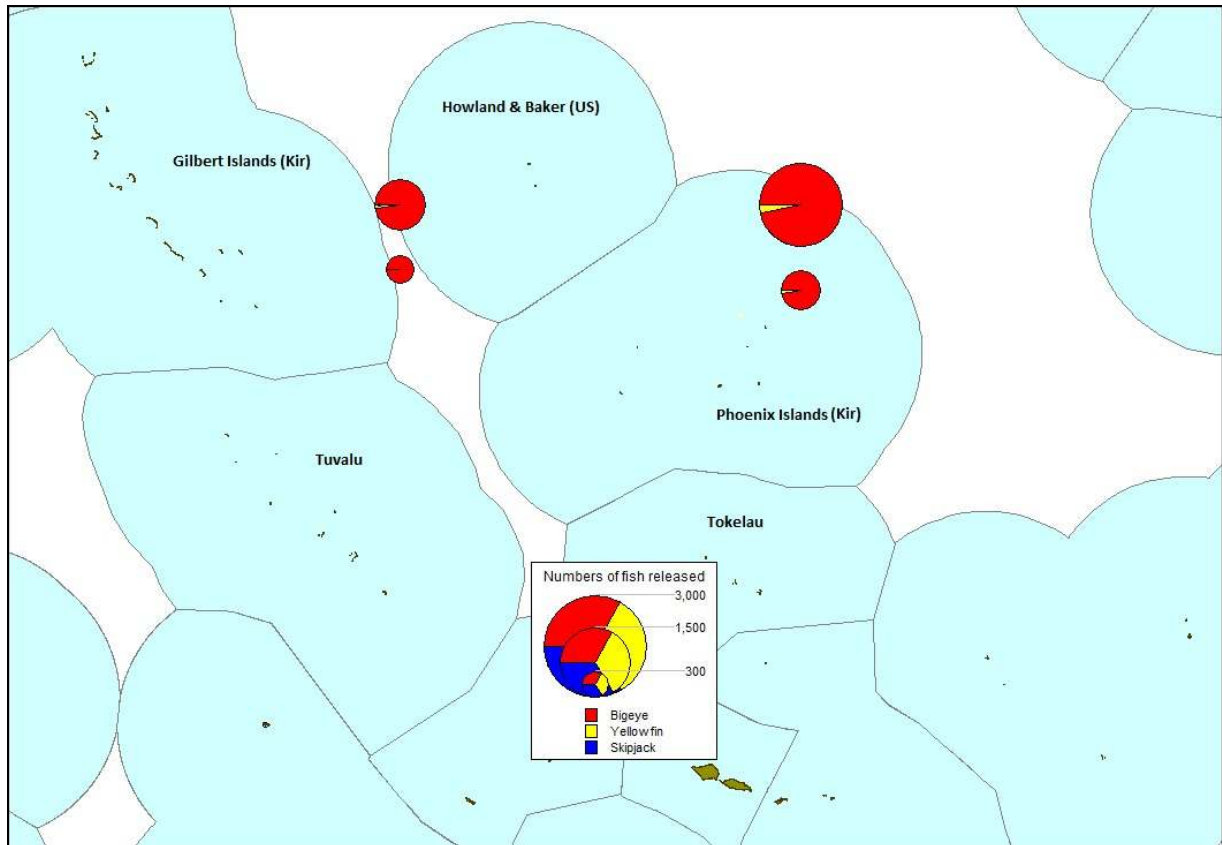
Each crew member was assigned to a dangle station. Two crewmen were hauling fish for the port and starboard stern dangle stations as well as taking care of two to three stern troll lines. Fish were handed to Malo (MJH) manning the stern tagging cradle. Two other crews were hauling fish from the two forward starboard dangles to feed the other conventional tagging cradle manned by cruise leader (BML) or the captain (ETP) (Picture 2). The crewman at the first starboard dangle 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 such case the boat was circling the aggregation on its autopilot. Suitable size fish for archival tagging were sourced from all four dangle 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, the tag was inserted between the pterygiophores of the second dorsal fin of fish using a sharp stainless steel applicator tube (Pictures 3 and 4). 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, MJH 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 tagger).

A total of 3929 tropical tunas was tagged and released during the cruise, comprising 3804 bigeye (97%), 2 skipjack (<1%) and 123 yellowfin tuna (3%). Spatial distribution of tag releases is shown in **Figure 1**.



**Figure 1: Distribution of tag releases during CP-6**

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

Tagger	Archival	Conventional	Total
BML	53	1317	1370
ETP	-	531	531
MJH	-	2028	2028
<b>Total</b>	<b>53</b>	<b>3876</b>	<b>3929</b>

### ***Comparison with CP-5 cruise***

Compared to CP-5, this cruise deployed about 40% less tags. Contrary to 2010, no fish were found at both TAOs located at the latitude 2N on the longitudes 170W and 180 (See Table 3 that display comparison for the number of fish tagged per buoy). The CP-6 releases at the 2S/170W have been hampered by the strong current (~2 knots) occurring this year at the time of the visit. On another hand, releases have been done for the first time on the 180 line at the equator and 2S TAOs.

