

PACIFIC TUNA TAGGING PROJECT

Phase 2 (Central Pacific)

Cruise CP-11, second leg: 6th of October to 2nd of November 2015

SUMMARY REPORT

Francois Roupsard, Kurt Schaeffer, Dan Fuller

The general descriptions of vessel, fishing gear and tagging process can be found in the “Cruise CP-11, first leg” report.

PERSONNEL ONBOARD

Crew and scientific personnel onboard Gutsy Lady 4 during CP-11, Leg 2 is listed in **Table 1**.

Table 1: Personnel onboard Pacific Sunrise during CP-11, Leg 2.

Name	Title/affiliation	Nationality
Tim Jones	Captain	U.S.
Kurt Schaeffer	Cruise Leader/ IATTC	U.S.
Dan Fuller	Scientist/ IATTC	U.S.
Francois Roupsard	Scientist/ SPC	France
Macarthur Malakai	Crew-bosom	U.S.
Bryan Materne	Crew	U.S.
Centriko Lucios	Crew	U.S.

FISH TAGGING DETAILS

Table 2 summarizes the number of fish tagged per tag type and per species during leg 2.

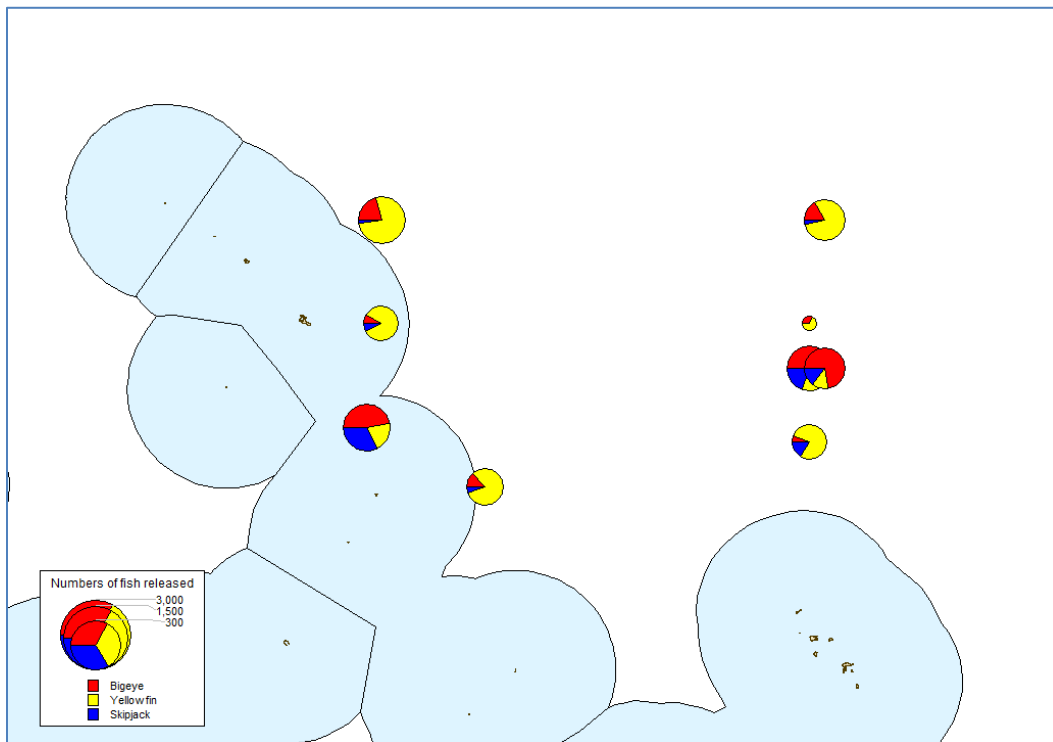
Table 2: Numbers of tags deployed by tag type and species during CP-11, Leg 2.

Tag type	BET	YFT	SKJ	Total
Archival	55	35	0	90
Conventional Y13	311	413	145	869
Total fish tagged	366	448	145	959

- **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 injuries¹, the tag was inserted between the pterygiophores of the second dorsal fin using a sharp stainless steel applicator tube. Used applicators were collected and immersed in a bucket containing a solution of 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 eleven 100 tag blocks in total. A total of 959 tropical tunas were tagged and released during the cruise, comprised of 366 bigeye (38%), 145 skipjack (15 %) and 448 yellowfin tuna (47 %). The spatial distribution of all tuna tag releases is shown in **Figure 1**. Their size distributions are shown in **Figure 3**.

