



SURVEY CRUISE REPORT

F.R.V.CHULABOHRN CRUISE 1-2/2010
5 May – 7 June 2010

**The Pelagic Fisheries resource survey in
the AFADs area in Andaman Sea**

CFTD
9/6/2010



Cruise no.: F.R.V.CHULABHORN No.1-2/2010

Period: 5 May – 7 June 2010

Area: Andaman Sea Waters of Thailand

Port of call: Phuket

Objective: **Main Activity for Research Survey are as follows:**

1. Pelagic Fisheries resources survey in the AFADs area
2. Pelagic longline demonstration by using Monofilament Reel System.
3. Oceanographic survey: ICTD, Bongo net,
4. AFADs searching by Echo sounder.
5. Whale sighting

III. Researcher from DOF/Thailand (LegII/ 25 May-7June 2010)

FRV. Chulabhorn officer		
1. Mr. Sakorn Pandithto	Master	
2. L.T. Pitak Jaidee	Chief officer	
3. L.T . Suthanee Sumanungkul	Second officer	
4. PO1. Narong Polprasert	Radioman	
5. Mr. Somboon Tempium	Assistant second officer	
6. Mr. Wanchai Paethong	Boat swain	
7. Mr. Suthep Paohnong	Ship steersman.	
8. Mr. Yutthana Munkong	Ship steersman.	
9. Mr. Insee Bunyarit	Ship steersman.	
10. Mr. Kritsada Wanprasit	Ship boy	
11. Mr. Sayan Sawaddee	Cook	
12. Mr. Wisut Thonghong	Assistant cook	
13. Mr. Decha Nakdaeng	Chief engineer	
14. Mr. Thawon Yamsoithong	Second engineer	
15. Mr. Reungrit Jirasathit	Engineer	
16. Mr. Kampanath Srithumthim	Engineer	
17. Mr. Kampol Jareampan	Electrician	
18. Mr. Uthai Raksapol	Metalworker	
19. Mr. Thawee Buranseth	Fitter	
20. Mr. Thanat Sirisaranont	Fitter	
DOF Researchers and Officers		
21. Mrs. Patthira Lertvithayaprasit	Chief scientist	
22. Mr. Narupol Darumas	Researcher	
23. Mr. Somjeth Sornkrut	Researcher	
24. Mr. Piroj Naimee	Researcher	
25. Mr. Eakapol Rathanapan	Researcher	
26. Mr. Pithaneth Uthus	Researcher	
27. Mr. Watharapong Chumcheun	Researcher	
28. Mr. Chitiwatana Lhengbumrung	Researcher	
29. Mr. Dumrongsak Thongkam	Officer	
30. Mr. Amorn Rod-Inn	Officer	

31. Mr. Chaiwat Mamueng	Officer	
32. Mr. Wirath Chamkrut	Able seaman	
33. Mr. Somchit Puengdaeng	Able seaman	

Collaborative researcher		
1. Mr. Kulthawat Manomayithikarn	SEAFDEC researcher	4 - 20 May 2010
2. Mr. Ritthirong Prommas	SEAFDEC researcher	4 - 20 May 2010
3. Mr. Natthapong Thubket	SEAFDEC researcher	4 - 20 May 2010
4. Mr. Sayan Promjinda	SEAFDEC researcher	23 May - 9 June 2010
5. Mr. Sakchai Arnupapboon	SEAFDEC researcher	23 May - 9 June 2010
6. Mr. Komsan Pofa	SEAFDEC researcher	23 May - 9 June 2010
7. Mr. Montri Sumontra	AFDEC researcher	23 May - 9 June 2010
8. Mr. Suppachai Rodpradit	AFDEC researcher	4 - 20 May 2010
Faculty of Fisheries, KU		
1. Mr. Jutha Arpanakapun	Practicum students	4 - 20 May 2010
2. Mr. Wiriya Pitisirikul	Practicum students	4 - 20 May 2010
3. Mr. Pornchai Lertwuthiporn	Practicum students	4 - 20 May 2010
4. Mr. Naris Ketjongkol	Practicum students	4 - 20 May 2010
5. Mr. Santipong Putsa	Practicum students	4 - 20 May 2010
6. Mr. Santhana SaengNgen	Practicum students	4 - 20 May 2010
7. Mr. Chatchai Pueksachad	Practicum students	4 - 20 May 2010
8. Ms. Chanthana Srineam	Practicum students	4 - 20 May 2010
9. Ms. Narinrat Nimprasert	Practicum students	4 - 20 May 2010
10. Ms. Manutchanok Suriyo	Practicum students	4 - 20 May 2010
11. Ms. Natthaporn Intanuchit	Practicum students	4 - 20 May 2010
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13. Ms. Peeyaporn Neanthasart	Practicum students	4 - 20 May 2010
14. Ms. Karnchana Anupan	Practicum students	4 - 20 May 2010
15. Ms. Sirinath Kaewkum	Practicum students	4 - 20 May 2010

