

**PACIFIC TUNA TAGGING PROJECT**  
**Phase 2 (Central Pacific)**  
**Cruise CP-08-01: 5 May – 3 June 2008**

**SUMMARY REPORT – David Itano**

## **INTRODUCTION**

This report summarizes activities during a 30 day cruise of the FV Double D to the NOAA TAO oceanographic buoys south of Hawaii along the 155°W meridian and the waters of Kiribati, Line Islands<sup>1</sup>. This tagging cruise represented the first “sub-regional” approach of second phase of the PTTP, designated **PTTP Phase 2 (Central Pacific)** and given the TAGDAGER Cruise designation CP-08-01. The proposed objective of sub-regional components of the PTTP is to target difficult to access areas of the Central Pacific and French Polynesia to improve overall spatial coverage of tag releases. The Double D is a multi-purpose pelagic handline/longline vessel equipped with the full complement of Hawaiian style tuna handline gears in addition to hydraulic trolling reels. The vessel is also equipped with two mini longline reels for conventional or targeted short-set longline fishing on tuna and pomphret aggregations. The vessel was used very successfully as a principal tagging platform during the PFRP funded Hawaii Tuna Tagging Program. The vessel sailed from Honolulu with Joe Dettling as captain, his son Joe C Dettling Jr as crew/cook. David Itano was contracted to conduct the tagging operations and to serve as charter Cruise Leader representing the SPC. Two additional crewmembers (Arvin Leal and Claver Servanes) were boarded at Christmas Island on 14 May who assisted on deck and bridge watch for the remainder of the cruise.

## **GENERAL DESCRIPTION OF VESSEL AND GEAR**

The Double D is a 21 m multi-purpose commercial tuna fishing vessel designed and constructed by owner/operator Joseph Dettling for Hawaiian pelagic fisheries. The boat is unique to say the least, of catamaran style and constructed completely of welded plate aluminum (**Figure 1**). The vessel was constructed in Kailua-Kona, Hawaii in 1988 and originally known as the **Fishing Island** which was anchored off Kona as a self-aggregating fishing platform in the style of the fishing “barges” of southern California c 1950 – 1970s. In 1992, Dettling installed twin Mitsubishi main engines and fitted the vessel for commercial fishing. The boat has been a keystone of the Hawaiian offshore handline fishery that operates on the Cross Seamount and offshore NOAA weather buoys, targeting juvenile bigeye tuna. A large proportion of tag releases achieved during the Hawaii Tuna Tagging Project were made from this vessel using a combination of troll and handline gears.

In January 2001, Dettling started to experiment with short longline gear over the Cross Seamount summit to target larger, higher quality bigeye and seamount associated pomphrets, locally known as monchong (*Eumegistis illustris*). Within a few years, a new fishery had developed that sets less than one nautical mile of mainline on aggregated tuna and monchong schools. Since then, two of the Cross Seamount/weather buoy highliners have fully converted to the short longline gear and method. Basically, the system deploys a float, long section of bare mainline, weight, branchlines, intermediate sub-surface floats, a weight, a long bare mainline to surface, and a final float which places all hooks at depth, close to the seamount summit. In essence the configuration is a single, huge basket of gear with all the branchlines at the bottom of the catenary and is fully described by Beverly and Itano (2004). The system put all hooks at the target depth with no hooks in the mixed layer, increasing value of the target catch and

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<sup>1</sup> <http://tao.noaa.gov/refreshed/index.php>

greatly reducing mixed layer bycatch. The short length of mainline also circumvents the need for a federally permitted and monitored Hawaii Longline Permit since “longline gear” in Hawaii is defined as having a mainline longer than one nautical mile.

In recent years, the captain has chosen to utilize his Hawaii Longline Permit and sets approximately 7 miles of horizontal longline to sweep the entire Cross Seamount summit, setting as deep as possible over the summit. The large weights are no longer used but very large baskets of gear are set with long droplines and an effort is made to set extra mainline during the set. The Double D was chosen for this project due to the autonomy of the vessel and proven ability of the captain to innovate and produce high quality tag releases.

Vessel and gear details are itemized in **Appendix I**. The boat is equipped with a very efficient reverse osmosis watermaker, designed and built by Dettling at a fraction of the cost of commercially marketed units. A fresh ice maker, low fuel consumption main engines, redundant power generation systems and large fuel capacity make the Double D an ideal platform for extended tagging cruises. The CL used this vessel during the HTTP to tag tuna throughout the Northwest Hawaiian Islands that stretch over 1250 nautical miles northwest of Honolulu. Dettling also used the vessel to explore and exploit fisheries in Palmyra and Kingman Reef which lie about 950 nm south of Hawaii. An “on demand” hot water shower was a very positive addition since the HTTP days but the lavatory still consists of a 5 gallon bucket with rope.

The vessel electronics are adequate for the job aside from the radar unit which is of limited range and use. The Furuno 5FCV 585 is an excellent depth sounder/fish finder with a bright, high resolution image and was very useful in assessing school size and species during the cruise. The IRIDIUM phone was linked to an HP laptop PC that was very efficient for email communications. The vessel was also equipped with two GPS radio buoys that report position through the Iridium email system.

Vessel accommodations are basic but adequate. The CL was housed in the main galley area on a couch. The only inconvenience experienced were two 12 volt lights that were constantly burning to allow crew to visit the galley at any hour or to locate tools and gear quickly. Airline style eyeshades solved that problem. The Captain and crew slept above on the bridge. The addition of two Philipino crewmen during the cruise made this a bit crowded but still workable. The contract requirement to air condition the galley area proved so desirable that the Captain also air conditioned the bridge prior to departing Honolulu. These proved to be life-savers as the low wind days were very hot and humid.

## FISHING GEARS

The Double D is truly a multi-purpose tuna fishing vessel, equipped for trolling, handlining and longlining. The stern deck is equipped with three hydraulic trolling reels that can double as hydraulic down lines for *palu ahi* and *ika shibi* handlining or for diamond jigging at depth. The crew is also very familiar with using short lines to “chunk bait” fish at the surface on cut bait or use traditional basket gear for *ika shibi* fishing. **Figure 2** shows the back deck layout which is equipped with twin longline reels and 3 hydraulic trolling reels. One of the three tagging stations set up for the cruise is also shown. The two Custom Sea Gear, mini-longline reels can be used to set short horizontal or vertical longline gear. Their rated capacity is about 5 and 8 nm of mainline. However, the Double D is not limited mainline sets of one nautical mile as the Captain also holds a Federal Hawaii Longline Permit.

The vessel is also rigged to deploy tuna “dangler” gear which consists of metal davits that extend at right angles from the hull for 1.5 to 2 meters and deploy one or two very short surface trolling lines (**Figure 3**). This is a gear type that was first developed by Dettling and is entirely unique to Hawaii and its offshore handline fishery. Dangler lines place a lure at the surface just below the dangler pole while the vessel steams slowly ahead at 4 – 5 knots. The gear is most effective if they are chummed with baitfish such as California anchovies or sardines. Bigeye and yellowfin both respond to dangles but the gear is most effective on bigeye tuna. Normally the gear is baited with imitation squid lures but any trolling type lure can be effective. The Double D is equipped to deploy 7 dangler poles per side that extend up the entire hull length with each pole deploying two lures. During normal dangler fishing, the lure is placed just at the surface of the water which does not allow the fish to get its head down after hooking. However, for tagging work, longer leaders with smaller barbless single hooks are used to minimize hooking trauma.

A combination of 7” and 9” trolling lures, plastic squids and hand fashioned trolling lures were used on the hydraulic trolling reels, short troll lines and dangles. Unfortunately, a bag of trolling lures, hooks and skirts went missing along with DVD movies following our short stopover for clearance and crew boarding at Christmas Island. Fortunately, about eight lai (*Scomberoides lysan*) were caught at the anchorage, skinned and dried. Lai skin makes very durable and attractive skirting material for trolling lures and was used to fashion bigeye lures during the cruise.

Handline jigging baskets were set up using 1/8” poly chord backing to 400 lb test monofilament crimped to chrome diamond jigs. The CL also brought two standup style sport rods with 2-speed conventional reels loaded with 80 and 100 lb test spectra line. These rigs are very effective at jigging sub-surface tuna due to the low drag and non-stretch qualities of the spectra. In order to leader and land the fish, jigs were rigged with 4 m of 1.8 mm monofilament. **Figure 4** shows the prepared lai skin for lure making and a mix of lures and jigs used during the cruise.

The most important consideration in retaining this vessel is that the Captain and crew of the Double D are adept at quickly selecting and switching to any combination of gear types and lures that are appropriate to target a particular fish school situation. This versatility and experience in getting a tuna school to bite is highly desirable for a tagging charter and a characteristic of the vessels engaged in the Hawaii offshore handline fishery.

## **TAGGING and DATA RECORDING**

The tagging and data recording gears used during CP-08-01 are detailed in **Appendix II**. The cruise was supplied with SPC yellow dart tags manufactured by Hallprint Ltd, Pty of Australia for the PTTP. Size Y-11 tags for fish less than 40 cm and size Y-13 tags were supplied but only Y-13 tags were deployed during the cruise. Fifty Wildlife Computers MK9 archival tags were also available during the cruise for use on bigeye and yellowfin tuna. These tags were of the newer generation MK9 with 64MB of memory and set to sample all parameters every 30 seconds. These tags were specifically requested and manufactured with shorter light stalks bent at 90° for streamlining and reduced drag. Archival tagged tuna were externally marked with a Y-13 conventional tag since red dart tags were not supplied.

Tag release data was recorded on Olympus Digital Voice Recorders (model VN-4100), transcribed to PTTP data sheets and entered into the TAGDAGER Access database. The voice recorder was made waterproof during fishing and tagging operations by protecting the unit with a West Marine waterproof pouch for small cel phones. TAGDAGER files were backed up daily to a

1 GB USB data stick. Total backups of TAGDAGER, report files and digital photos were made to a LaCie 80 GB external hard drive.

Four tagging stations were set up on the rear deck of the Double D. The CLs primary tagging station was a tagging cradle originally designed for the University of Hawaii *RV Opah* for sonic tagging tuna in Hawaiian waters. The cradle was installed on the port stern transom of the Double D and supplied with a saltwater hose for irrigating tuna during archival tagging procedures. **Figure 5** shows this tagging cradle with a bigeye tuna being irrigated with the seawater hose and conventional dart tags tied to the front of the cradle. One of the bent stalk MK9 archival tags has already been inserted and sewn into the peritoneal cavity. The cradle location on the transom make it ideal for loading fish from the port gate and releasing tuna right over the stern. Two other tagging cradles were manufactured by Dettling to house 110 cm closed cell foam tagging mattresses that were installed on the port and starboard near the hydraulic reels (**Figure 6**). An additional tagging mattress was placed on the starboard deck for larger fish or when the small tagging cradles filled.

A 1.8 m sling for lifting large tuna was fabricated in Honolulu specifically for this cruise. The sling was based on the design developed by BM Leroy that has been used successfully on longline vessels and during the PNG Tuna Tagging Project. The only significant change in materials was the use of stainless steel poles in place of the aluminum poles used by Leroy. A long handled dip net with knotless webbing and 90 cm ring was also used for lifting medium sized tuna from the water for tagging. **Figure 7** shows the lifting sling from side and front view.