Figure 1: Distribution of tag released in tropical tunas during CP-11, Leg 2 (log scale).



- **Archival tagging:**

57 Wildlife Computers MK9, 25 Lotek LTD 2310 and 33 Lotek Lat2810 archival tags were available for deployment during the first leg of the cruise. 55 MK9 tags were deployed in bigeye tuna and 2 MK9 and 33 Lat2810 on yellowfin tuna. All tags were configured to sample all likely depths, sea and internal fish

¹ Typical injuries, incurred by large hooks and the shock/trauma 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.

temperatures and light intensity every 30 seconds. Archival tagged tuna were externally marked with an orange 13 cm conventional tag. Suitable sized tuna (generally > 55 cm for MK9 and > 45 cm for LAT2810, see the length frequencies in Figure 3) 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.

Access to dFADs and satellite buoy data information used during the cruise:

Beth Vanden Heuvel provided by email the positions of Tri Marine dFADs. Two of them were checked and fished. Indication of the approximate amount of fish under a buoy has been used to direct the boat to the best available dFAD in range of the tagging vessel.

GENERAL DESCRIPTION OF CRUISE TRACK AND FISHING ACTIVITY

The track of Cruise CP-11, Leg 2 is shown below in **Figure 2**. The 8N, 5N, 2N, equator and 2S TAOs on the 155W line, and the 2S, equator, 2N and 5N on the 140W line were visited along with 2 dFADs.

A summary of general movements during the cruise and daily tag releases by area/buoy is given in **Appendix I**. Daily log extracts providing detailed written descriptions of daily activities are provided in **Appendix II**.

Of the 28 days of charter during CP-11, Leg 2, 14 days were spent steaming and/or checking buoys with no fish, and part or all of 14 days were spent fishing and tagging.

Between the nine TAO buoys and two dFADs we checked, only two buoys had a bigeye percentage higher than 40% (2S/155W: 47% and 0/140W: 69%). We had jigging sessions (see **Picture 1**) only on these two buoys and 20% of the tagged bigeye were caught during these sessions. Note that the tagged bigeye percentage is almost the same using jig or troll lines.

The tagged tuna species composition we obtained during leg 2 (B-38%, Y-47%, S-15%) was really different from the average observed species composition (B-94%, Y-5%, S-1%) on previous TAO tagging experiments.

Picture 1: Jigging session around the parachute (school originally associated to TAO 0/140W).