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

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

### ***Archival tagging***

Sixty Wildlife Computers MK9 archival tags and 20 Lotek Lat2810 were available during the cruise. Fifty-one tags (45 Mk9 and 6 Lat2810) were deployed in bigeye tuna and two (Lat2810) on yellowfin 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 (see Picture 2), 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 two sutures. All archival tagging was conducted by the cruise leader (BML).

In the same way than CP-5, the large numbers of suitable size fish being caught on the dangles/troll lines and the captain being able to deploy conventional tags allowed for all archival tags to be deployed during the day and none during jigging fishing at night as it was necessary during previous CP cruises.

### **Data recording**

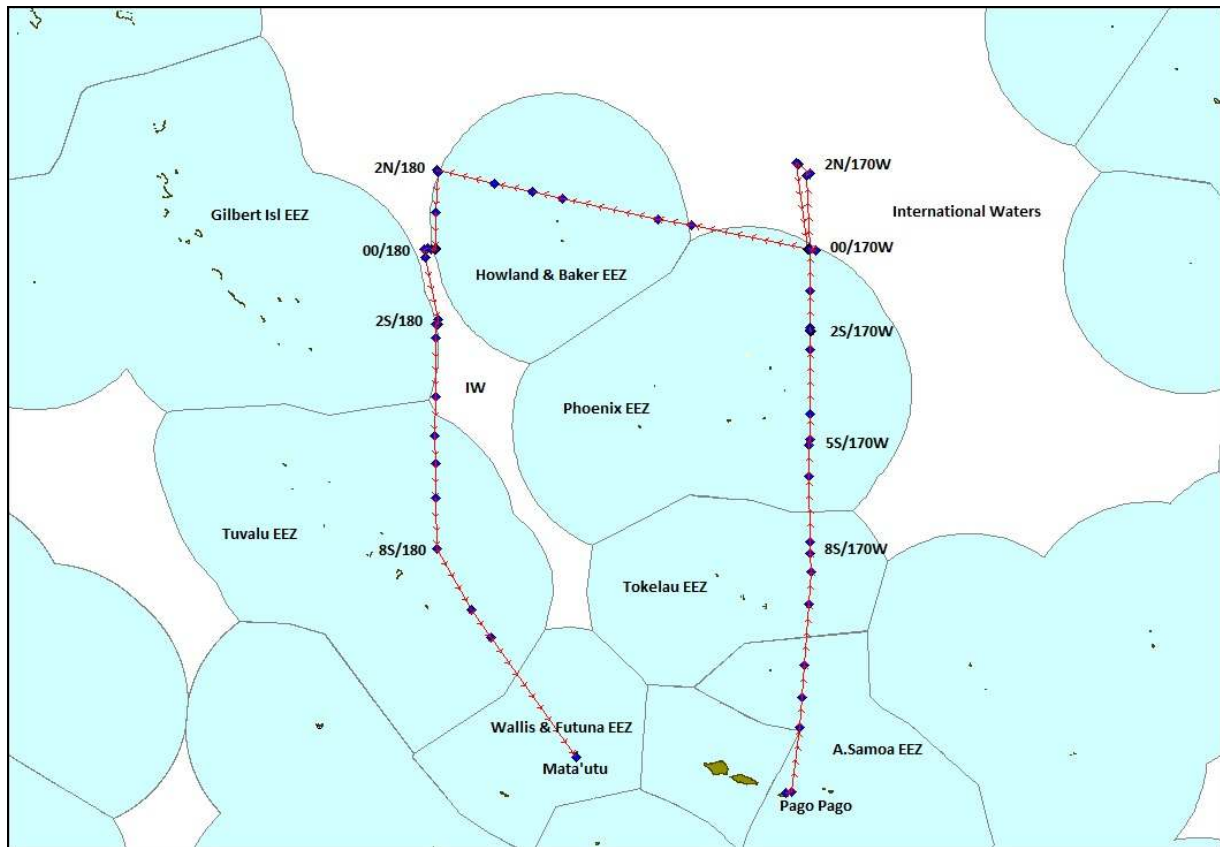
Each tagger was equipped with a digital voice recorder enclosed in a waterproof sleeve. The first and last tag in each new block was read out before commencing tagging, and tag numbers were intermittently recorded. After each fish was tagged, its length was recorded from the graduations on the cradles. 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-6 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, 8S) → Mata'utu***

The TAO 5S/180W was reported to have gone adrift just a few days prior to the cruise start and was out of our reach during the cruise.