Joe Dettling Jr. was trained in tagging and data entry during the cruise and participated in full tagging duties from May 16 onwards (**Figure 8**). He learned very quickly and proved essential to the success of the tagging cruise. Maximum benefit of two taggers was achieved by training the two Philipino crewmen to pull fish for the taggers. The tuna usually bit in quick bursts that kept two taggers fully occupied. Having Joe Jr tagging also allowed the CL to concentrate on archival tagging the larger, best condition tuna while JD2 kept up on conventional releases.

## GENERAL DESCRIPTION OF CRUISE TRACK AND FISHING ACTIVITY

The track of Cruise CP-08-01 is found below as **Figure 9** and can be summarized by the following schematic:

***Hawaii → 8N TAO → Christmas Island → 2N TAO → 5N TAO →  
2N TAO → 5N TAO → 8N TAO → Hawaii***

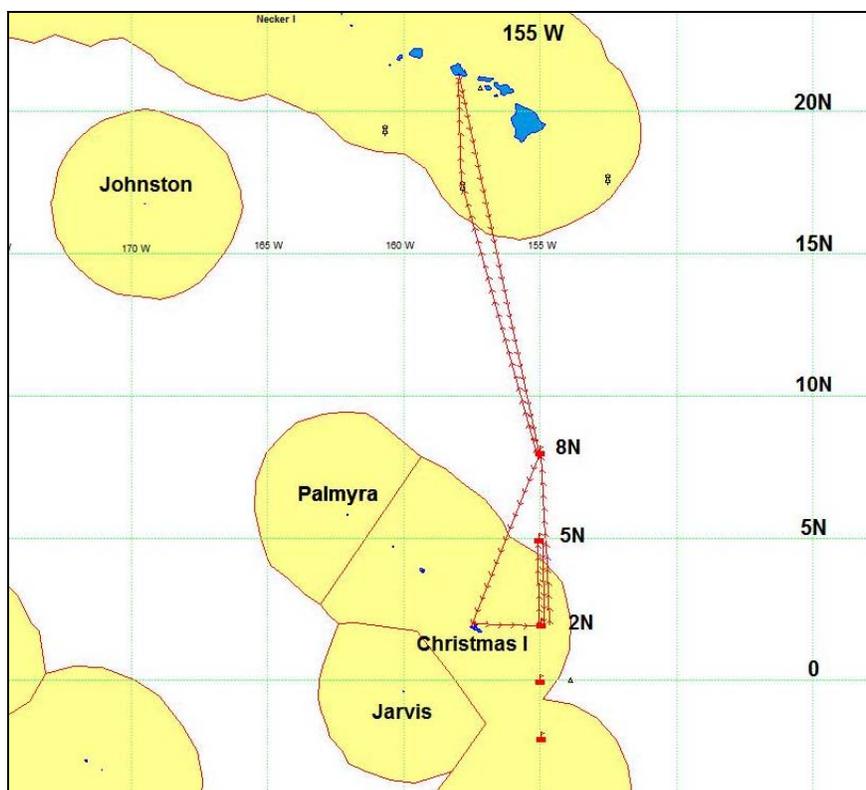


Figure 9. Cruise track during Cruise CP-08-01-08, May 5 – June 3, 2008

A summary of general movements during the cruise and daily tag releases by area/buoy is given in **Table 1**. Details of cruise activities with daily tag releases are included in **Appendix III**. Daily Log extracts that provide detailed written descriptions of daily activities is provided in **Appendix IV**. A detailed account of the encounter with the purse seine vessel on TAO buoy 8N 155W are included in the **Appendix IV** entry for May 26 and in the section below.

Of the 30 days of charter during CP-08-01, 12 days were spent steaming, one day was spent at Christmas Island to clear customs formalities and board crew and part or all of 17 days were spent fishing and tagging.

The Double D left Honolulu Harbor on the morning of May 5, 2008 on a direct course for the TAO array that lies along the 155°W meridian. The plan was to try the TAO buoys at 8°N and 5°N before running in to Christmas Island to pick up the rest of our crew. After that we would evaluate the situation and either return to the 5°N or investigate the TAO buoys at 2°N and the Equator. During this transit a leak developed in the 1100 gallon diesel fuel bladder we were carrying for spare fuel. This resulted in several days of inconvenience and hard work for the Captain but it all came good before we arrived at Christmas Island. About half the fuel was salvaged and transferred into the bow tanks and the mess cleaned up as well as possible.

The vessel ran SSE for five days, arriving at the 8°N TAO buoy on May 10 by late morning. A large mixed species aggregation was present making it difficult to target the tuna, especially with the rough sea conditions encountered. Several mahi mahi, wahoo, silky sharks and a large marlin were hooked. It didn't help that the crew was still feeling the ill effects of the diesel cleanup. Ran south to the TAO buoy at 5°N and were pleasantly surprised to find an actively

biting bigeye school on the surface which was fished and tagged for 123 quick releases. We then proceeded toward Christmas Island all day and next, arriving late on May 13. Customs formalities were taken care of on May 14 and our two Philipino crewmen were taken aboard.

The vessel ran east to the TAO buoy at 2°N 155°W and fished it for four days with the first two days producing 1049 releases, almost all of which were bigeye. Fishing success quickly slowed after the first day or two: a pattern that continued throughout the cruise. Images on the high definition echo sounder indicated that a large school of bigeye was still present but not biting. Night time jigging was variable but produced some larger bigeye for archival tagging up to 115 cm. We moved north to the TAO buoy at 5°N on May 20 for four days of fishing that repeated this pattern with tag releases declining from 143, 64, 39 to one skipjack over the four-day period.

There seemed to be no choice but to return to the TAO buoy at 2°N where 178 tuna, mostly bigeye, were tagged over the next two days. On May 26 we returned once again to the TAO buoy at 5°N by mid day to find a large purse seine vessel nearby and a drifting FAD and strobe light tied to the TAO buoy. Only 11 releases were made on this day and mostly by jigging small tuna while tied up to the buoy. We drifted the school off in the early morning of May 27 and headed north, arriving at the TAO buoy at 8°N on May 28. We found a mixed aggregation clustered tight on the buoy and tagged 89 tuna by trolling and jigging. The next morning only one yellowfin was trolled and tagged. The sounder indicated a good sized aggregation of tuna but they refused to bite. We headed north toward Hawaii on the morning of May 29, arriving at the NOAA weather buoy 51002 inside the Hawaii EEZ the afternoon of June 1. Eleven bigeye and yellowfin were tagged with the last 3 remaining archival tags and a 8 conventional tags. The vessel then steamed north to finish the cruise on June 3, 2008.

Table 1. Daily activities and tag release summary during CP-08-01-08

Date 2008	General Area	Principal Activity	Conventional Tag Releases			
			(archival releases in brackets)			
			BET	SKJ	YFT	Tot
5/5/08	Depart Honolulu	Running	-	-	-	-
5/6/08	S Hawaii EEZ	Running	-	-	-	-
5/7/08	S of Hawaii	Running	-	-	-	-
5/8/08	S of Hawaii	Running	-	-	-	-
5/9/08	S of Hawaii	Running	-	-	-	-
5/10/08	TAO 8N 155W	Fishing	0	1	5 (1)	6
5/11/08	TAO 5N 155W	Fishing	97 (5)	0	1	98
5/12/08	TAO 5N 155W	Fishing running SW	121	0	2 (1)	123
5/13/08	NE of Christmas	Running SW, arrive Christmas	-	-	-	-
5/14/08	Christmas I	Clearance crew loading	-	-	-	-
5/15/08	E of Christmas I	Running E	-	-	-	-
5/16/08	TAO 2N 155W	Fishing	471 (19)	10	38	519
5/17/08	TAO 2N 155W	Fishing	526 (6)	2	2	530
5/18/08	TAO 2N 155W	Fishing	77 (6)	5	1	83
5/19/08	TAO 2N 155W, north to 5N	Fishing Running N	11	2	0	13
5/20/08	TAO 5N 155W	Running N Fishing	135	1	7	143
5/21/08	TAO 5N 155W	Fishing	62 (1)	0	2	64
5/22/08	TAO 5N 155W	Fishing	32	2	5	39
5/23/08	TAO 5N 155W	Fishing Running south	0	1	0	1
5/24/08	TAO 2N 155W	Fishing	101 (6)	24	8 (1)	133
5/25/08	TAO 2N 155W north to 5N	Fishing running N	43	0	2 (1)	45
5/26/08	TAO 5N 155W	Running N Fishing	8	1	2	11
5/27/08	between 5N and 8N on 155W	Running N	-	-	-	-
5/28/08	TAO 8N 155W	Fishing	45	8	36	89
5/29/08	TAO 8N 155W	Fishing running N	0	0	1	1
5/30/08	S of Hawaii	Running N	-	-	-	-
5/31/08	S of Hawaii	Running N	-	-	-	0
6/1/08	NOAA 51002	Running N Fishing	7 (2)	0	4 (1)	11
6/2/08	S of Hawaii	Running N	-	-	-	-
<b>6/3/08</b>	S of Oahu Honolulu Harbor	Running N end cruise	-	-	-	-
	<b>TOTALS</b>		<b>1736</b>	<b>57</b>	<b>116</b>	<b>1909</b>

### ***Purse seine vessel encounter – May 26, 2008***

The Double D sighted the TAO buoy at 8N, 155W at 1130 on 5/26/08 while running north from the TAO buoy at 5N. Around 1145 the mast, boom and upper structure of a large purse seine vessel were sighted to the east of the buoy. On arrival at the TAO buoy it was discovered that a drifting FAD was tied to the buoy and a light strobe was attached to the buoy “A” frame that holds the instruments and satellite antennae (**Figure 10**). The drifting FAD was taken onboard the Double D using the starboard boom and electric winch. At this point, Dettling succeeded in contacting the purse seine vessel via VHF radio and requested the vessel’s identity. An English speaking representative on the purse seiner with heavy Latin accent identified the vessel as the purse seiner Ana or Anna, last out of Callao, Peru. Capt Dettling informed the vessel that we had removed the drifting FAD we had found on the TAO buoy, to not tie any FADs to TAO moorings and that we would be patrolling all TAO buoys on the 155W line from 8N to 8S. The vessel replied that the fishing was not so good here anyway, he was going to “look around” and the vessel turned east and left the area. Video footage of the vessel was taken.

The drifting FAD taken onboard the Double D was typical of the type the CL had seen onboard Spanish purse seiners in the Indian Ocean which are described in Itano et al. 2004. The main construction was a rectangular bamboo raft (170 x 260 cm) covered with ¾” fine mesh netting with four purse seine corks tied to each corner for additional buoyancy (**Figure 11**). A 20 meter section of purse seine webbing (# 48 mesh in 4.25” stretched mesh) was tied to the center of the underside of the raft to serve as an aggregator. The bottom of this netting was weighted down with a short section of used chain.