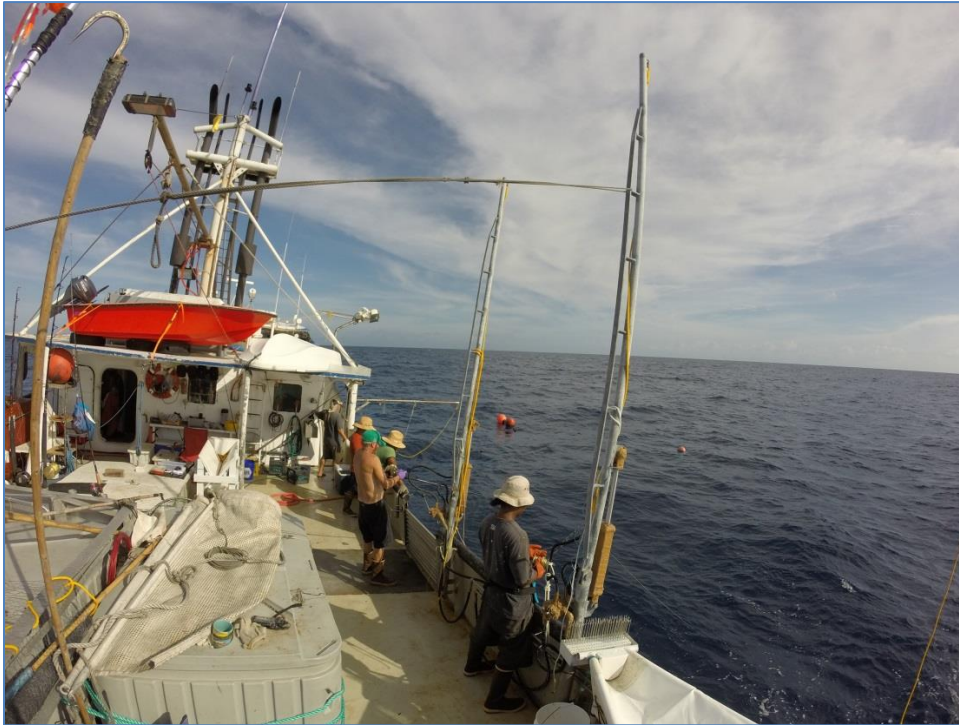
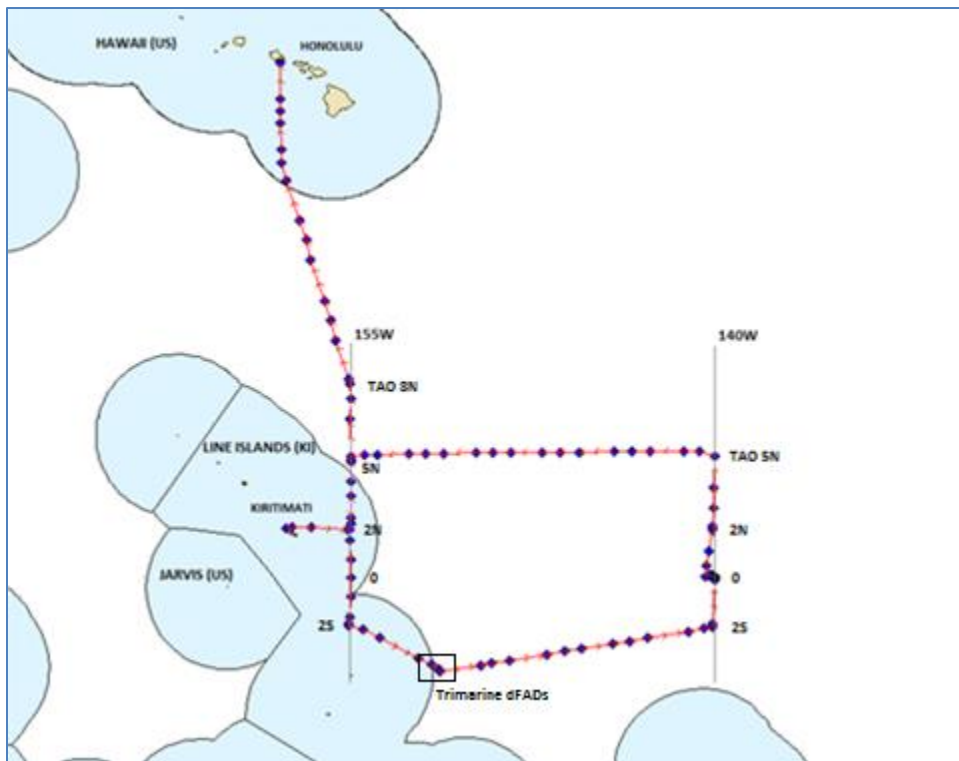