**Figure 2: Cruise track during CP-6**

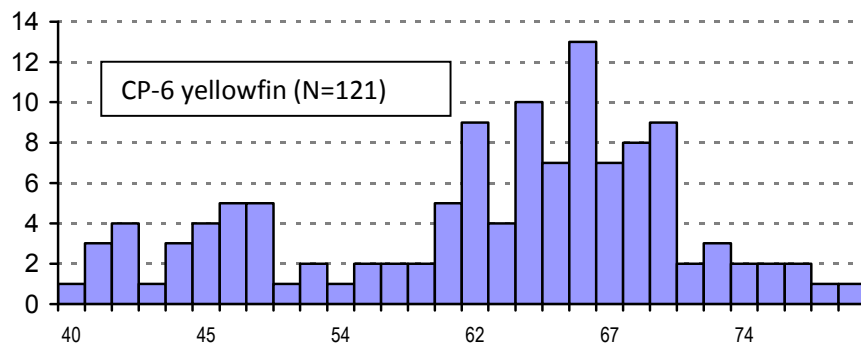
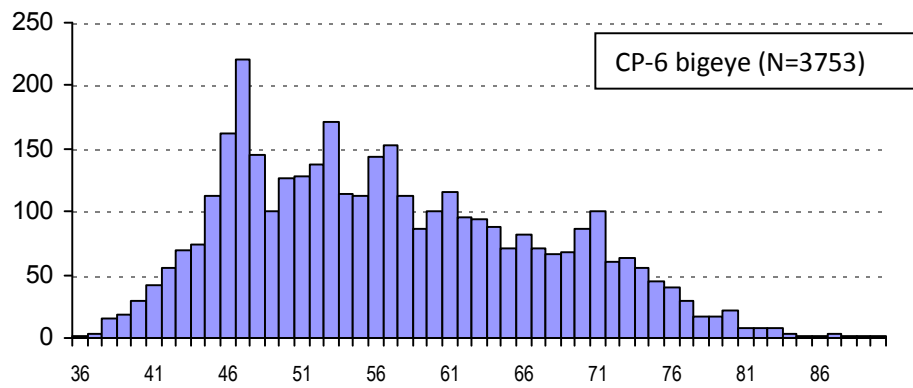
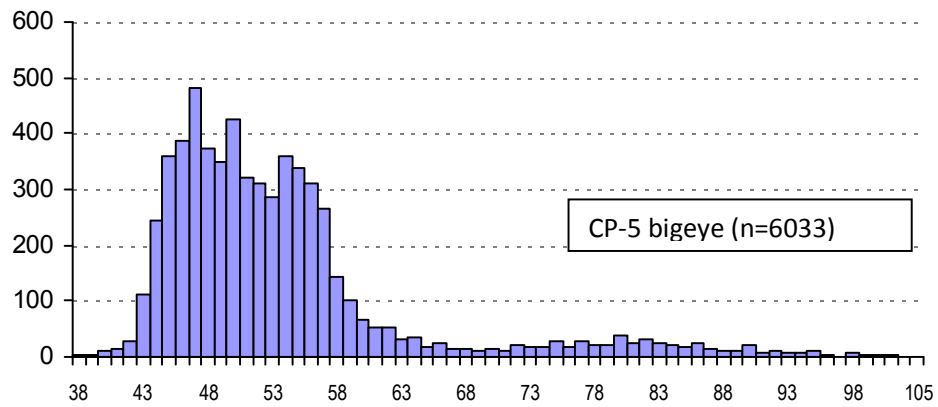
A summary of general movements during the cruise and daily tag releases by area/buoy is given in Appendix II

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

Of the 24 days of charter during CP-6, 11 days were spent steaming and checking buoys with no fish, two days were spent in Pago Pago to take fuel and provisions, and part or all of 11 days were spent fishing and tagging.

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

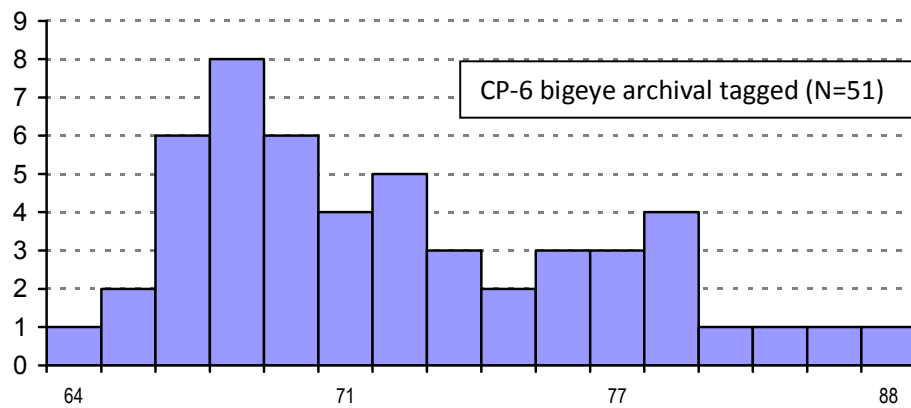
The size distribution of bigeye and yellowfin tuna conventionally tagged during the cruise is shown in **Figure 3** below. The two skipjack tunas which were tagged (length of 52 and 58 cm) are not shown. As a matter of comparison size distribution of bigeye tagged during CP-5 is also displayed. We could note that, if the modal length is situated for both cruises between 45 and 60 cm, the 60-70 cm class made up about one third of the captures for CP-6 whereas it was only about 7% for CP-5.