The incident was reported to the IATTC, WCPFC and the National Data Buoy Center by email. No vessel of that name could be found on the IATTC or WCPFC vessel registries. It was assumed the vessel falsified its identity or was an unregistered IUU vessel operating without authorization. The distance to the vessel remained too far to read any name or identifying numbers but video footage was taken that may reveal her identity. By sight and experience the vessel was judged to be close to 1200 GRT in size, was of the Campbell Shipyards style with main engine smokestack on the stern deck forward of the net pile and relatively old in style, c 1975 – 1980. It is difficult to see in the video but it appears there are two speedboats on the starboard working deck and a helicopter on the deckhouse landing pad (**Figure 12**).

### **FISHING TECHNIQUES**

The primary fishing gear used during CP-08-01 was troll or modified trolling/dangler surface gear or sub-surface jigging. All 1909 tag releases were made on one of the three TAO buoys visited. The longline gear was not used during the cruise. Our first attempts at trolling with the hydraulic trolling reels used conventional 7” skirted trolling lures with 9/0 single hooks. This gear proved unsuitable for the most part as it tended to attract bycatch species (mahi mahi, wahoo, sharks, billfish) and the hooks damaged many of the smaller target tuna species. The Captain quickly shifted gears to short troll lines (4 – 10 m) and dangler gear rigged with small lures and 7/0 – 8/0 single hooks. When the bite slowed, the hydraulic trolling lines were run with small lures and light drag. All barbs were completely bent down to ease release and minimize damage. Trolling in this manner was most effective from 0600 – 0830 and around 1400 – 1730.

Dangler gear was very effective for landing fish in a hurry and during the short periods when the tuna were biting surface gear (**Figure 13**) lengthened slightly so about 50 cm of line trailed in the water below the dangler pole. This reduced hooking stress as danglers are normally set very short so the fish are not able to get their head back in the water once hooked. The dangler and

troll gear was assisted by a stream of chum thrown out when the sounder indicated the vessel was trolling over the main biomass. The cruise carried frozen anchovy (*Engraulis mordax*) and sanma (*Cololabis saira*) for chum and longline bait respectively. Frozen anchovy was far more effective for chumming purposes.

Sub-surface jigging was carried out primarily at night and usually when the vessel was tied up to the buoy. The Double D has a large profile above the water line and very shallow draft resulting in a fast drift that makes jigging almost impossible unless tied up to a FAD, anchored or on a sea anchor. Unlike PTPP experience in the western Pacific, the best jigging hours for bigeye were from 1930 – 2200 hours. After that, schools of small yellowfin took over feeding on tiny flying fish attracted to the ships lights. These fish usually did not take jigs readily although they tended to bite just before dawn. Loss of jigs to sharks was greatly reduced by wiring jigs with a 20 cm section of single strand wire. All jigs were rigged with single hooks on a short section of spectra line (see Figure 4). The sport poles with spectra line out fished the heavy handline gear most of the time but were abandoned in favor of handlines or hydraulic reels when the bite improved (**Figure 14**). The most efficient system found was to jig with the 400 lb mono on the hydraulic reels with jigs attached with a 5 m section of 250 lb mono. Small fish were hauled by hand but larger fish could be pulled on the hydraulic reels. The reels have an adjustable drag which allows a setting that minimizes damage.

Fish were often detected on the depth sounder but would not bite troll gear, jigs or dead bait. Palu ahi gear was deployed on two occasions with sanma or cut tuna for bait but did not produce any hookups. Live squid (*Sthenoteuthis oualaniensis*) were jigged on a few occasions. The live squid baited on circle hooks never failed to produce bigeye (see **Figure 15**).

## TAG RELEASES

### *Conventional tags*

A total of 1909 tropical tunas were tagged and released during the cruise comprising 1736 bigeye (90.9%), 57 skipjack (3.0%) and 116 yellowfin tuna (6.1%). Only the larger Y-13 tags were used as no releases were less than 40 cm FL. Conventional tag releases spanned the Y-13 tag numbers P61001 – P62950<sup>2</sup>. Fishing and tagging was conducted on 17 of the 30 cruise days for an average of 112 releases per fishing day. Daily tag releases ranged from 530 per day on May 17 to a single release on May 29. The relatively low proportion of fishing/tagging days had to do with the long run from Hawaii to the fishing grounds, distance between TAO buoys and lack of free schools or other floating objects encountered.

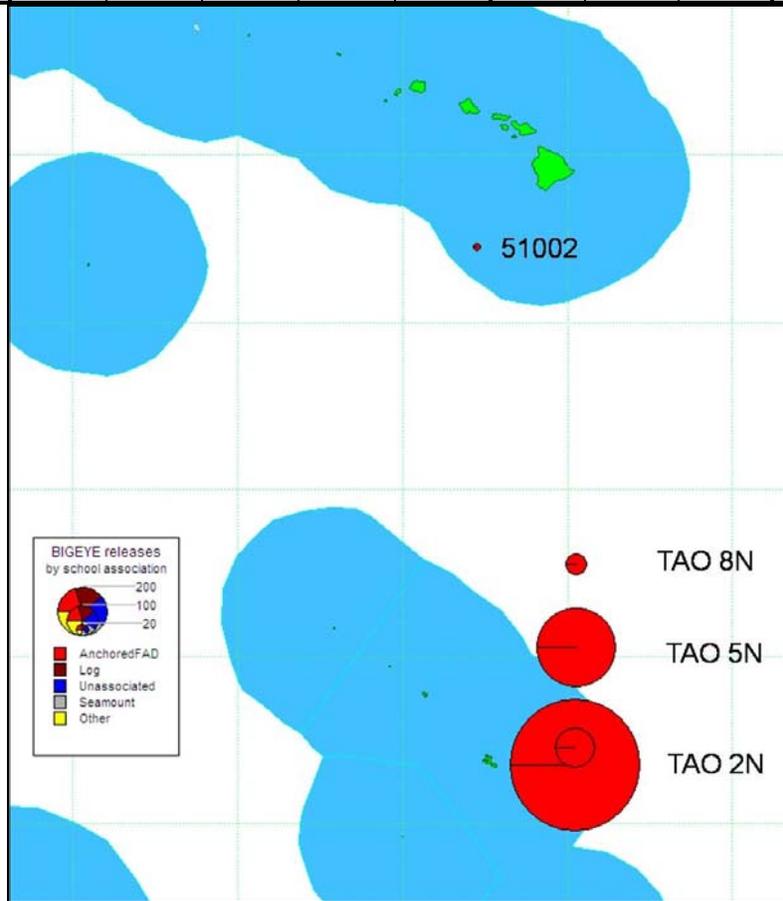
The majority of tag releases were made on the TAO buoy at 2N (69.3%) with 25.1% released on the TAO buoy at 5N. Over 90% of these releases were bigeye tuna. The high percentage of bigeye overall was a big surprise and bonus achieved by this cruise. This information is summarized in **Table 2**. The distribution of bigeye releases, by buoy is shown in **Figure 16**. Higher percentages of yellowfin were found on the higher latitude buoys where relatively few fish were tagged.

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<sup>2</sup> Does not total 1909 as some tags were lost overboard while loading tags or during tagging operations

**Table 2. Tag releases by buoy**

Buoy	# days	BET	SKJ	YFT	Total	Percentage			Total %
						BET	SKJ	YFT	
51002	1	7	0	4	11	63.6	-	36.4	0.6%
8N	3	45	9	42	96	46.9	9.4	43.8	5.0%
5N	7	455	5	19	479	95.0	1.0	4.0	25.1%
2N	6	1229	43	51	1323	92.9	3.3	3.9	69.3%
<b>Totals</b>	<b>17</b>	<b>1736</b>	<b>57</b>	<b>116</b>	<b>1909</b>	<b>90.0</b>	<b>3.0</b>	<b>6.1</b>	



**Figure 16. Distribution of Bigeye tag releases by buoy**

***Archival tagging summary***

The cruise was equipped with 50 Wildlife Computers MK9 archival tags. All fifty were deployed during the cruise in 45 bigeye and 5 yellowfin tuna. Most of the tags were deployed on the TAO buoy at 2N (37 bigeye, 2 yellowfin) with 6 bigeye and 1 yellowfin implanted with archival tags on the TAO buoy at 5N. Archival tags were also deployed at TAO 8N (1 yellowfin) and NOAA weather buoy 51002 (2 bigeye, 1 yellowfin). All archival tags were implanted into the peritoneal cavity and secured with two sutures. Tuna receiving an archival tag were placed upside down on the central tagging cradle, irrigated with a seawater hose, eyes covered with synthetic

chamois, measured and also tagged with a Y-13 Hallprint dart tag (Figure 17). All archival tagging was conducted by the cruise leader.

**TAG RECOVERIES**

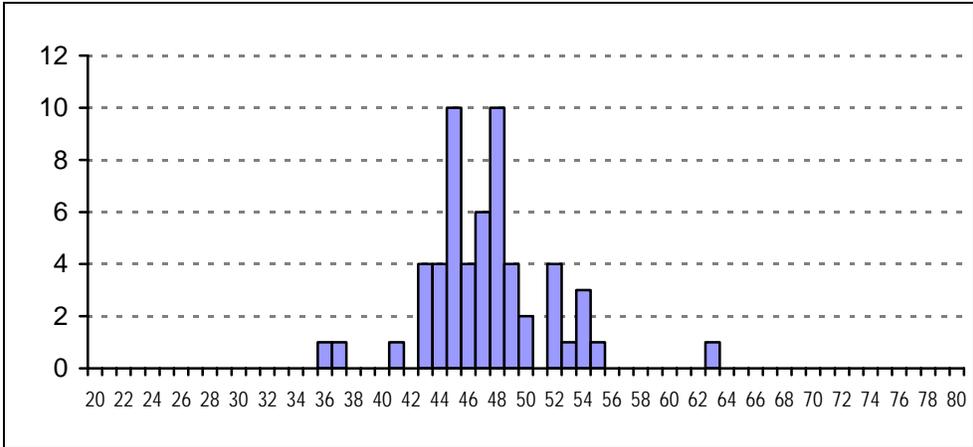
Three tuna tagged during the cruise were recaptured by the tagging vessel. All recaptures were made on the TAO buoy at 2N 155W. The recaptures consisted of one yellowfin tuna (9 DAL), and two bigeye (1 and 9 DAL). The recaptured bigeye appeared normal and the tag entry wounds were starting to heal nicely (see Figure 18). The recaptured yellowfin was hooked on a jig at night but acted very sluggish and “tired” looking when landed.