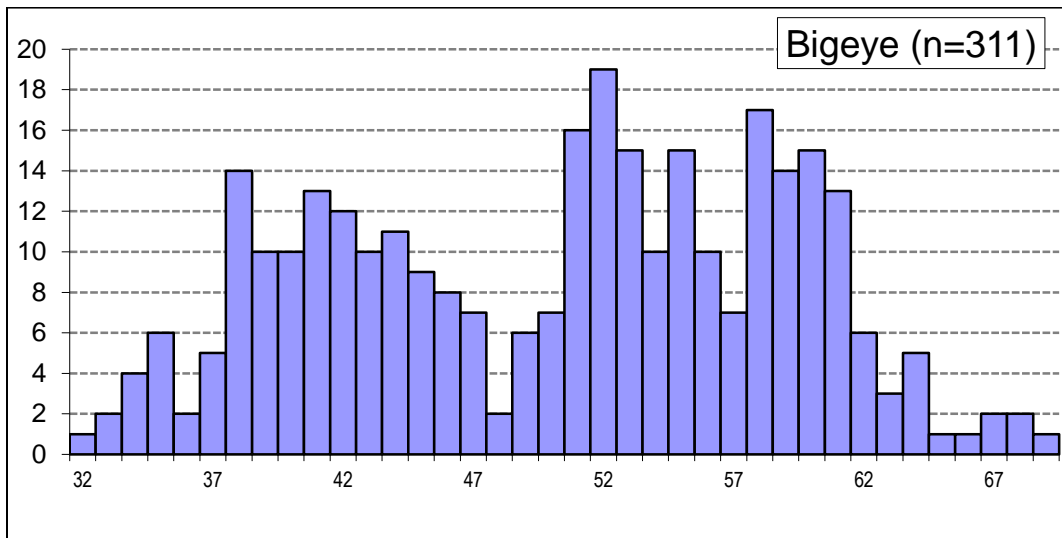
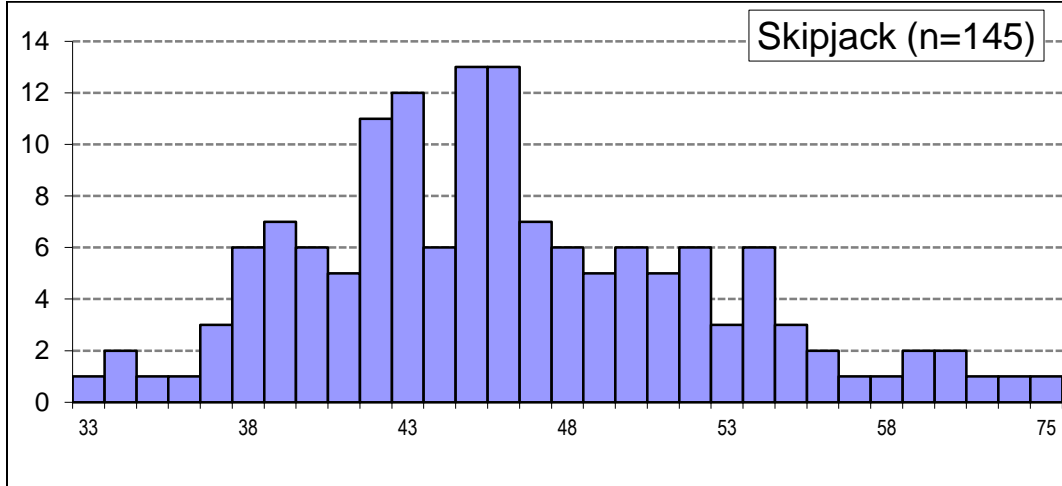
Figure 2: Cruise track during CP-11, Leg 2.

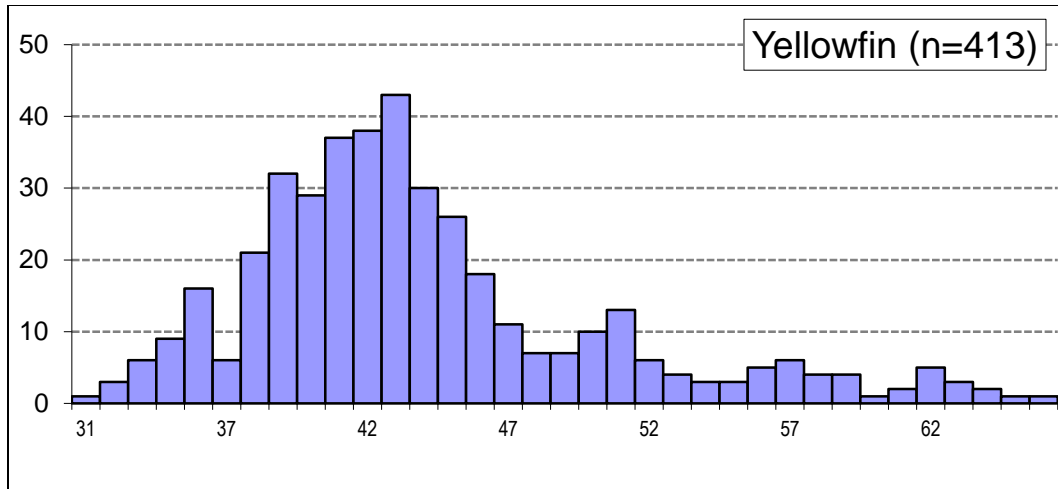


SIZE DISTRIBUTION OF TAGGED FISH

The size distribution of tuna conventionally tagged during the leg 2 is shown in **Figure 3** below.

Figure 3: Size distribution (cm) of fish conventionally tagged during CP-11, Leg 2.