**Figure 3: Length frequency of bigeye and yellowfin tuna conventionally tagged during CP-6, with length frequency of bigeye tagged on CP-5 for comparison.**



The size distribution of bigeye tuna tagged with archival tags is shown in **Figure 4** below.



**Figure 4: Length frequency of bigeye tuna tagged with archival tags**

## BIOLOGICAL SAMPLING

Part of a large study undertaken at SPC to describe the trophic interactions of the pelagic ecosystem, sixty fish across four species were sampled during this cruise (see Table 4), including 50 bigeye and eight yellowfin tunas, as well as one mahi-mahi and one wahoo. Overall, sizes of fish ranged from 46 cm to 123 cm. For bigeye tuna, sizes ranged from 46 cm to 86 cm. Sampling was conducted after tagging operations in the morning and afternoon. Fish that were unsuitable for tagging were put aside in the shade on the port side of the aft deck. Sampling was coordinated by MJH with the assistance of one crew member who had been briefed on sampling procedures. Except for one, all fish were sampled for stomach, muscle and liver. 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. Samples from each school were placed in labeled bags and a sample of the bait used was also included.

**Table 4: Summary of biological samples collected during CP-6 (S: stomach; M: muscle; L: liver).**

Species	Number	S	M	L
BET	50	50	50	50
YFT	8	8	8	8
WAH	1	1	1	0
DOL	1	1	1	1
<b>TOTALS</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>59</b>

## **DIGITAL MEDIA DOCUMENTATION**

Two GoProHD cameras were used to record still pictures and high definition videos. The cameras were placed in waterproof housings and mounted on the dangles, deck poles, on a head mount as well as on a submerged pole immersed underwater (Picture 6). There is sufficient media footage which could be used to edit a short (10 to 23 minutes) movie about the CP-6 cruise. All videos and still pictures were recorded and taken by MJH.

## **CONCLUSIONS / RECOMMENDATIONS**

Pacific Sunrise proved again to be a very efficient tagging platform and the captain and crew performed very well in all aspects of the cruise. Having a captain well aware of the fish tagging procedures and able to man a tagging station was of course a big advantage. Proximity of the vessel port base to the fishing grounds compared to Hawaii allowed this cruise to be successfully completed in only 24 days. It is strongly recommended that this vessel be considered for future tagging cruises in this region of the central Pacific. The assistance of the National Oceanic and Atmospheric Administration (NOAA) has been much appreciated to obtain updated positions of the TAO moorings. We hope that stronger regulations will efficiently ban any commercial fishing on all these oceanographic buoys to protect the schools of juvenile bigeye tuna that are frequently associated with these, and also to protect the buoy themselves.

#### **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 tons
Hull:	Fiberglass
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 liters 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).**

<b>Date</b>	<b>General area</b>	<b>Principal activity</b>	<b>Conventional tags</b>			<b>Archival tags</b>		<b>Total tagged</b>
			<b>BET</b>	<b>SKJ</b>	<b>YFT</b>	<b>BET</b>	<b>YFT</b>	
<b>2011</b>								
03-Oct	Pago Pago	Fuelling, provisioning						
04-Oct	Pago Pago	Idem, left harbor at 16:35						
05-Oct	Am Samoa EEZ	Steaming, fish gear rigging						
06-Oct	TAO 8S/170W-TK	Steaming, checking buoy						
07-Oct	TAO 5S/170W-PX	Checking buoy-steaming						
08-Oct	TAO2S/170W-PX	Fishing	250		3	3		<b>256</b>
09-Oct	TAO2S/170W-PX	Fishing	98		7	3		<b>108</b>
10-Oct	TAO2S/170W-PX	Fishing & steaming	156	1	7	2		<b>166</b>
11-Oct	TAO 0/170W-PX	Fishing	1152		23	19		<b>1194</b>
12-Oct	TAO 0/170W-PX	Fishing & steaming	403		14			<b>417</b>
13-Oct	TAO2N/170W-IW	Checking buoy & steaming						
14-Oct	TAO 0/170W-IW	Fishing	141	1	33	2	1	<b>178</b>
15-Oct	TAO 0/170W-IW	Fishing & steaming	326		6			<b>332</b>
16-Oct	International W	Steaming						
17-Oct	IW and US EEZ	Steaming						
18-Oct	TAO 2N/180-IW	Checking buoy & steaming						
19-Oct	TAO equ/180-HB	Fishing	576		21	9	1	<b>607</b>
20-Oct	TAO equ/180-HB	Fishing & steaming	330		3	6		<b>339</b>
21-Oct	TAO 2S/180-GL	Fishing	222		4	4		<b>230</b>
22-Oct	TAO 2S/180-GL	Fishing & steaming	99			3		<b>102</b>
23-Oct	TV EEZ	Steaming						
24-Oct	TAO 8S/180-TV	Checking buoy & steaming						
25-Oct	TV & Wallis EEZ	Steaming to Wallis						
26-Oct	Wallis	Steaming-arrival in Wallis						
<b>Total</b>			<b>3753</b>	<b>2</b>	<b>121</b>	<b>51</b>	<b>2</b>	<b>3929</b>