1. Area of Survey

Leg I (5-20 May)

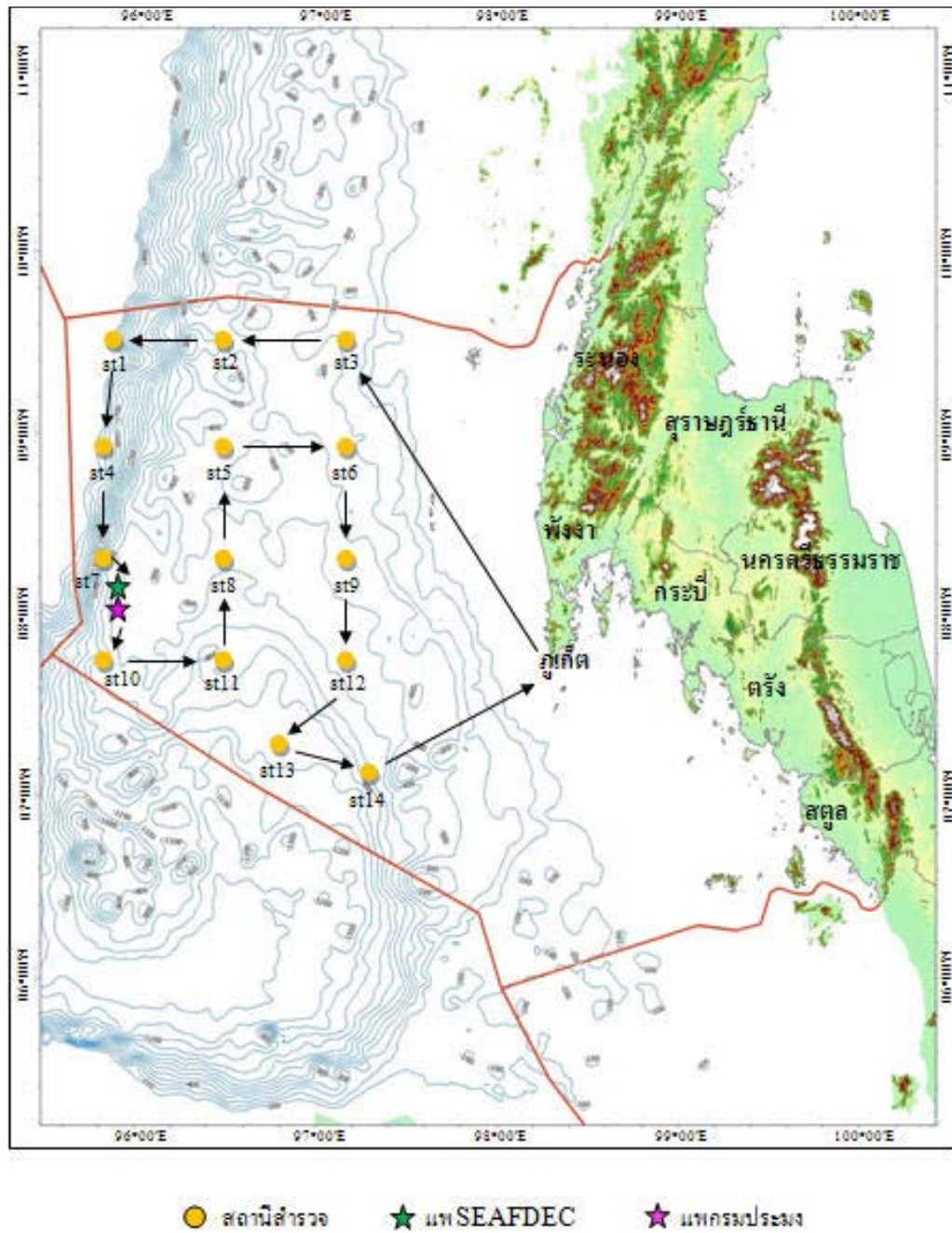