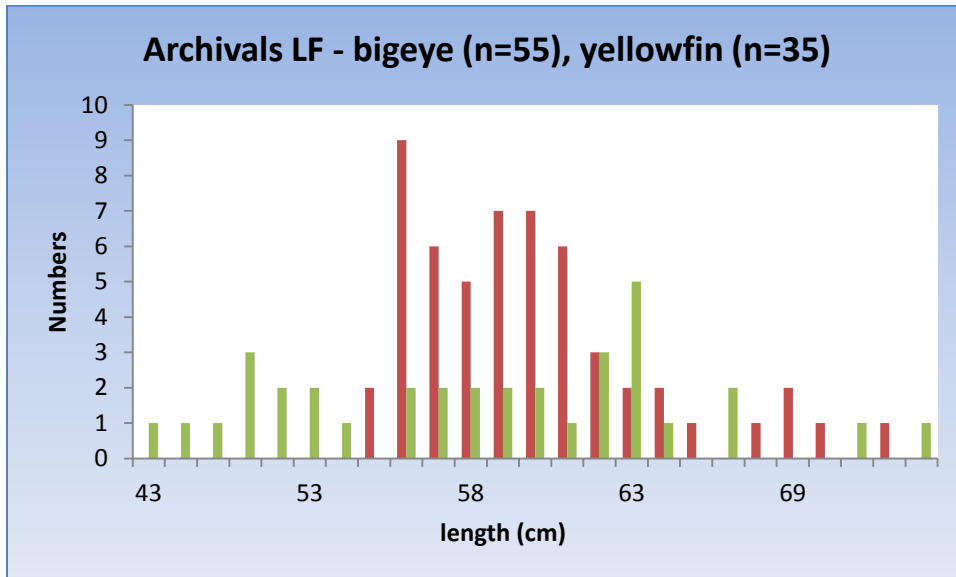




ARCHIVAL TAGS

90 fish were released archival tags. The size range for the 55 bigeye was 56 to 77 cm and 43 to 79 cm for the 35 yellowfin. The length frequencies for both species are displayed in **Figure 4**.

Figure 4: Length frequency of bigeye and yellowfin (green) tagged with archival tags.



BIOLOGICAL SAMPLING

The low number of fish caught didn't allow us to collect large quantities of priority species biological samples (bigeye and yellowfin).

Table 3 summarizes the nature and number of collected biological samples.

Table 3: Summary of biological samples collected during CP-11, Leg 2 (O: otolith, S: stomach; M: muscle; L: liver, G: gonad, DS: dorsal spine, B: blood).

Species	Number	O	S	M	G	DS	B	L
BET	10	8	10	10	10	8	9	10
YFT	17	15	17	17	14	13	13	17
SKJ	20	19	20	19	20	19		20
DOL	19		19	19				19
RRU	8		8	8	1			8
BUM	4		4	4	3	2	4	4
WAH	1		1	1				1
Total	79	42	79	78	48	42	26	79

CONCLUSION

As for CP-11 Leg 1 cruise, second leg cruise was marked by the lack of bigeye aggregations. Schools associated to TAO buoys were only small size and mixed species fish, making the average fish composition very uncommon compared to previous TAO tagging experiment.

Fishing more drifting FADs would possibly bring more fish and collaboration with Trimarine was effective but, unfortunately, most of the provided FAD positions were out of range given the tight schedule of this cruise.

We'd like to thank the captain and crew of GL4 for doing their best during all this experiment despite the poor amount of fish. They made this cruise nice and safe.

APPENDIX I: Summary of cruise activities, with number of fish released per day (dates are displayed on Hawaii time).