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

#### **3/10/2011 - In Pago Pago for fuel and food**

MJH and BML arrived in time (08:05) by flight from Apia; waited for Friendly car rental agent and have to finally phone. Went to Pago harbor checking the fuel dock where a large tanker was loading fuel; Pacific Sunrise was at the main dock all cleared; Agent Tony said we would have to wait till tomorrow Tuesday 16h for getting fuel. Did all shopping during morning and afternoon. Visa CC gold seems not accepted by the shop's machines so have to get cash from the ATM.

#### **4/10/2011 - In Pago getting fuel and food and steaming north**

After more shopping in the morning, finally have the green light to go to the fuel dock at 15:30; got the 2642 gallons in about 35 min and left the harbour at 16:35. Change fuel filter about one hour later. Sea a bit in two directions making the road a bit bumpy although wind only 10 to 15knts.

#### **5/10/2011 - Steaming towards TAO 8S/170W**

Gentle rolling in a long 1m ENE swell; course 352, speed 8.5 kts; spent morning rigging lures and loading tag blocks; wind didn't increase in the afternoon, making the ride quite easy.

#### **6/10/2011 - Steaming towards TAO 8S/170W**

Wind turned a bit during the night from NE to E; spent morning arranging the deck, set-up CT cradles and testing the spray system. The V cradle for AT will have to wait till tomorrow to be set-up as some fuel drums are still in the way. Arrived at the 8S buoy at 15:25. No sign of life, nothing on echosounder, no mahi or wahoo on the troll lines, not even a single bird; Stopped circling the buoy at 15:50 and headed to the next buoy 180 nm away.

#### **7/10/2011 - Steaming towards TAO 5S/170W**

Wind turned SE in the night. Arrived at the buoy at 13:05. Circling around with troll lines and echosounder checking up to 300 m deep, but same desert as on the 8S. Thought about staying till sunset but chose to hit the road and concentrate on the usually productive buoys between 2S and 2N.

#### **8/10/2011 - Fishing TAO 2S/170W**

Wind turned back on E quadrant and swell on the side make the ride a bit less comfortable. Arrived at first buoy, the south one, at 09:40, nothing there, few spots at 120 m only. We then went onto the second buoy, about 1 mile north, to find a nice school with a flock of birds on top. Quickly started to bite, pure bigeye 41 to 77 cm with maybe some bigger ones below as evident on the sounder. Stopped after 50 min, fish becoming shy and going deeper. 212 tagged including 2 AT. Drift till 15:20 in 2 knots of current. As already experienced in previous cruises, the afternoon bite was very slow, fish staying at about 40 m deep. Stopped at 16:45 after 44 tagged including one AT. Total for the day : 252 BE (including 3 ATs) and 3 YF. Current and wind too strong to stay at the buoy so we ran 2 hrs upwind, then stop and drift for the night.

### **9/10/2011 - Fishing TAO 2S/170W**

Started fishing at 05:40; tried for about one hour to chum the school but fish stayed below 25 m and we got only a few bites with about 50 tagged. The strong current at about 2.3 kts is probably preventing the chum (cut sardines) cuts from reaching the fish depth. We stopped at 06:50, in the hope the current would slow down. Started again at 07:40 for almost 1 hour but only 3 fish tagged; had a try with the hydraulic reels and drop lines but no success, wind + current put the drift speed up to 3 knots. Tried again at 16:25 for 46 tagged included 2 AT. Stopped at 17:50 and went to check the second TAO but still nothing there. Stopped fishing at 18:05. Total for the day: 7 YF and 101 BE including 3 ATs.

### **10/10/2011 - Fishing TAO 2S/170W**

Wind changed to east and current dropped by 0.5 kts at 1.7 kts. Might explain that fish were more enthusiastic about our lures this morning. Started at 05:35 and have a good run for ~150 tagged until biting decreased and we stopped for 30min at 06:50. Started fishing at 07:25 and stopped again for one hour at 08:00; the fish are following the chum, eating the baits but not hungry enough to jump on the lures, just one fish tagged at 09:00, we decided to hit the road at 09:30. Total for the day=166 fish (158 BE, 7 YF and 1 SJ) tagged including 2 ATs. The total for the TAO2S was 530 fish (512 BE, 17 YF, 1 SJ with 8 BE ATs)

### **11/10/2011 - Fishing TAO Equator/170W**

Good passage overnight; arrived at the buoy at about 04:00. Drifted, waiting for first light. Current < 1 kts. Large aggregation appeared on the echo sounder when approaching the buoy; stopped tagging at 07:06 for reloading tags. Almost pure BE from 42 to 90cm+. Only few YF at the beginning. Eti started tagging so CL could concentrate on ATs. Stopped for the morning session at 09:12, only the smallest fish biting slowly. Total for the morning: 853 including 16 ATs. Started again tagging at 15:40. Stopped for the day at 17:15, fish not biting anymore, after 353 tagged including 3 ATs. Steamed away from the buoy for 1 hour. Total for the day : 1171 BE +23 YF= 1194 incl 19 ATs.