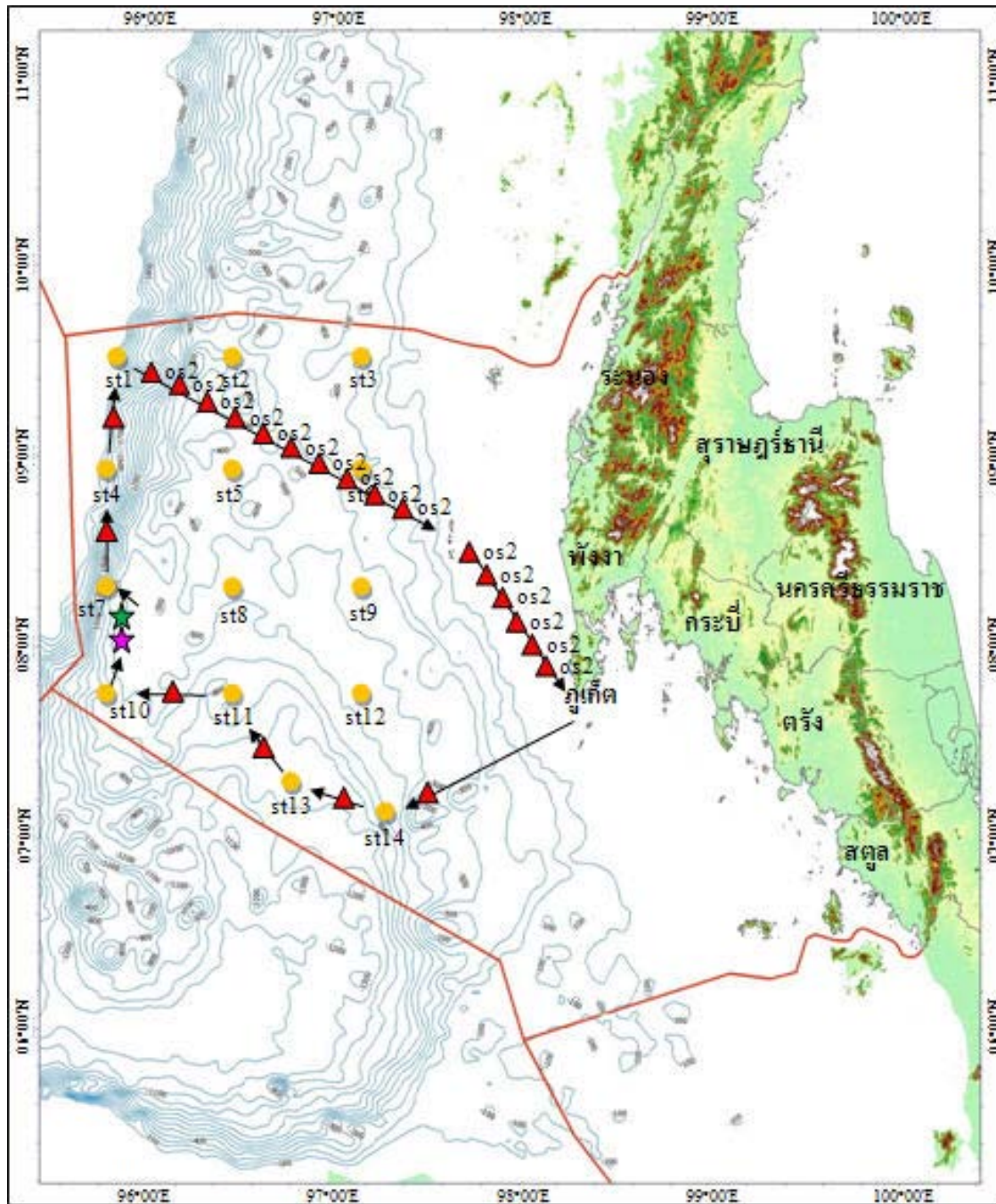