Date	General area	Principal activity	Conventional tags			Archival tags		Total tagged
			BET	SKJ	YFT	BET	YFT	
6-Oct	Line Island EEZ	At port						
7-Oct	Line Island EEZ	At port - steaming						
8-Oct	Line Island EEZ	Fish TAO 2N/155W - steaming	4	2	28		10	44
9-Oct	Line Island EEZ / IW	Fish TAO 5N/155W and log - steaming	11	4	55		1	71
10-Oct	Line Island EEZ	Fish TAO 2N/155W - steaming		2	4			6
11-Oct	Line Island EEZ	Fish TAO 155W/2S	86	35	32	6	2	161
12-Oct	Line Island EEZ	Fish TAO 2S /155W - steaming	6	33	7			46
13-Oct	Line Island EEZ	Fish 2 Trimarine dFADs - steaming	9	4	49		5	67
14-Oct	IW	Steaming						
15-Oct	IW	Steaming						
16-Oct	IW	Steaming						
17-Oct	IW	Fish 2S/140W TAO buoy - steaming	2	9	39	1	2	53
18-Oct	IW	Fish TAO equator/140W	44	14	6	22	6	92
19-Oct	IW	Fish TAO equator/140W	66	27	15	11	5	124
20-Oct	IW	Fish TAO equator/140W - steaming	37	10	2	12		61
21-Oct	IW	Fish TAO 2N/140W - steaming	2		4			6
22-Oct	IW	Fish TAO 5N/140W - steaming	18	4	82		2	106
23-Oct	IW	Steaming						
24-Oct	IW	Steaming						
25-Oct	IW	Steaming						
26-Oct	IW	Steaming						
27-Oct	IW	Fish TAO 5N/155W - steaming	26	1	90	3	2	122
28-Oct	IW	Fish TAO 8N/155W - steaming						
29-Oct	IW	Steaming						
30-Oct	IW	Steaming						
31-Oct	US EEZ	Steaming						
1-Nov	US EEZ	Steaming						
2-Nov	US EEZ	Arrival in Honolulu						
Total			311	145	413	55	35	959

APPENDIX II: Daily activities summary from Daily Log entries

Logdate	Notes
6-Oct	We arrived in Kiritimati too late for immigration to come on GL4 and give us clearance. They should come around 9am tomorrow. We are heading to the deepwater, a few miles away, to run away from the big swell around Kiritimati.
7-Oct	Immigration gave us our clearance this morning so we are now running to the 2N/155W TAO buoy. Gear and tags blocks prep on the way.
8-Oct	We arrived on 2N/155W TAO at 6.55am and were optimistic about the fishing as we saw birds above the buoy. Unfortunately it was a small aggregation: 44 releases (4B, 2S,38Y) including 10 archival tags on YFT only. We sampled a few fish (1B, 1S, 3Y, 1RRU). We are now heading to the 5N/155W TAO and should be there around 8.30am tomorrow. The plan is to check again the 2N buoy on our way down to the equator buoy.
9-Oct	Arrived at 5N/155W TAO at 7.40am and start fishing on a small aggregation. 71 fish tagged (15B, 6S, and 56Y) including 1AT on a Y. On our way down to the 2N buoy, we stopped on a log spotted by Dan but after 30 minutes circling and chumming we had no response. We should arrive at the 2N buoy tomorrow morning around 9am.
10-Oct	We arrived at 8.15am on the 2N/155W TAO buoy and just had the time to tag 2S and 4Y before seeing a couple of dolphins. That ended the session... A 6min event for a tagged school could be a record (?). We are on our way to the equator and a couple hours ago we crossed a PS setting his nets and a whale leaving the area. The PS was probably targeting a school which was associated to the whale (?). We'll be at the equator TAO buoy around 11pm. After a quick echo sounder check showing no serious aggregation, we are running to the 2S TAO buoy.
11-Oct	Arrived at 2.45pm at the 2S/155W TAO buoy and tagged 140 fish. After a nice corn and beef bbq we had a jig session (adding 29 tagged fish).
12-Oct	We started tagging at 5.45am on the 2S/155W TAO buoy but BET didn't come up (70% SKJ). Including the 46 fish from today the big total is now 347 tagged fish (CT: 113B, 139Y, 76S; AT: 6B, 13Y). On our way to 2 Trimarine dFADs (3.5S/151W), 1 showing a big aggregation, positions was emailed by Beth.
13-Oct	Arrived at 3.50pm on the first dFAD but just got 1 tagged fish after 30 min circling around the raft. Second one was 6 miles away and was supposed to have a good aggregation (estimation of 60t) but no big deal on our echo sounder and only 66 tag deployed after 1h30 fishing. On our way to the 2S/140W TAO buoy.
14-Oct	Nothing really exciting on the way to the 2S/140W TAO buoy except crossing 2 large free schools of skipjacks.
15-Oct	No dFAD, no birds, no fish, nothing...
16-Oct	No dFAD, no birds, no fish, nothing... again
17-Oct	We (finally) arrived at the 2S/140W buoy at 3.30pm and after a good start we circled around the buoy for almost 1h for just a few SKJ tagging. Wasn't worth it to stay so we're heading to the equator buoy, should be there around 7am tomorrow.