### **12/10/2011 - Fishing TAO Equator/170W**

Tried to start at 05:05 but fish still sleeping, had a second coffee waiting for daylight. Real start at 05:35, had a good run till 06:55 (410 fish tagged) when we stopped to reload tags and let the fish have a rest. Started at 07:40 but, apart a few of the smallest fish, the school stayed between 100m and 25 m deep and not biting. Stopped again at 08:20. A last try for the morning didn't change the situation. Started drifting at 09:30 till 15h. Started fishing at 15:30, but fish no more interested in our frozen sardines. Stopped at 16:15 after 7 tagged, 4 small bigeye and 3 yellowfin. Large yellowfin seen chasing flying fish all around. Bigeye school still present just at the buoy but stayed in the deep. Decided it was time to move to the next TAO to arrive there at sunrise. Total for the day : 417 fish (403 BE & 14 YF, no AT).

### **13/10/2011 - Fishing TAO 2N/170W**

Our course drifted west during the night due to some current. Flat calm seas. Arrived at the buoy at 07:15 but no school home. Caught one mahi. Decided to find the second TAO gone adrift one day ago with the position and drift direction given by NOAA. Current about 1.5 knts from ENE. At 9:30 still searching the buoy. No answer to message sent to NOAA about buoy position updates...10:34 finally received position update, buoy 12 nm away now. Finally found it at 12:05 on the radar. It has drifted more than 7 nm from the pos given this morning. No evidence of a school associated with the buoy. A few detections only. Drift waiting till 16:15 to start fishing but no success. Decided to come back to the equator TAO to get another morning fishing there before switching to the 180 line. Unfortunately current of about 1.8 kst against us, at least for a while, will make us arriving around 08:00 /09:00 in the morning tomorrow.

#### **14/10/2011 - Fishing TAO Equator/170W**

Steamed all night from the north in calm weather but with current against us. Arrived at the TAO at 08:25 and fished till 09:50. Fish not biting well, we were two hours late. More yellowfin than previous days. Some RR and silky sharks around. 129 (22 YF) fish tagged including 1 BE AT. Decided to stay there for another good morning. Started at 16:00 trying to fish with drop-line and hydraulic reels but no success. Started dangler fishing at 16:35 till 17:45 for 49 tagged incl 1 BE AT and 1 YF AT. Quite puzzling to see how fish suddenly disappeared. Total for the day: 178 (143 BE, 34 YF, 1 SJ) with 3AT (2 BE, 1 YF); will try a dropline/jigging session at 03:30 tonight to see if could catch a fish for the sat-tag...

#### **15/10/2011 - Fishing TAO Equator/170W and steaming west**

Tried to jig and drop baited line at 03:30 in the morning but presence of silky sharks made the fishing impossible. Start dangler session at 05:30 for 2 hours. Tagged 326 BE and 6 YF , then started steaming for the long haul towards the TAO buoy at 2N/180.

#### **16/10/2011 - Steaming towards TAO 2N/180**

Woke up to the good news: NZ vs Aust (20-6). Pancakes for breaky, crew and CL mounted new short troll lines; the crew fixed the two water pumps, Soko working hard. Lentils and smoked fish for lunch (even captain ate some). MJH sorting through movies filmed over the last few days. NZ beef stew for dinner. Basically a steaming day with not much to do, c'est la vie.

#### **17/10/2011 - Steaming towards TAO 2N/180**

Not much wind but a 1 m long swell. Another long day on the water. Bacon and eggs for breakfast, fish in coconut milk for lunch, leftovers for dinner and ice cream. Morning and afternoon exercise (push ups and abs). Crew finished transferring diesel into main tanks and cleaning fish holds. Waiting for some great fishing and tagging action tomorrow.

#### **18/10/2011 - Checking TAO 2N/180 and steaming towards TAO Equator/180**

Arrived around TAO vicinity at 04:30, standby at 05:00, slow steam towards buoy at 06:00, waiting for first light. Started monitoring the area with echo sounder at 06:18. Alas no school associated with the buoy. No fish on the troll lines, absolute desert. Took some pictures of the boat from the water. Start steaming towards the equator buoy at 07:15.