**SIZE DISTRIBUTION OF TAGGED FISH**

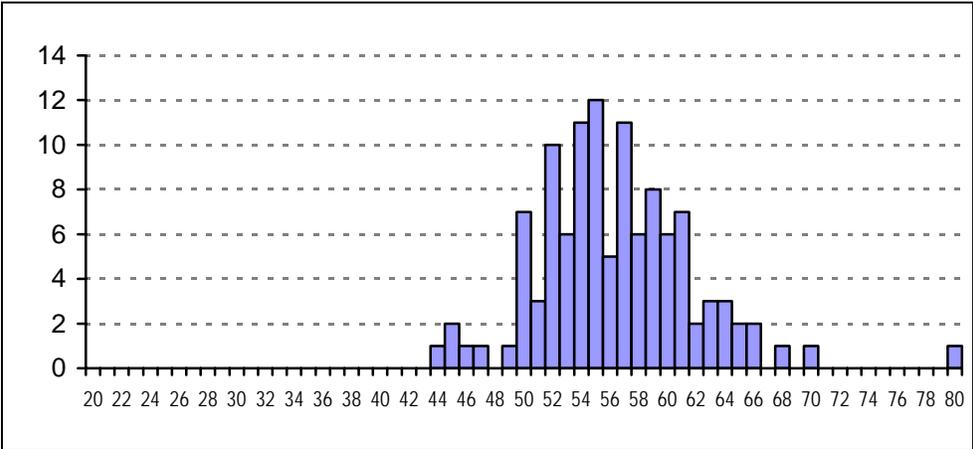
Figure 19 shows the size distribution of skipjack, yellowfin and bigeye tuna tagged during the cruise up to 80 cm FL. Some larger yellowfin and bigeye were tagged with archival tags and are represented separately. The small number of skipjack present were generally small in size, between 48 – 52 cm. There were large breezers of small skipjack present on the TAO buoys at 2N and 5N but were not targeted or well selected by the fishing gear used. Most of the yellowfin tagged during the cruise were year old fish around 50 – 62 cm in size. Bigeye tag releases centered around 60 cm with no distinct modes in the smaller sizes. Figure 20 shows the size distribution of archival tag releases that ranged from 63 – 115 cm for bigeye and 68 – 106 cm for yellowfin. Most archival releases ranged from 67 – 80 cm. The largest archival releases were caught using jigs on handlines or sport poles. It should be noted that several bigeye greater than 75 cm that were suitable for archival tags were only marked with a conventional dart tag due to the time required for archival tagging and the fast biting nature of the schools.

**Figure 19. Size distribution of tagged fish**

**Skipjack n = 57**



Yellowfin n = 113



Bigeye n = 1692

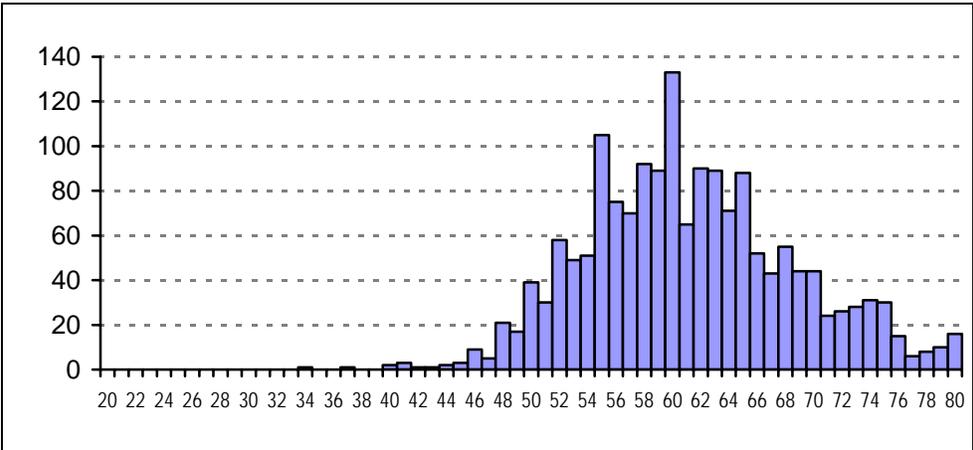
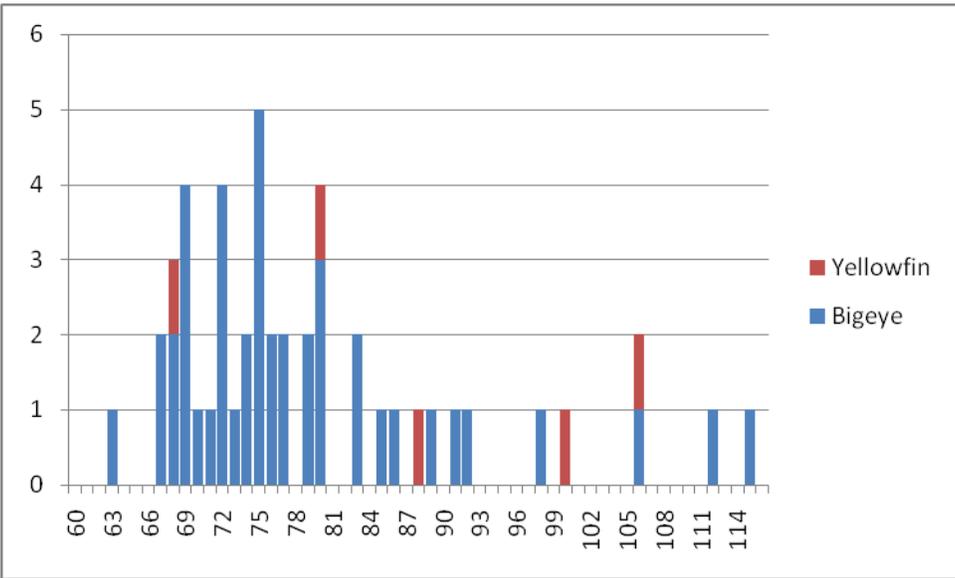


Figure 20. Size distribution of archival tag releases



## BIOLOGICAL SAMPLING

Bigeye and yellowfin tuna judged to be unsuitable for tagging due to injury were retained for biological sampling in support of NOAA/JIMAR project #651106, examining nursery origin and degrees of movement of yellowfin and bigeye tuna in the central Pacific. Saggital otolith pairs were extracted and stored for later analysis (**Figure 21**). A total of 96 bigeye and 32 yellowfin were sampled in this manner.

## UNDERWATER VIDEO AND CRUISE DOCUMENTATION

Cruise CP-08-01 was well documented with hundreds of digital still pictures (examples used to illustrate this report), digital video (JVC unit for fishing and tagging documentation) and with a submersible video system. The underwater video was taken with a Splashcam Marine Video system by Ocean Systems Inc<sup>3</sup> (Deep Blue Professional system). The unit consists of a color video camera head tethered to an LCD screen and DVD recording unit that remains on the vessel (**Figure 22**). A Wildlife Computers MK9 archival tag was attached to the camera head during tests to log recording depth. Digital still images of the echo sounder display were also taken of the presumed tuna schools while recording underwater images (examples in **Figure 23**).

Clear images of tuna were easily captured at depths corresponding to the depths indicated by the depth sounder images (25 – 50m). Tuna species and general size were readily identifiable to the trained eye: bigeye, yellowfin and skipjack images were recorded. The tuna did not appear alarmed or necessarily aware of the camera and came very close to the recording head. Unfortunately, all frames recorded underwater were very over-exposed which created a “washed out” appearance to all underwater footage. This was not seen for video taken with the same gear in above water shots. Ocean Systems Inc. was contacted by email during the cruise but were not able to correct the issue. The system has been sent back to the manufacturer to try and solve the problem.

## OUTCOMES and RECOMMENDATIONS

CP-08-01 proved to be a highly successful first trial of the “sub-regional” approach to deploying tags in remote or difficult to access areas of the WCPO. Tag release numbers were respectable considering all fish were taken with non pole-and-line gear. The greatest unanticipated bonus of the cruise was the discovery that these TAO buoys held shallow schooling bigeye that were vulnerable to surface “Cross Seamount” style trolling and dangler gear.

The choice of vessel, captain and crew was certainly validated during the cruise. The Double D performed extremely well in fuel economy, autonomy, stability and ability to raise schools to the dangler gear. The mix of gears at Capt Dettling’s disposal also proved to be the key to the success of the cruise. Training Joe Jr in tagging and data recording procedures was also an important side-benefit resulting from the cruise. Having the two Filipino crewmen to pull fish to keep two taggers fully occupied was also key to the success of the cruise.

The tagging stations set up for the cruise proved to be nearly ideal. If this vessel is chartered again it would be best to have one more tagging mattress on the deck and another archival tagging station set up on the starboard stern transom. The two tagging cradles constructed for

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<sup>3</sup> <http://www.splashcam.com/index.htm>

CP-08-01 were 28" and 36" in height. The lower cradle was found to be easier to use and load with dangler caught fish and two at this height should be constructed for subsequent cruises. The shorter light stalks for the MK9 archival tags used on the cruise appeared to be a good choice and were easy to implant and suture. The shorter stalk appeared to be long enough to obtain light data but less conspicuous to predators.

The timing of this cruise was tailored to personnel availability and anticipated poor market conditions in Hawaii (which held true), but was not well timed for the fishing. This cruise spanned the full moon period which is traditionally the worst time for surface bigeye and dangler fishing. If possible, future trips should be planned to incorporate the new moon to full moon periods.

A striking feature noted by the Captain and CL during the cruise was the green color of the water below 10N which was also relatively cool. The water looked very different from Hawaii or the tropical western Pacific and appeared to be more similar to water in the EPO. An email query on the water color and SST with National Data Buoy Center personnel during the cruise resulted in the following note from an oceanographer at NOAA:

**Subject:**Re: [Fwd: [Fwd: Re: 155W TAO Buoy Positions 5/11/08]]

**Date:**Mon, 12 May 2008 14:04:16 -0500

**From:**Janice Boyd <[Janice.Boyd@noaa.gov](mailto:Janice.Boyd@noaa.gov)>

**To:**Dick Thayer <[Richard.Thayer@noaa.gov](mailto:Richard.Thayer@noaa.gov)>

**References:**<[482854A0.1060103@noaa.gov](mailto:482854A0.1060103@noaa.gov)>

There is a persistent phenomenon called equatorial upwelling that causes deep waters (generally containing nutrients) to be pulled up to the near surface region, resulting in enhanced productivity along the equator. Further north, between around 2- 10 deg N, is the eastward flowing North Equatorial Counter Current. It tends to have high nutrients but productivity is often limited by the availability of micronutrients, esp. iron. Further north of 10 deg, the waters become typically low nutrient and low productivity (ie, blue).

Sounds like they are sailing S into regions of water with enhance nutrient concentration where micronutrients for whatever reason (dust clouds from land) are not limiting so the phytoplankton are taking off. Not particularly unusual, but the occurrence is patchy and may not look the same a month from now.

Janice

The fact that these buoys report water temperatures to a depth of 500 m is a huge bonus for planning future trips. It is possible that the success of this cruise, particularly for bigeye was promoted by an episodic upwelling event of short temporal scale. Planning future cruises in this area should make full use of the TAO sensors and sources of remote sensing data of SST, currents, chlorophyll and other nutrient levels.

The vessel was well equipped for the cruise but could improve in a few areas. Future tagging charters should require a better radar unit and functional SST gauge. A longer range, higher definition radar would promote safety while running at night and easier target acquisition if logs or drifting FADs are marked with radar reflectors. A larger selection of trolling lures, jigs, hooks, handline and leader material should also be stocked to be prepared for any situation. Gear loss

to sharks, wahoo and other situations can be considerable. A larger variety and stock of food would be appreciated by all.