18-Oct	<p>We arrived at the equator buoy at 8am and found an aggregation of good size fish with (finally) BET. After 2h of trolling we started a jig session till 1pm. We had a new jig session while drifting (school is now following us) allowing us to deploy quite a lot of AT (22 during jig fishing).</p> <p>Plan is to keep tagging this school at least 1 more day.</p>
19-Oct	<p>98 tags deployed this morning. In the afternoon, a large group of pilot whales passed within 50m from the boat heading south. They didn't stay but that could explain the poor tagging session afterward.</p> <p>Big total is now 656 (272B, 125S, 259Y) including 64 AT (37B, 27Y)</p>
20-Oct	<p>Started trolling around the parachute and tagged 61 fish (49B, 10S, 2Y including 12 AT on Y). Half an hour jigging adding only 1 fish. After 2 days drifting the school is now around 30 miles away from the equator TAO buoy. We're now running to the next one, TAO 2N/140W.</p>
21-Oct	<p>We started fishing the TAO 2N/140W at 4.40am but just a few scattered spots on the echo sounder and just tagged 2B and 4Y + 3 dolphin fish for dinner... On our way to the 5N/140W buoy we caught a 180cm blue marlin. Weather is fine and the sea is pretty calm.</p>
22-Oct	<p>Started fishing the TAO 5N/140W at 4.50am on a small aggregation of YFT (80%). Another group of pilot whales were swimming by 200m away from the buoy but didn't disturb the tagging. Kurt decided to skip the 8N/140 TAO buoy to go back to the 5N/155 TAO buoy hoping that the aggregation will be bigger than 2 weeks ago. Total now is: 831 tagged fish (335B, 352Y, 144S), including 78 AT (49B, 29Y).</p>
23-Oct	<p>On our way to the 5N/155W buoy, weather and sea are fine but forecasts are rain and 25k wind this afternoon and tomorrow.</p>
24-Oct	<p>Weather is better than expected, 15k instead of the 25k forecasted but we are fighting currents, vessel speed is only 6.5k. This morning we caught a 85 cm mahi-mahi on the troll line (with the stomach full of well preserved fish for Elodie and Valerie).</p>
25-Oct	<p>Sea is quite calm and the wind still decreasing. Nothing exciting today, not even a hit on the troll lines... We are still fighting the current but we are speeding up a little: 7.4k.</p>
26-Oct	<p>Best sea conditions so far, we're running on a lake! We caught a nice 2.2m blue marlin this morning. This afternoon, I smashed a bed bug which was running on the laptop... in the galley... Dan got bite once couple of days ago but Kurt and I are still the magnets. We should arrive at the 5N/155W buoy tomorrow around 3pm.</p>
27-Oct	<p>Arrived at the 5N/155W TAO buoy for a late tagging session (5.15pm). The aggregation composition didn't change much since our last visit 2 weeks ago, mainly YFT (75%), but we tagged more BET than SKJ this time. We tagged 122 fish (29B, 1S, 92Y) so total now is 953 (364B, 145S, 444Y) including 83AT (52B, 31Y).</p> <p>We're heading to the 8N/155W TAO, hoping to tag at least 47 fish to hit the 1000 (fingers crossed).</p>
28-Oct	<p>We arrived at the 8N/155W TAO buoy at 4.05pm but just caught a couple of mahi-mahi. Quite disappointing for our last event and quite frustrating to miss the 1000 tags but c'est la vie! Heading to Honolulu, we should arrive the 2nd of November so 4 days to clean, inventory and pack the equipment (+ the bed-bug annihilation by storing everything in the freezer during 4 days).</p>

29-Oct	Weather is fine and the boat runs at 8.5kn. Cleaning and packing still in progress. We caught the very 1st fish with "the bird", the (probably) new Japanese fishing technique, a 50cm skipjack... That's a start.
30-Oct	Weather is still good, sea is fine even if the boat rolls a little (at least 75t lighter than day of departure). Tim and Dan tried to contact Jeff so he can organise the US immigration clearance on Monday, no news yet.
31-Oct	Quiet day: notice of arrival/departure sent to US immigration, report writing, 2 mahi-mahi on "the bird".
1-Nov	Last day onboard. Boat cleaning for the crew. A few immigration details for Kurt and Dan: seems that Coast Guards need a 96h notice before arrival. Jeff is making arrangements so Kurt and Dan don't miss their 4.30pm flight...
2-Nov	Arrival in Honolulu Good to know: a non US scientist disembarking in US need a special visa (ESTA doesn't work in that case). Immigration officer was kind enough to give me a waiver (saving almost 600\$ and paperwork).