Fig. 1 the survey station in Leg I

Leg II (25 May – 7 June 2010)



- = Pelagic long line survey station
- ▲ = Oceanographic survey station
- ★ = DOF's FADs
- ★ = SEAFDEC's FADs

Fig. 2 the survey station in Leg II

The survey has been conducted in the Andaman Sea within EEZ of Thailand located from Latitude 07°00'N- 09°35' N and longitude 095°30'E- 097°40' E. the survey period was divided into two cruises. The first survey and second survey was carried out between 5 May – 20 May 2010 (Leg I) and 25 May to 7 June 2010 (Leg II), respectively. The survey stations in Leg I and Leg II are showed in **Fig.1** and **Fig.2**. The sea depth ranged from 205m to 2,165m. The total number of fishing operation were 22 stations and oceanographic operation were 38 stations

2. Survey summary

The total survey stations were 38 stations. The fishing survey was only operated for 16 stations but oceanographic was operated in all survey station. For fishing activities, there were 17 operations of pelagic longline (PLL) and 5 operations of drifting vertical longline (DVL). For oceanographic activities, in the first leg survey oceanographic activities included iCTD, chlorophyll-a concentration, nutrient, bongo net and phytoplankton survey. Whereas, there was only one oceanographic activity (iCTD survey) was operated in the second leg survey. The summary of fishing and oceanographic station is shown in **table 1**.