Encountering the purse seiner Montelucia transshipping at Christmas Island was a sobering moment but a good reminder to increase tag return publicity with the EU fleets and any fleets likely to be operating in the cruise area (**Figure 24**). Ideally, publicity should be initiated well before the commencement of future cruises

The confrontation with a purse seiner on TAO buoy 5N 155W was a real “wake up call” to the PTTP and future cruises. It is unlikely that surveillance or enforcement will be able to prevent fishing operations on these buoys which stresses the importance of drifting aggregations away from the buoys after tagging. PTTP tagging vessels should be equipped with an underwater bait attraction light and powerful surface lights to facilitate this process. Cruise plans should also include the time needed to drift schools far away from the buoys which may require a full day of drifting per buoy or FAD.

Final note: NMFS enforcement officer Kevin Painter<sup>4</sup> is investigating the identity of the purse seine vessel in question and promoting increased monitoring of this area as much as possible. He has informed the US Coast Guard of the situation and asked them to incorporate the TAO and other weather buoys into their surface and air patrols of the WCPO. He has apparently been chasing after these boats for some time. Captain Dettling has supplied him with a copy of the video taken of the drifting FAD and vessel sighted by the Double D.

## REFERENCES

Beverly, S., and D. Itano. 2004. **Technology related projects and proposals to mitigate bycatch levels in longline and purse seine fisheries.** a. Trial setting of deep longline techniques to reduce bycatch and increase targeting of deep-swimming tunas. 17th Standing Committee on Tuna and Billfish, Majuro, Republic of the Marshall Islands – 11-18 August 2004. FTWG WP-7.

Itano, D., S. Fukofuka, & D. Brogan. 2004. **The development, design and recent status of anchored and drifting FADs in the WCPO.** 17th Standing Committee on Tuna and Billfish, Majuro, Republic of the Marshall Islands – 11-18 August 2004. FTWG INF-3.

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<sup>4</sup> Pago Pago based, <Kevin.Painter@noaa.gov>

**APPENDIX I. Vessel and gear details**

Construction	Kailua-Kona, Honokohau Harbor
Date of launch	March 20, 1988
Call sign	WBQ7713
Hull style, material	Catamaran, all aluminium welded
Net tonnage	34
Length (overall)	70' (21.3 m)
Breadth	24' 4" (7.4 m)
Draft	3' (0.9 m)
Fuel Capacity	3,400 gallons (12873 L)
Operating range	30 days fuel, water unlimited
Freshwater capacity	400 gallons (1515 L) storage onboard reverse osmosis watermaker
Speed (cruising)	7.2 kts @ 915 rpm
Main engines	Hyundai 6DZ (2)
Auxiliary engines	Kubota 20 kw
	John Deere 20 KW
Auxiliary generator	Cruise, belt driven off main, 20 KW
Fresh ice maker	Howe 3 st/day
Desalinator	Applied Membrane Rev Osmosis, 30 gal/hour
Fish hold capacity	15 t
<b>ELECTRONIC GEARS</b>	
Global Positioning System	Furuno GP 31, Furuno GP 50
Autopilot	COMNAV 1001
Radar	Furuno
Fish finder	Furuno 5FCV 585
Radios	Furuno FS 1503 SSB
	Motorola Triton II
	Standard Communications VHF
Satellite communications	IRIDIUM 9595A handset SkyFile email program on HP laptop
GPS radio buoys	ORBIMAGE GPS radio buoys (2)
Vessel Monitoring System	Faria Watch Dog

<b>FISHING GEARS</b>	
Hydraulic trolling reels	Custom Sea Gear (3)
Longline reels	Custom Sea Gear, 5 nm capacity (2)
Dangler poles	2 per side rigged during cruise
Misc handlines, short troll lines	
Misc jigs and trolling lures	

## APPENDIX II. Tagging and data recording gear

Conventional tags – supplied by SPC	Hallprint plastic dart tags (yellow) Y-13 (5,000 pcs) P61001 – P66000 Y-11(1,000 pcs) Z40001 – Z41000
Conventional tags – used during cruise	Y-13 (P61001 – P62950)
Stainless steel applicators	Y-13 size, 170 mm length overall (300) Y-11 size, 140 mm length overall (150)
Archival tags	Wildlife Computers, MK9 Modified short light stalk, bent at 90°
Archival tagging cradle	110 cm, 42” high at highest point
Conventional tagging cradles (2)	110 cm, 28” and 36” high at highest poing
Tagging mattress	100 cm
Archival tagging sutures	Ethicon PDS II, CP-1 ½ circle, 70 cm violet absorbable suture, # Z467
Tuna lifting sling	1.8 m long x 1.5 m opening
Landing net	90 x 90 cm ring with 1.8 m handle
Laptop PC with TAGAGER software	Dell Latitude D620
Data recorders	Olympus Digital Voice Recorder VN-4100
Backup hardware	LaCie 80 GB external HD, PNY Attache 1 GB USB data stick

**APPENDIX III. Summary of cruise activity, with number of tagged fish released per day**

Date 2008	General Area	Principal Activity	Conventional Tags (includes archival releases)				Archival Release detail			Total Tagged
			BET	SKJ	YFT	Tot	BET	YFT	Tot	
5/5/08	Depart Honolulu	Running	-	-	-	-	-	-	-	-
5/6/08	S Hawaii EEZ	Running	-	-	-	-	-	-	-	-
5/7/08	S of Hawaii	Running	-	-	-	-	-	-	-	-
5/8/08	S of Hawaii	Running	-	-	-	-	-	-	-	-
5/9/08	S of Hawaii	Running	-	-	-	-	-	-	-	-
5/10/08	TAO 8N 155W	Fishing	0	1	5	6	0	1	1	6
5/11/08	TAO 5N 155W	Fishing	97	0	1	98	5	0	5	98
5/12/08	TAO 5N 155W	Fishing running SW	121	0	2	123	0	1	1	123
5/13/08	NE of Christmas	Running SW, arrive Christmas	-	-	-	-	-	-	-	-
5/14/08	Christmas I	Clearance crew loading	-	-	-	-	-	-	-	-
5/15/08	E of Christmas I	Running E	-	-	-	-	-	-	-	-
5/16/08	TAO 2N 155W	Fishing	471	10	38	519	19	0	19	519
5/17/08	TAO 2N 155W	Fishing	526	2	2	530	6	0	6	530
5/18/08	TAO 2N 155W	Fishing	77	5	1	83	6	0	6	83
5/19/08	TAO 2N 155W, north to 5N	Fishing Running N	11	2	0	13	0	0	0	13
5/20/08	TAO 5N 155W	Running N Fishing	135	1	7	143	0	0	0	143
5/21/08	TAO 5N 155W	Fishing	62	0	2	64	1	0	1	64
5/22/08	TAO 5N 155W	Fishing	32	2	5	39	0	0	0	39
5/23/08	TAO 5N 155W	Fishing Running south	0	1	0	1	0	0	0	1
5/24/08	TAO 2N 155W	Fishing	101	24	8	133	6	1	7	133
5/25/08	TAO 2N 155W north to 5N	Fishing running N	43	0	2	45	0	1	1	45
5/26/08	TAO 5N 155W	Running N Fishing	8	1	2	11	0	0	0	11
5/27/08	between 5N and 8N on 155W	Running N	-	-	-	-	-	-	-	-
5/28/08	TAO 8N 155W	Fishing	45	8	36	89	0	0	0	89
5/29/08	TAO 8N 155W	Fishing running N	0	0	1	1	0	0	0	1
5/30/08	S of Hawaii	Running N	-	-	-	-	-	-	-	-
5/31/08	S of Hawaii	Running N	-	-	-	-	-	-	-	-
6/1/08	NOAA 51002	Running N Fishing	7	0	4	11	2	1	3	11
6/2/08	S of Hawaii	Running N	-	-	-	-	-	-	-	-
6/3/08	S of Oahu Honolulu Harbor	Running N end cruise	-	-	-	-	-	-	-	-
<b>TOTALS</b>			<b>1736</b>	<b>57</b>	<b>116</b>	<b>1909</b>	<b>45</b>	<b>5</b>	<b>50</b>	<b>1909</b>

**Appendix IV****DAILY LOG EXTRACTS**

May 5<sup>th</sup>

Left Honolulu at 1030 after final Customs clearance and final checks with email. Good correspondence with the NDBC who agreed to send us daily updates of TAO buoy positions on the 155W line. Running south all day in moderate to fresh tradewinds.

May 6<sup>th</sup>

Unwelcome discovery at 0300 that the 1100 gallon fuel bladder has sprung a leak in its temporary storage spot in the fish room. Messy situation bravely dealt with by Joe once dawn arrived. Discovered very small defect hole in the material, not on any seam but slopping fuel out at significant rate. Much of the morning spent transferring fuel from the bladder to top up the four ship tanks. Temporary repairs effected and on our way under increasing Trades. Rough water when crossing the Alenuihaha Channel wind line and later the South Point wind wrap, neither good for the fuel situation.

May 7<sup>th</sup>

Loaded tag needles and tags in magazines. Ran inventory of archival tags, labeled and sorted into bags for easy access. General inventory and sorting of gear and familiarization of crew with tagging forms and procedures. Transferred more fuel but vessel very fuel efficient and could not move a lot from the defective bladder. Smell of diesel is effecting us negatively.

May 8<sup>th</sup>

Strong easterly Trades persist and more fuel transferring. The smell of diesel is a drag and makes me tired, with headache and little desire to work on detailed matters. Basically it makes one feel seasick and is impacting the crew as well. Rigged the Leroy lifting sling that looks good if we ever get into some big fish.

May 9<sup>th</sup>

Woke up to steady Trades and lumpy seas again but a noticeable warming by mid-day. The good news is the sea is alive with flying fish of all sizes and the bow deck collected about 20 pieces. We also ran by two nice bird schools, one of which may have merited a closer look but we are on a mission to get to the 8N TAO FAD at dawn. The larger bird pile had an adult Laysan albatross that kept us company for a few miles. We are now on the 9N line and running south in good spirits. Joe drained the fuel bladder this afternoon and we thankfully rolled it up and stored it on the bow deck. Three garbage cans still full of diesel that should drain into the bow tank tomorrow and we will be done with that episode. Already feel much better either psychologically or the smell of diesel is truly diminished. Rigged jigs, trolling lures and baiting hooks with Joe Jr and set up danglers just in case.

May 10<sup>th</sup>

Still much to do at sunrise due to rough weather and delays caused by the fuel fiasco. Up before dawn and all hands rigging troll gear and setting up for action. We rigged short wire trace on all trolling lures in prep for wahoo and ran smaller hooks. The tagging station was already set up but we rigged the irrigation hose and prepped archival tagging gear. The TAO buoy at 8N 155W was located easily thanks to updates from the NDBC and we made our first pass at 0700. Blowing +20 and lumpy seas made things difficult but still very workable on the Double D. First few passes were barrages of small mahi mahi and a large marlin. Small yellowfin followed mostly on the short lines with smaller lures as well as three wahoo, rainbow runners, amberjack

and skipjack. Tagged five yellowfin and one skipjack between 52 – 68 with the largest yellowfin receiving an MK9 archival tag. No red tags aboard so this received a yellow Y13 dart tag along with the rest. About five skipjack and yellowfin hooked trolling that were too damaged to tag unfortunately. Hook size still too large on the larger lures for this size fish. Tried dropping the butterfly jigs and had good tuna hits immediately but these were quickly taken by silky sharks. Pretty soon, free swimming silky sharks surrounded the stern making jigging useless. We worked till 0900 but the trolling bite stopped and saw no point in hanging around in rough seas.