#### **19/10/2011 - Fishing TAO Equator/180**

Up at 05:00. Slow steam towards buoy until 06:00. Waiting for first light. Started at 06:17. Fish biting immediately but strong current and presence of sharks (bit 2 tunas on the dangles) made the fish shy and the bulk of the school remained under 100 m deep. Stopped at 07:18 for 45 minutes. Stopped for the morning at 09:17 after 333 tagged including 6 AT (5 BE, 1 YF). Start evening session at 15:27 and finished at 17:38 after 274 tagged included 4 AT. Total, quite useful for the day, is 607 (585 BE, 22 YF) including 9 BE ATs and one Y AT.

#### **20/10/2011 - Fishing TAO Equator/180**

Start steaming back to the buoy at 01:30 to check the aggregation. SE wind pick-up a bit at about 15 kts made the buoy moving about 0,2 nm from the previous position. Few fish close to the surface, the bulk of the school is sitting right under the buoy, a bit up current, between 100 and 170 m deep. Start fishing at 06:05 and we had a good session until 07:20. Stopped for 40 minutes, drifting with part of the aggregation. But fish not biting anymore. Managed to tag an OWT (oceanic white tip shark) with a mini p/sat. Hope it will survive the quite bad handling by crew. Stopped at 08:24 , drifting with the school at 2 kts, after 326 fish tagged including 6 ATs. Start engine at 15:30 and tried to fish the school but response to chumming was very poor and stopped completely after the first 10 min and only 13 fish tagged. After trying for another half hour, decided to hit the road to arrive at sunrise at the 2S. Total for the day: 336 BE and 3 YE.

#### **21/10/2011 - Fishing TAO 2S/180**

Steamed all night in choppy conditions to arrive at the first 2S TAO at 07:10 but the buoy has no more frame on top, only the ring left and looked like it was drifting; arrived at the 2nd buoy at 07:42; an aggregation of bigeye is there, not as big as on the previous buoy. More small size fish and biting not very well. Tagged almost 200 fish until 09:12 then stopped for half an hour as biting was slow. Finally finished for the morning at 10:30 after 229 tagged including 4 ATs. Wind up to 20 knots making drifting not very comfortable. Started engine at 15h and fished around the buoy for 30 min but school didn't answer to chum. Stopped at 15:40 . Start again at 16:30 and no more joy. One YF tagged. Steaming slowly upwind for the night drift. Tomorrow morning will be the last chance. Total for the day 230.

#### **22/10/2011 - Fishing TAO 2S/180 and steaming towards TAO 8S/180**

Start engine at 05:10; fishing started at 06:10; slow bite til 07:40 for 84 tagged including 2ATs. Started again at 08:15 for one hour but fish stayed in the deep. Possibly another school of bigger fish moving around, associated with yellowfin but can't get them. Pull the plug at 09:14 and head to the 8S, 360 nm away. Crew cleaning deck and galley. NZ wins over France in RWC, 8-7.



**23/10/2011 - Steaming towards TAO 8S/180**

Wind turned to NE, 20 knots, choppy swell making the ride bumpy. Working on trip report and sorting out pictures. Liaising with Wallis Fisheries Department in preparation for arrival.

**24/10/11 - Checking TAO 8S/180 and steaming towards Wallis Is.**

Arrived at the buoy at 04:30. Nothing on echo sounder. Wait for day lights, trolled a 15 min trying to catch the eventual mahi but no success. Hit the road again at 06:30. Cleaned cradle tarpaulins and other equipment, packed gear and inventories. Duck and spuds for dinner.

**25/10/11 - Steaming towards Wallis Is.**

Easy passage overnight. Finished storing and inventory of I equipment that will be left with ETP. Finished writing cruise summary report.