Remark; DVL was operated in few numbers because it was only designed to operate in FAD area when PLL could not operate due to avoiding the entangling of FAD and fishing equipment.

FADs searching were conducted through the cruise by using Echo sounder when F.R.V. Chulaporn surveyed around FADs area. The route of the survey was show in Fig.... Cetacean sighting survey was conducted along the route of survey

3. Pelagic resource survey

An automatic longline system was installed to F.R.V.CHULABHORN by Fishing Engineering Section, Capture Fisheries Technology Division, SEAFDEC/TD. This system composed of mainline spool, automatic line shooting machine and branch line setting beeper. Complete set of pelagic longline composed of mainline, branch line and buoy line (Fig.3). 300 -500 hooks per one operation were deployed. Twenty hooks were set per basket, and in each set, the circle hook were set alternate with J-hook, basket by basket. Ranges between hook was 40m. In general, the length of the float line was 25 m. However in operation 4-11, longline system was malfunction, Cremona rope were use for main line and the length of float line was longer, that was 50m, ten to fifteen hooks are set per basket. On this cruise, the Round scads were used for baits. In each operation, Depth sensor and Temperature sensor was attached in deepest and shallowest position of hook, show in Table..

FADs monitoring, Drifting Vertical long line was conducted at the FADs area, fishing gear construction of DVL was shown in (Fig. 4). Two operations were conducted at the south part of DOF's FADs, one operation was operated at the middle between FADs of DOF and SEAFDEC, last area for SEAFDEC's FADs were conducted two operations. 80 hooks were deployed in each operation. Distance between branch line was 400 m. The shooting time was in the evening and hauling in the morning on next day. Round scads were use for baits.

Table 1: Oceanographic activities summaries

Operation number	St.no.	Date	Time	Lat	Long	Fishing activities
1*	03	6 May 53	0805	09°26.580'N	097°18.200'E	PLL
2*	02	7 May 53	0742	09°34.960'N	096°37.510'E	PLL
3*	01	8 May 53	0746	09°22.380'N	095°53.830'E	PLL
4*	04	9 May 53	0845	08°56.420'N	096°06.160'E	PLL
5*	07	10 May 53	0803	08°18.950'N	096°01.020'E	PLL
6*	SEAFDEC	11 May 53	0831	08°10.940'N	095°48.850'E	DVL
7*	DOF	12 May 53	0935	07°55.590'N	095°49.370'E	DVL
8*	10	13 May 53	1046	07°31.640'N	095°40.530'E	PLL
9*	11	14 May 53	1048	07°38.260'N	096°25.460'E	PLL
10*	8	15 May 53	0951	08°14.970'N	096°28.920'E	PLL
11*	5	16 May 53	1106	08°56.150'N	096°35.920'E	PLL
12*	6	16 May 53	1624	08°51.400'N	097°06.430'E	PLL
13*	9	18 May 53	0802	08°20.030'N	097°09.990'E	None operation
14*	12	18 May 53	1351	07°44.570'N	097°09.970'E	None operation
15*	13	19 May 53	1126	07°11.930'N	096°54.360'E	PLL
16*	14	19 May 53	1617	07°04.740'N	097°19.860'E	PLL
17**	Add	25 May 53	1505	07°09.290'N	097°28.000'E	None operation
18**	Add	25 May 53	1652	07°00.550'N	097°16.510'E	None operation
19**	Add	26 May 53	1219	07°09.320'N	097°04.910'E	None operation
20**	13	26 May 53	1516	07°17.930'N	096°47.160'E	PLL
21**	Add	27 May 53	1206	07°32.700'N	096°40.750'E	None operation
22**	11	27 May 53	1423	07°44.900'N	096°30.820'E	PLL
23**	Add	29 May 53	1750	07°45.310'N	096°10.460'E	None operation
24**	10	30 May 53	0718	07°51.260'N	095°52.590'E	PLL
25**	SEAFDEC	31 May 53	0929	08°07.070'N	095°58.670'E	DVL
26**	MID	31 May 53	1520	08°09.800'N	095°47.470'E	DVL
27**	SEAFDEC	1 Jun 53	1445	08°14.300'N	095°49.270'E	DVL
28**	7	2 Jun 53	1004	08°19.480'N	095°50.430'E	PLL
29**	4	3 Jun 53	1630	08°51.680'N	095°49.950'E	PLL
30**	Add	4 Jun 53	1021	08°45.980'N	096°05.070'E	None operation
31**	Add	4 June 53	1158	08°37.520'N	096°19.000'E	None operation
32**	Add	4 June 53	1311	08°32.950'N	096°30.130'E	None operation
33**	Add	4 June 53	1436	08°28.270'N	096°41.710'E	None operation
34**	Add	4 Jun 53	1605	08°23.330'N	096°53.570'E	None operation
35**	Add	4 Jun 53	1735	08°16.970'N	097°05.080'E	None operation
36**	Add	4 Jun 53	1858	08°11.750'N	097°16.070'E	None operation
37**	Add	4 Jun 53	2029	08°05.710'N	097°28.100'E	None operation
38**	Add	4 Jun 53	2143	08°00.160'N	097°38.710'E	None operation