May 11<sup>th</sup>

Ran all night and arrived at the TAO buoy at 5N, 155W at 0850. The first fish was a small yellowfin but was quickly followed by a rush of schoolie bigeye. To our delight a hot biting school of bigeye presented itself next to the buoy resulting in 97 BET and 1 YFT release. The bigeye were 50- 68 cm. The five largest bigeye (all over 65 cm) were tagged with MK9 archival tags. Surprised to see the school on the sounder remained shallow at 20 fathoms until around 1100 AM when it finally stopped biting. We were also very pleased to see the bigeye biting readily on the “dangler” gear but only when chummed with the frozen anchovy Joe had brought from Honolulu. The seas were still lumpy but winds have dropped to 10 kts and quite workable. Otolith samples taken from 14 bigeye after tagging ceased. Drifted, reorganized and rested. Tried the school again at 1730 to sunset but not a bit and the sounder indicated the school had dispersed. Drifted the evening to try again in the morning.

May 12<sup>th</sup>

Up early and found the TAO 5N 155W at dawn. These buoys do not have lights and have a very weak radar return so will need to be marked with our own light if we intend to try pre-dawn fishing. The bigeye school had re-grouped and we had good action and dangler rushes until 0800. Two good size YF tagged, one with archival and 121 bigeye with conventional. This school began to descend to 40+ fathoms by 0730 and we stopped fishing by 0810. Diamond jigs and bait were tried but with little success and some harassment by small silky sharks. Sampled otoliths and decided to run for Christmas Island to pick up crew. We will surely return to this buoy but do not want to over-pressure the relatively small school present.

May 13<sup>th</sup>

Running southwest all day for Christmas Island which we sighted at 1515 hrs. No sooner sighted than 2 large mahimahi came on the troll, one lost on barbless hook, one landed for dinner. On approach to London we sighted the luxury liner Tahitian Princess in the process of leaving and a carrier unloading to a large purse seiner as well as a small Japanese style pole and line vessel at anchor. The carrier proved to be the Montesol (Panama) receiving catch from the Spanish seiner Montelucia. We anchored in 9 fathoms between the Montesol and the bunkering wharf. Contact was made with the port captain who was very efficient, reporting that we could bunker in the morning and would be met by our crew and the clearance officials and fisheries officer. Safely anchored off London.

May 14<sup>th</sup>

Up early but long wait till Port Authority checked in at 10:00. The agent for the Philipino seamen had no advance notice of our arrival so big runaround for her but all parties very helpful. The clearance party finally arrived in a large Kiribati motor canoe at 1530. The ship was cleared in to Kiribati waters, all customs, health, fisheries, etc formalities finally settled around 1630. Philipino fishermen Arvin Leal and Claver Servanes joined the Double D crew leaving behind 12 other Philipino seamen who were picked up by the Honolulu based longliner Pacific Star that arrived at 1600. The fisheries officer Tekemaeu Burrieta did not board but his Quarantine Officer,

Kaintoa Tairo was among the boarding group. He stated that the purse seiners Monterocio had already transshipped and the Montelucia was the second to do so this year. He also stated that the vessel was being sampled by “observers” Angimarau and Raietea Teeman. The boarding party was satisfied and finally left us to deal with the Pacific Star situation. We re-set anchor and Joe ran through maintenance on all engines, replacing several belts and beginning to train Claver who has had a lot of engineering experience. We decided to spend the night and leave early in the morning to arrive at the 2N 155W TAO buoy just before dawn the next day.

May 15<sup>th</sup>

Anchor up at 0530 and running east all day toward the 2N TAO. An upwind run, slightly bumpy but no swell. Dead water, no flying fish, few birds and no strikes on the troll. Our new crew finding their sea legs, poor Arvin seasick most of the day but he came around by late afternoon. Surely both are very jet lagged and tired from long trip from Manila via Hong Kong/Sydney/Nadi/Christmas. Rigged more gear after discovery that some of our guests at Christmas Island must have made off with a critical bag of our best trolling and jigging lures! Another lesson from Joe on how to rig lures with next to nothing. Luckily we had caught 7 lai (*Scomberoides lysan*) at Christmas and skinned them all for lure making.

May 16<sup>th</sup>

Arrived in vicinity of the TAO buoy at 2N, 155W at 0500, locating it after sunrise and started fishing at 0600. Great news to find a big spot of bigeye up shallow that bit hard till close to 1000 AM. CL very busy shuttling between three tagging cradles for the first school, almost all bigeye. Many good sized fish above 65 cm up to 80. The new Philipino crew did a fantastic job of pulling fish and learned very quickly to assess condition and handle the fish gently. We broke for lunch, sampled otoliths, transcribed data and rigged gear. Our lures are mostly makeshift now thanks to light fingered government officials at Christmas Island. The weights rigged with *Scomberoides lysan* skin were big winners today, accounting for much of the tag releases. During the break the CL trained Joe Jr in tagging and data handling considerations. We started up again at 1530 and found the fish biting hard till about 1730 after which the school seemed to dissipate till sunset. Joe Jr did great, tagging 90 fish with no loss of data or mistakes. We finished the day with 520 releases (10 SJ, 38 YF, 453 BE plus 19 archivally tagged bigeye. Weather still a bit rough to try the drop camera but a great start on this buoy.

May 17<sup>th</sup>

Drifted overnight downwind from the buoy and ran up before dawn. Good bite on the bigeye from 0530 till 1000 with almost pure bigeye in the smaller sizes, about 55 – 70 cm. Drifted in the afternoon and transcribed data while Joe rigged more gear. Serious shortage of troll gear onboard in smaller sizes for tagging. The leads and lai skin lures are working great tho but only last one good session before needing a refit. We approached the buoy again at 1600 and had a fierce bite on a larger size class of bigeye with some over 80 cm, rushing the short troll lines and dangles. Finished the day with 530 releases, almost all of which were bigeye. Large school of small 1.8 kg skipjack present on the buoy also. We rigged the Splashcam and dropped it while tied up to the buoy in the afternoon. Great shots immediately of bigeye and yellowfin at approximately 20 – 30 fathoms. An MK9 was attached and will yield precise depth information for these trials. Rigged the dropcam in the afternoon on an aluminum pole to film dangler and short trolling action.

May 18<sup>th</sup>

Drifted overnight again and made the same approach to the buoy at dawn. Very disappointing morning with next to nothing on the troll lines despite a good mark of bigeye on the sounder tight on the buoy. Tied up to the buoy and got some nice fish on the diamond jigs and handlines

while Joe rigged more trolling lures. Tried it again at 1530, but this time running long troll lines with light leader. This fooled a few bigeye every pass but they refused to come up on the chum and take off on the short gear. Scratched away till sunset and tied up to the buoy again. Started jigging at 2000 and immediately started hooking up on a larger size class of bigeye mixed with the smaller fish. Put archival tags in all fish over 100 cm with the largest at 115 cm. Bite slowed by 2215 and went to bed planning to drift the fish off before sunrise.

May 19<sup>th</sup>

The school was completely gone from the sounder by 0300 and nothing showing at 0400 and 0500. Captain decided to not attempt a drift off and they were wasted from the night of jigging. At dawn a few marks started showing and quickly jigged two bigeye at 0600. Detached from the buoy and tried trolling and dangles. Very slow bite with the school showing on the sounder but only a few fish per pass. Only a dozen tagged. Decision made to run north to the 5N, 155W TAO buoy. Left the 2N buoy at 0830, running all day in squally, rainy weather and rough NE seas. One very nice 8 kg skipjack broke the boredom. CL made quick decision to cut for poke and sashimi rather than dubious value of releasing this large fish with a tag.

May 20<sup>th</sup>

Arrived at the 5N, 155W TAO buoy at noon and started to fish a shallow, dense mark surrounding the buoy. Slow troll bite with a few going on the dangles for 135 bigeye, 7 YF and one skipjack release. Tested the drop cam in between trolling attempts but just could not get much of a bite going. Killer dinner of aku/Portuguese sausage spaghetti and drifted downwind of the buoy overnight.

May 21<sup>st</sup>

A decent mark on the buoy but very reluctant to bite. Slow bite on the troll in the early morning on small sized bigeye with a large school of skipjack about one mile from the buoy. Stopped and tied up in the morning and jigged small bigeye. Biting ok on the sport gear but hard to hook and the heavy diamond jig gear was useless. Smaller jigs and light leader was the key. Very hot, calm day so waited out the heat till 1600. Trolled some good sounder marks but not a single bite aside from one 9 kg wahoo that we wanted to kill as we had some critical lures taken by a wahoo in the morning. Tied up to the 5N, 155W TAO buoy before sunset for night jigging. Great sounder marks all evening but very poor fishing. Took two bigeye on the jigs, one archivally tagged and released. The second bigeye was a recapture from one of our releases made on 5/12/08. JD2 caught one live squid that was dropped down and immediately accounted for a nice bigeye release.

May 22<sup>nd</sup>

Woke up at 0300 and discovered the fish were finally biting. Hooked two bigeye on first two drops when Joe realized we had broken free from the buoy! Bad piece of luck. The line we were using had worn through at the buoy setting us adrift. We soon discovered that the school had come with us so fired up the vessel and sped away to leave the school on the buoy. Returned to troll the buoy at 0600 but very slow biting response from a very large, dense sounder mark that looked like bigeye. Trolled the school till 0700 for 31 bigeye and one skipjack conventional tag release. Tied up to buoy 5N at 0710. Dense tuna school marking on the buoy all day but very poor response to jigging. We jigged one small and one large squid and put them down as live bait using weighted spreader bars. The squid were identified as *Sthenoteuthis oualaniensis*, the same squid which is commonly used for tuna bait in the Hawaiian ika shbi handline fishery. The smaller squid was taken by a 66 cm bigeye that was tagged. A very active school of small yellowfin appeared after 1900, feeding on very small flying fish attracted by our lights. We

managed to jig or chunk bait five yellowfin and one skipjack release, but hard work for little result.

May 23<sup>rd</sup>

Started jigging at 0500 and the same small yellowfin present. Hooked four in a row but kept tearing off. One bigeye jigged but hook damage so retained for otolith sampling. Trolled the 5N 155W buoy from 0600 – 0700 but only tagged one skipjack. The school still present and looking very large on the sounder but no response to the lures. Stopped fishing at 0700 and turned south, running back to the 2N, 155W TAO buoy. Running all day downswell, making good speed with ETA of 0600.

May 24<sup>th</sup>

As we ran south the winds and seas shifted to southerly, slowing our arrival at 2N till 0730. We found a big meter mark on the buoy and a slow bite of mixed small tuna and a few larger ones that were archival tagged. Tied up to the FAD and tried jigging but a very strong southerly current made this impossible. A large school of 1.5 kg skipjack still present and breezing downswell but upcurrent from the buoy for much of the day. Hung on the buoy all day and let go at 1600 to try trolling again. Was immediately attacked by larger bigeye on the troll and dangles in a bite that lasted until sunset. Tied up to buoy again. Found the current much reduced and was able to jig 6 bigeye releases and several small yellowfin that were archival tagged. Arvin showing some style with the standup gear at last and jigged some nice fish including a recapture bigeye. Ended a long day with 133 conventionals and 7 archival tags.