**26/10/11 - In port, Mata'utu**

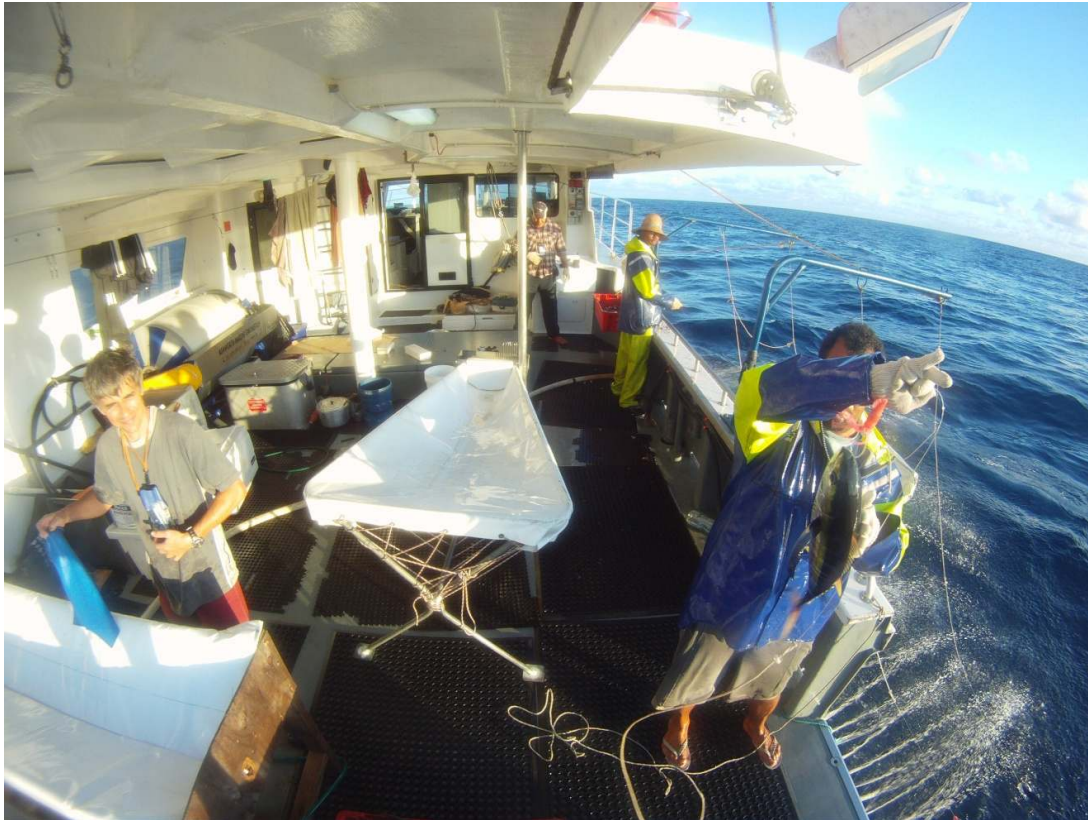
Arrived in front of main pass at 05:30. Docked at 06:45. Group picture and croissants for breakfast.

End of cruise.

#### APPENDIX IV: Pictures



**Picture 1:** F.V. Pacific Sunrise in fishing action around a TAO buoy



**Picture 2 :** Fishing action midship: The archival tagging cradle and CL in the left foreground, one of the two conventional tagging cradles and a crew handling a bigeye in the right foreground and the captain and the chummer in the background.

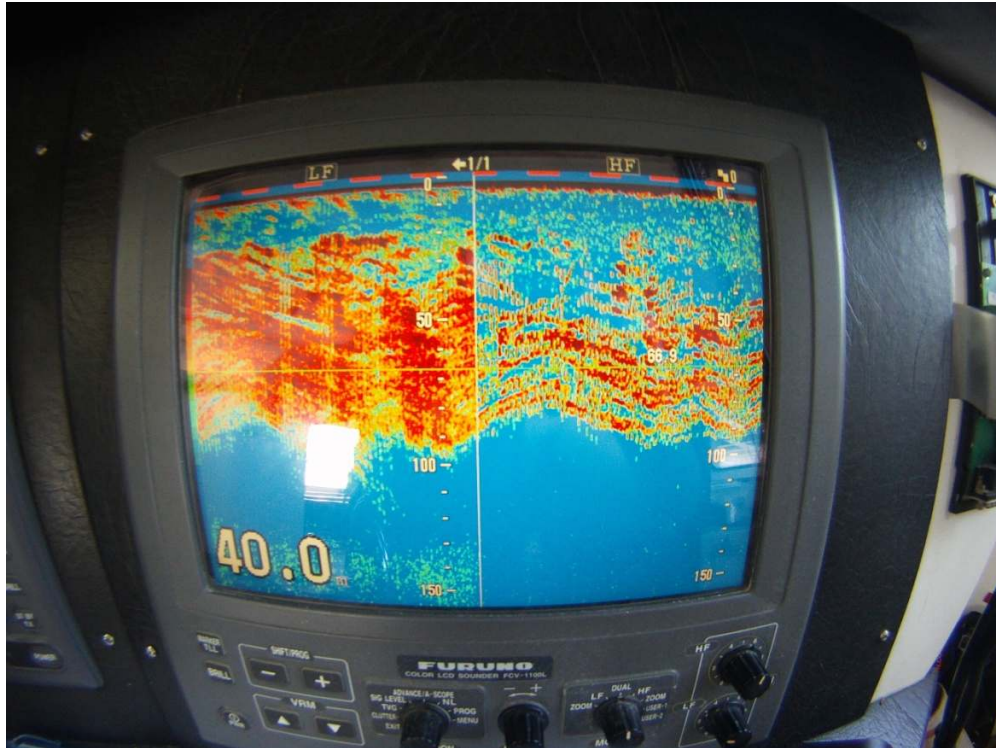


**Picture 3 :** Crew and MJH handling a bigeye caught on the starboard stern troll line. The conventional tagging cradle includes: a graduated canvas, a tagging block with loaded tags and a bucket to place used tag applicators.





**Picture 4:** Tagged juvenile bigeye tuna released from the stern tagging cradle.



**Picture 5** : Sounder showing tuna aggregation under the vessel.



**Picture 6 :** Underwater image of bigeye tunas being caught and released.





**Picture 7 :** The CP-6 tagging team: Left to right, back: Eti, Malo, Hopo, Tiu, Mani. Front: Soko and Bruno.