Remark: *= First leg survey/ **=second leg survey

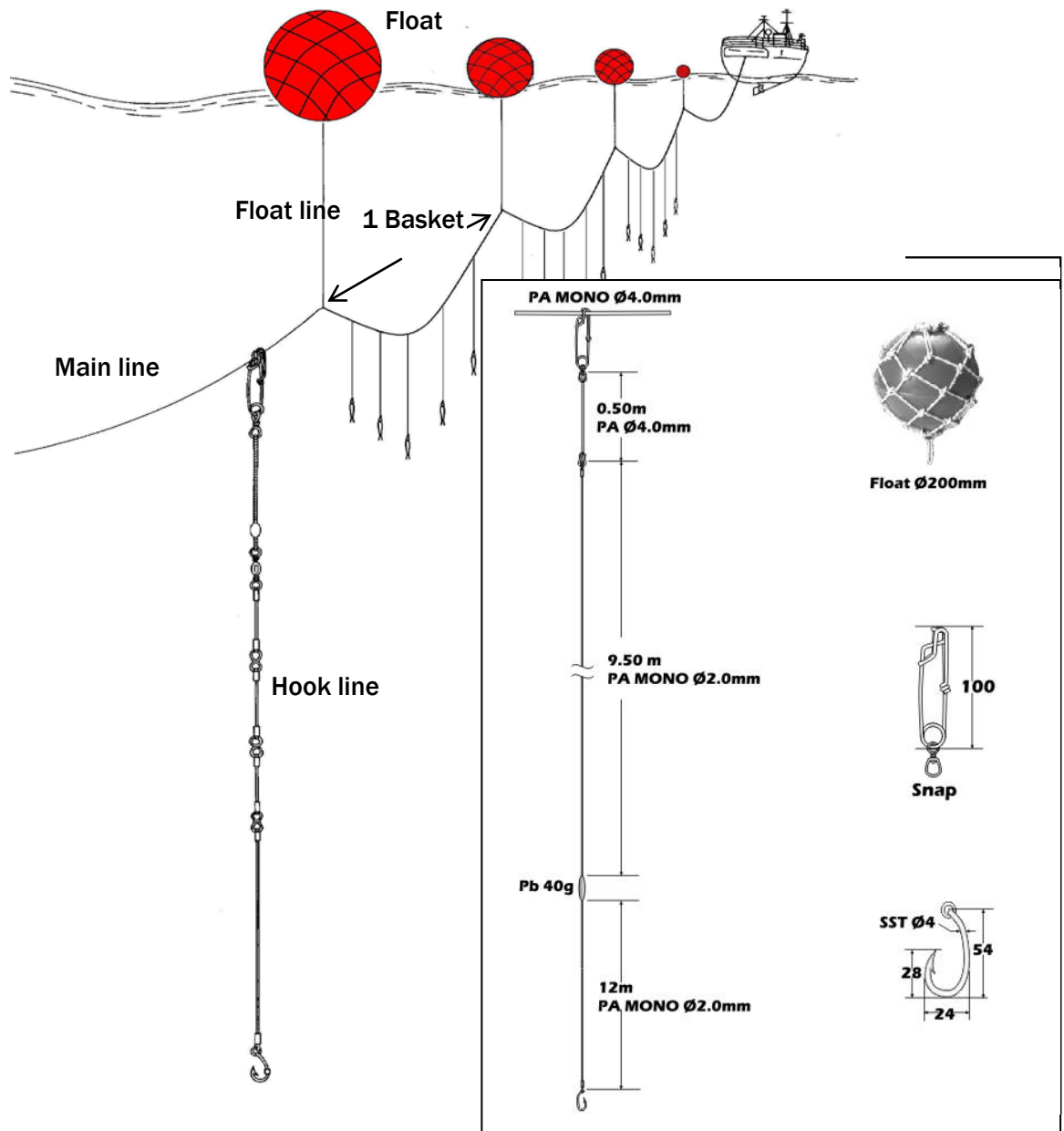


Fig. 3 Pelagic longline construction

3.1 Results of the Pelagic resource survey

Catch Rate

A total of 54 by number weighing approximately 867kg was caught during the survey. Total number of hook deployed were 6,377 hooks in PLL and 401 hooks in Drifting vertical longline (DVL). Catch per unit effort (CPUE) of pelagic resource survey separated by leg were 6.16 individuals/1,000hooks and 6.25 individuals/1,000 hooks for PLL and DVL respectively in leg I and 13.11 individuals/1,00 hooks for PLL and 4.15 individuals/1,000 hooks for DVL in leg II. The CPUE of each operation were show in Index II.The overall CPUE was 7.97 individuals/1,000 hooks. Considering the CPUE by operation, the highest CPUE 20.92 individuals/1,000 hooks was found in station 1(operation no.3) followed by station 13 (operation no.13) with CPUE 16.5 individual/1,000 hooks and station 10 (operation no.15) with CPUE 14.7 individuals/1,000 hooks.

Catch rate varies by fish species, Sword fish *Xiphias gladius* showed the highest CPUE of 1.48 individuals/1,000 hook followed by Pelagic stingray *Dasyatis sp.* with CPUE of 0.89 individuals/1,000 hooks and the group of fishes with same CPUE of 0.74 individuals/1,000hooks for Indopacific Sailfish *Istiophorus platyperus*, Treasher shark *Alopias pelagicus* and Longnose lancet fish *Alepisaurus ferox*.(Index III)