May 25<sup>th</sup>

Woke up early and jigged a yellowfin recapture from a tag release on 5/16/08, same buoy. Started trolling soon after sunrise and made 46 conventional tag releases and one nice yellowfin archival. Large school still present but they seemed to be over it. Decided to leave the buoy for the last time, glad for the 200+ releases and especially for 8 more archival in good sized yellowfin and bigeye. Started running north for the 5N by late morning.

May 26<sup>th</sup>

A rough transit with NE swell and winds to 20 kts. Arrived at the 5N TAO buoy just before noon and found an old Campbell style super seiner laying off about 3 miles east of the buoy. We found they had tied a drifting FAD on the buoy and a light strobe on the A frame, typically indicative of a planned set for the next morning. Dettling hailed the vessel on VHF 16 and they identified themselves as the Anna or Ana from Callao, Peru. Dettling informed them that we had cut off their raft and taken it and would remove any rafts found attached to TAO buoys and would be patrolling the 155W line from 8N to 8S. They said something about not much fish in this area, turned around and left. The raft was typical of the Spanish style drifting FADs seen in the Indian Ocean consisting of a bamboo raft covered with fine mesh webbing, some purse seine corks for flotation and a 20 m section of purse seine webbing suspended beneath. A small section of chain was woven into the bottom of the netting. We trolled one bigeye and one yellowfin before tying up to the TAO buoy. A second attempt at trolling at sunset produced no fish so we tied up again at 1830. Jigging produced 8 more tag releases, mostly small bigeye.

May 27<sup>th</sup>

We detached from the buoy after midnight but uncertain if we were able to bring the school with us. The school was not showing well before or after detaching to drift. We drifted with lights on until 0500 when we headed north to the 8N 155W TAO buoy. Running all day in light rains and easterly seas.

May 28<sup>th</sup>

Arrived at the TAO buoy at 8N, 155W early in the morning and trolled from 0630 – 0800. Decent bite on small yellowfin and skipjack with more bigeye taking over after the first hour. Made about 70 releases but no fish large enough for archivals. Tied up to buoy all day and tried trolling again at 1600 but no bite at all. Tied up before sunset and had small yellowfin, skipjack and a few bigeye biting the jigs for 17 releases and more otolith samples.

May 29<sup>th</sup>

Nothing under the boat early morning. Trolled the buoy till 0800 but only one small yellowfin tagged. Large school of bigeye and yellowfin showing on the meter right on the buoy but refused to bite. Underway by 0820, headed northwest toward home. Very rough seas from ENE at 20+ kts. Steady rain all day.

May 30<sup>th</sup>

Running north all day in 15 kts of NE Tradewinds. Rigged small gear, uneventful.

May 31<sup>st</sup>

Running north all day in 17-20 kt tradewinds. Bumpy ride but not too bad and a bit of sunshine. Trolled one blue marlin at mid-day, about 65 kgs and kept for smoking. Worked on video clips and odd jobs.

June 1<sup>st</sup>

Trades starting to moderate and start to turn more easterly providing an easier trough run. Speed picking up accordingly to 8.3 kts. A nice 16 kg wahoo this afternoon signaled the fact that we are getting closer to the islands. Arrived at the NOAA weather buoy 51002 at 1500. Good mixed school of bigeye and yellowfin greeted us on the dangles with mahi mahi on the long trolled lures. Was able to deploy the last remaining archival tags on 2 bigeye and one yellowfin and finish up the bits of tags left in the tagging magazines to round off leftovers to even sets of 50 or 100. Released 7 bigeye (2 arch) and 4 yellowfin (1 arch). Felt great to finish up these tags, giving us the following result:

**BET: 1736 (45 arch) 90.9%**

**SKJ: 57 3/0%**

**YFT: 116 (5 arch) 6.1%**

**Total releases 1909**

June 2<sup>nd</sup>

Hove to on the Cross Seamount this morning from 0330. Captain conducting formalities via email for 24 hour notification of arrival to Customs and making arrangements for crew transfer to the fishing vessel Pacific Sun. Trolled to yellowfin tuna over the Cross Seamount summit in the morning on the way towards Honolulu. Light Tradewinds and fair skies, steaming north all day.

June 3<sup>rd</sup>

Hove to and drifting offshore early this morning to wait the transfer of crew. Fired up at 0700 and met the Pacific Sun at 0800 about 12 miles off Barbers Point. Arvin and Claver ferried their gear over in trash bags and then made the jump and short swim to their new home. Ran in to Honolulu and were cleared by US Coast Guard and US Customs officials in Kewalo Basin. Ran back to Honolulu Harbor and tied up at Pier 38 United Fishing Auction at 1230. End of cruise !

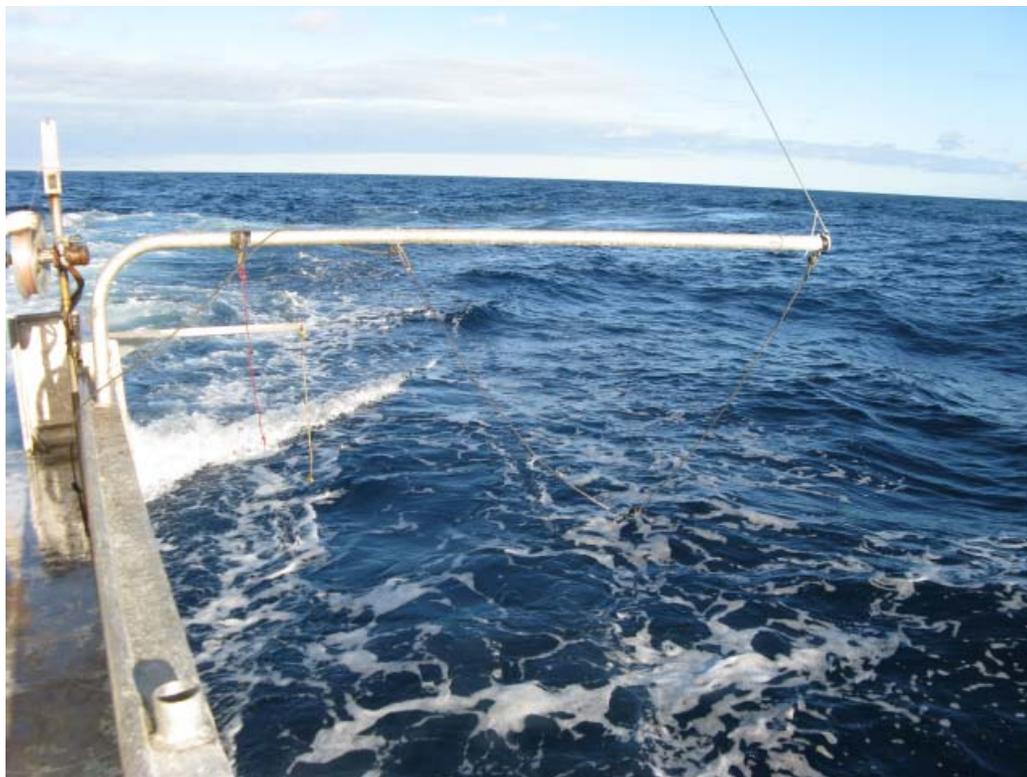
**FIGURES**



**Figure 1. Double D provisioning in Honolulu**



**Figure 2. Starboard stern working deck showing one mini-longine reel, one hydraulic trolling reel, a padded tagging mattress and tagging cradle.**



**Figure 3. Two dangler poles rigged on the port stern.**



**Figure 4. Lai skin for lure making and a mix of troll and jigging lures.**



Figure 5. Archival tagging cradle with a tagged bigeye



Figure 6. Conventional tagging cradle



Figure 7. Lifting sling for large tuna



Figure 8. Happy tagger

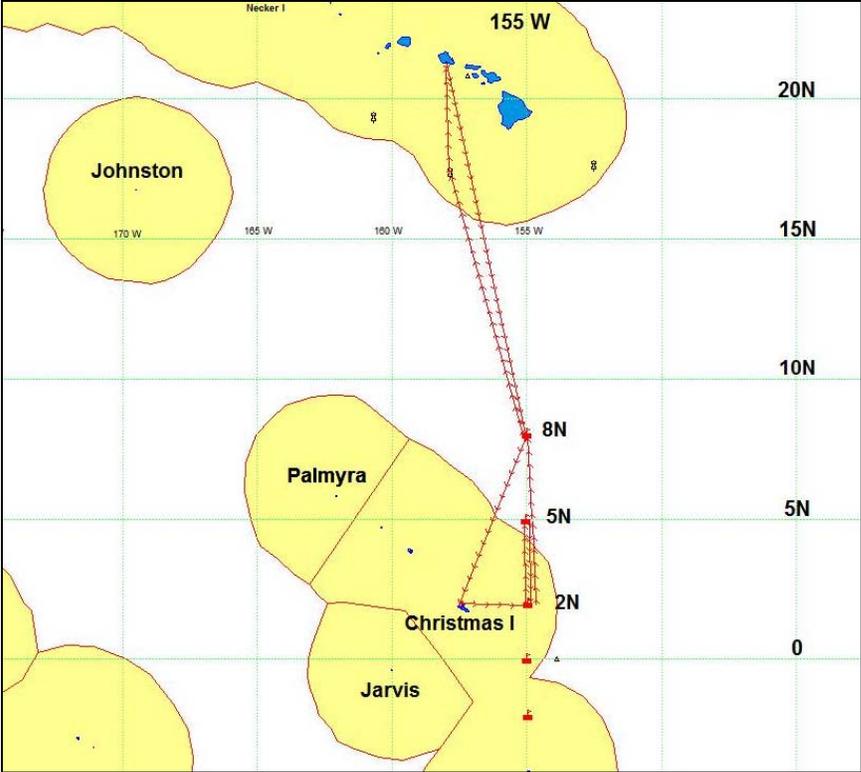


Figure 9. Cruise track during CP-01-08, May 5 - June 3, 2008



Figure 10. buoy at 5N, 155W with purse seine drifting FAD tied to it and a strobe light on the frame