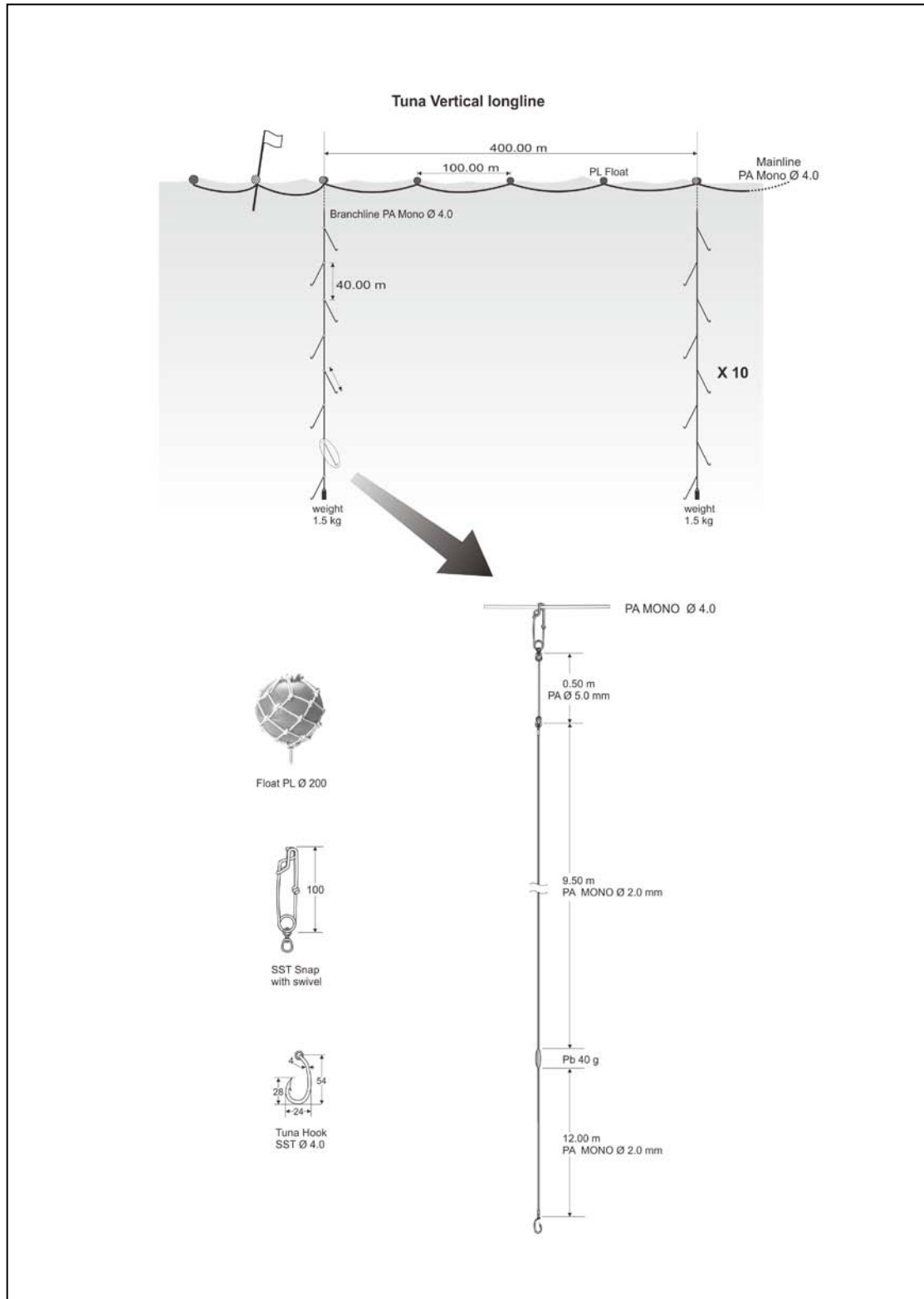


Fig. 4 Drifting Vertical longline

4. FADs searching

The Echo sounder model JRC color Echo Sounder JFC-130 onboard F.R.V.CHULABHORN was use for searching FADs in each leg. The survey tracks are design like a flower, which the position of FADs is the center of track survey (Fig.8). The speed of vessel for searching is 3 knot. At Latitude $8^{\circ}10.88$ N and Longitude $095^{\circ}51.71$ E was found the line like a rope of FADs in first leg near the position of DOF's FADs (Fig.6). At SEAFDEC's FADs not found the FADs from Echo but found the school of Whale and Dolphins 30-40 numbers. In second leg at the SEAFDEC's FADs can found, which show in Echo sounder (Fig. 5) at Latitude $8^{\circ}14.85$ N and Longitude $095^{\circ}48.66$ E. The range of depth from 25 – 40 m, and the fish school also were found around the FADs. (Fig.7)

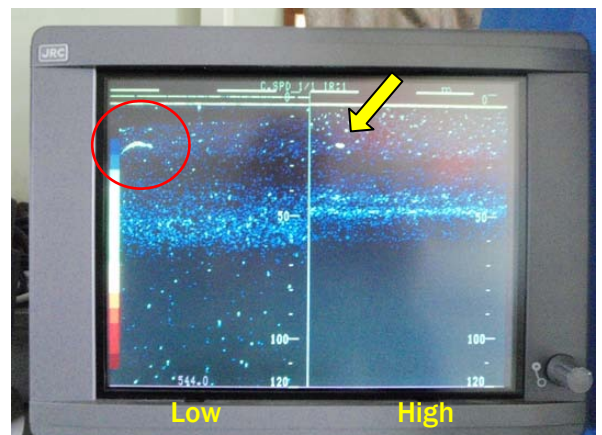
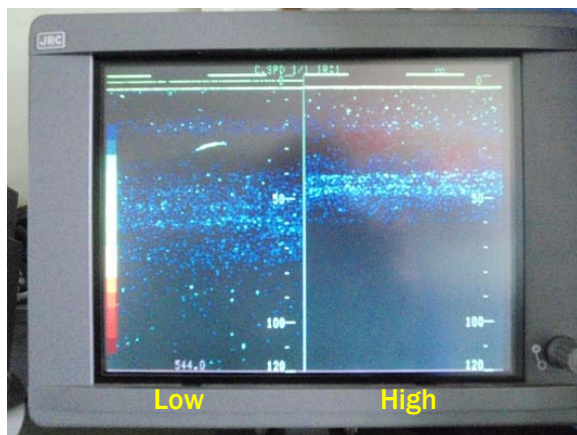