**Figure 11. Underside of drifting FAD showing attachment point for 20 m aggregator**



**Figure 12. Single frame image from digital video of purse seine vessel on TAO 5N 155W**



Figure 13. Dangler action



**Figure 14. Jiggy jiggy**



**Figure 15. Jigging squid for live bait**

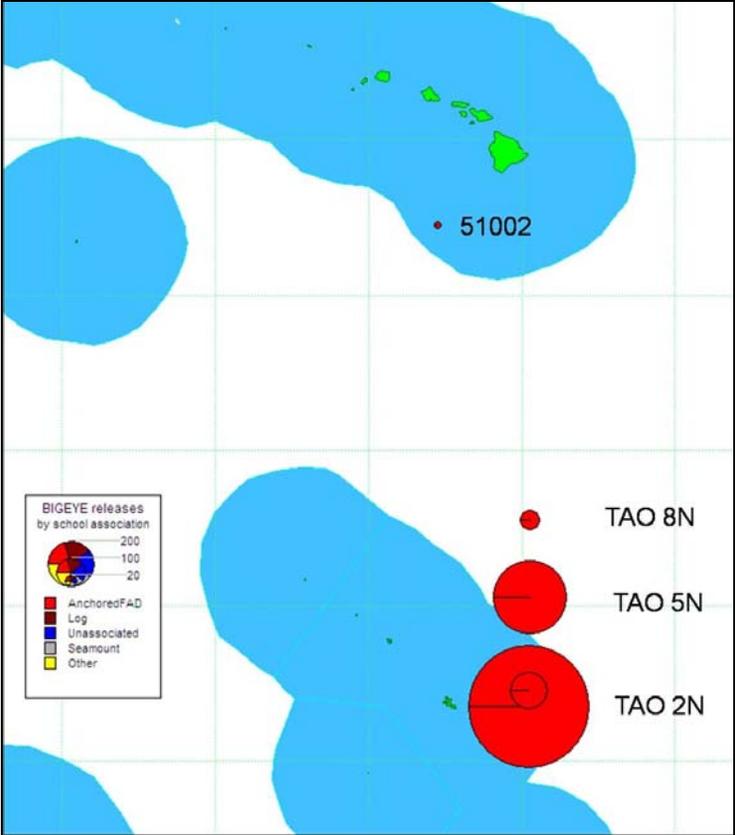


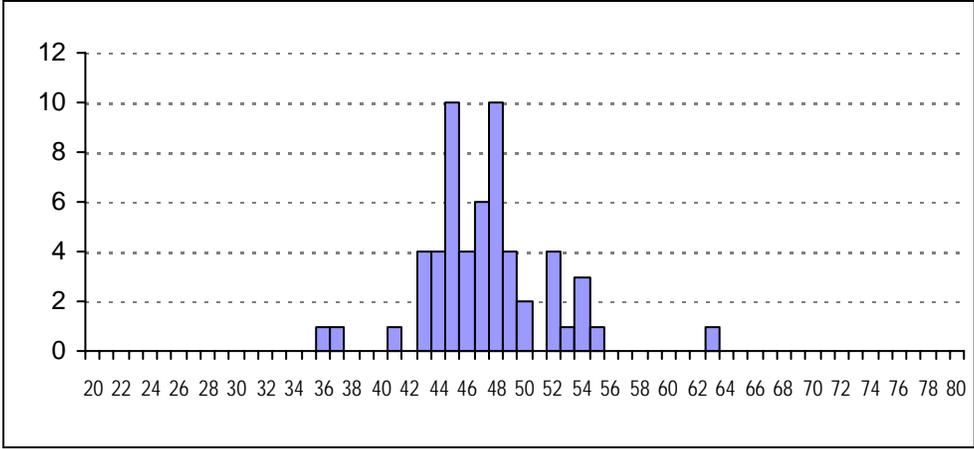
Figure 16. Distribution of Bigeye tag releases by buoy



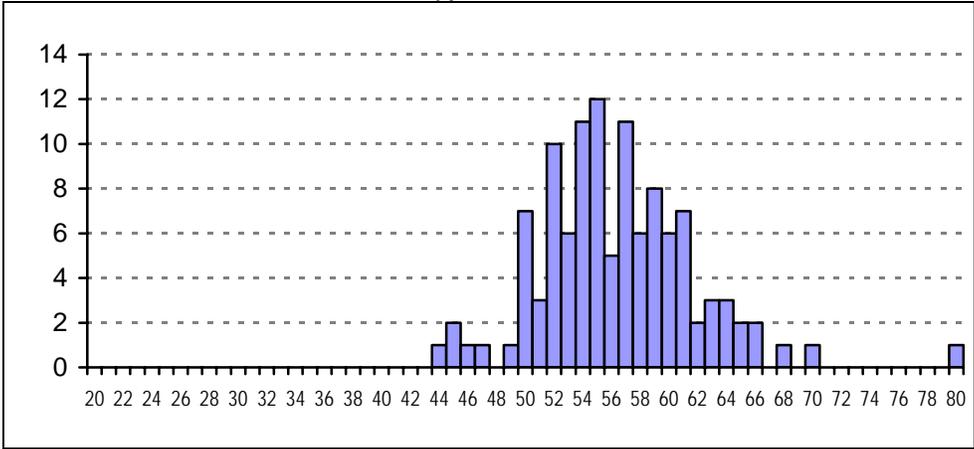
Figure 17. Bigeye tuna tagged with MK9 archival tag



**Figure 18. First recaptured bigeye for CP-01-08**



Skipjack n = 57



Yellowfin n = 113

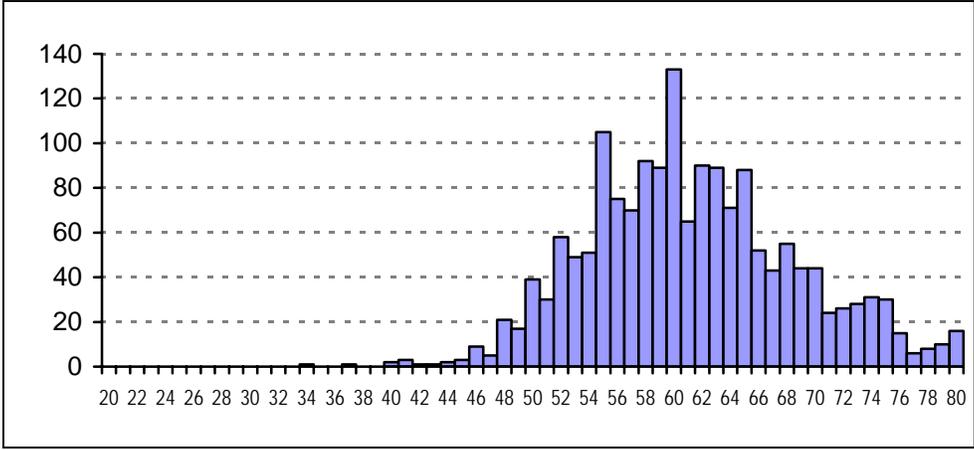


Figure 19. Size distribution of skipjack, yellowfin and bigeye tuna tagged during CP-01-08

Bigeye n = 1692

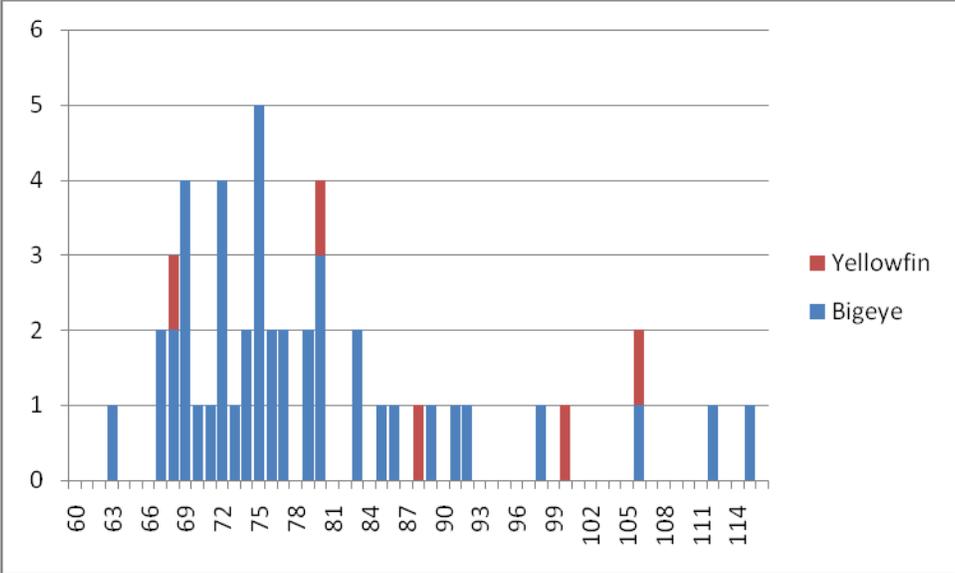


Figure 20. Size distribution of archival tag releases



Figure 21. Measuring tuna selected for otolith sampling



**Figure 22. SPLASHCAM system showing video head, stabilizing fin and weight cabled to viewing and recording gear**

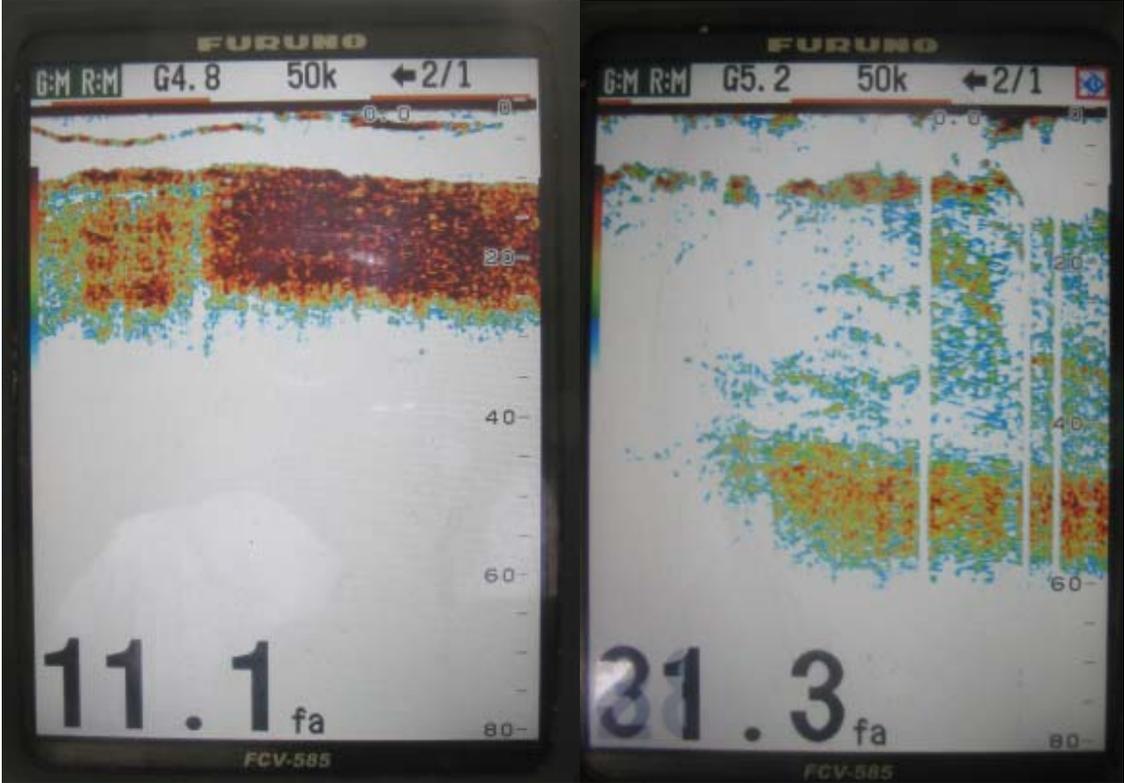


Figure 23. Echo sounder images of presumed tuna schools aggregated to TAO buoys (depths in fathoms)



Figure 24. Purse seine vessel Montelucia transshipping catch to the carrier Montesol off Christmas Island