Fig. 5 show position of SEAFDEC's FADs

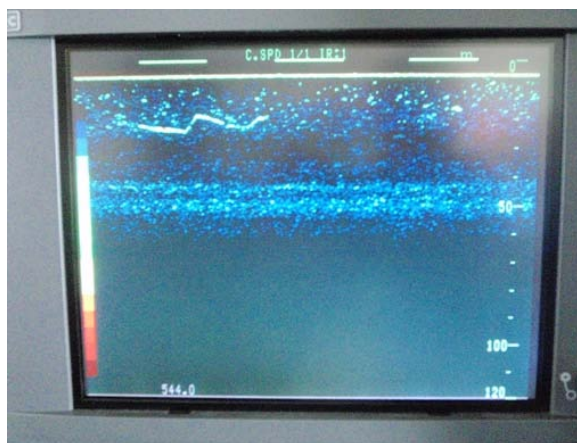
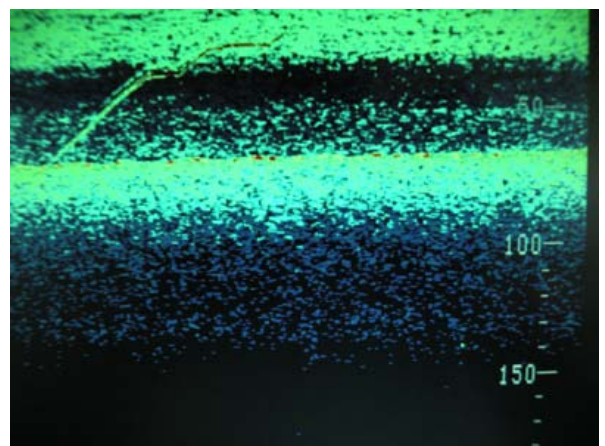
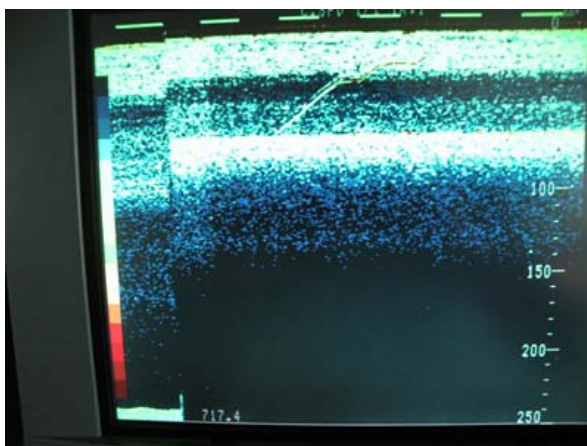


Fig. 6 show position of DOF's FADs



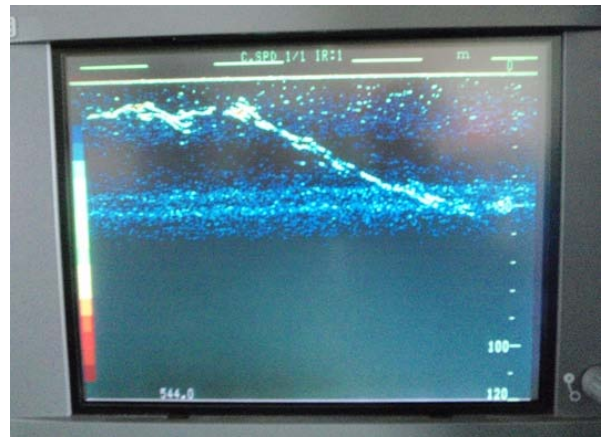
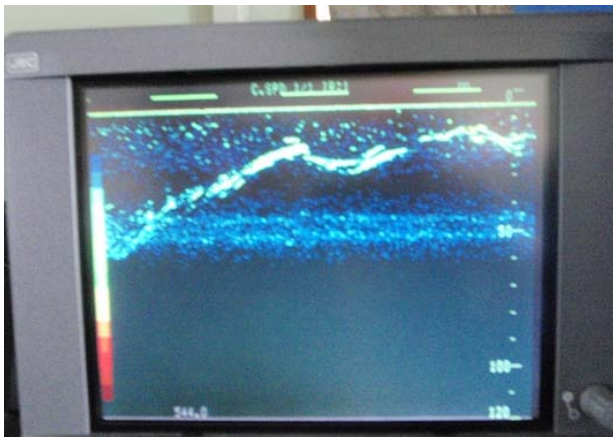


Fig. 7 show the Fish school around the FADs

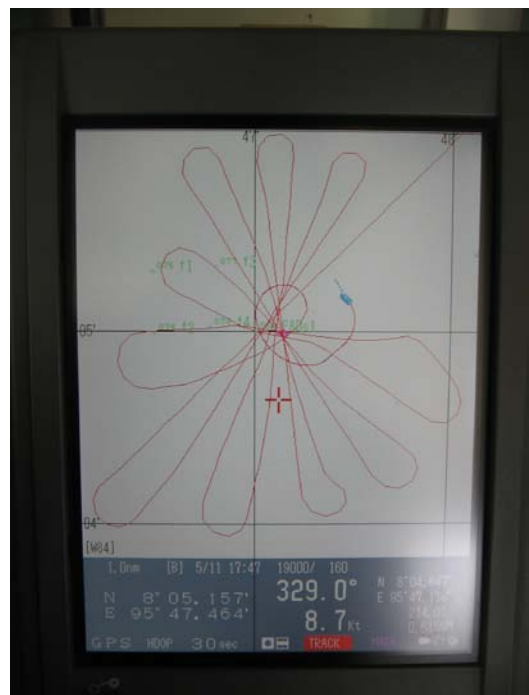
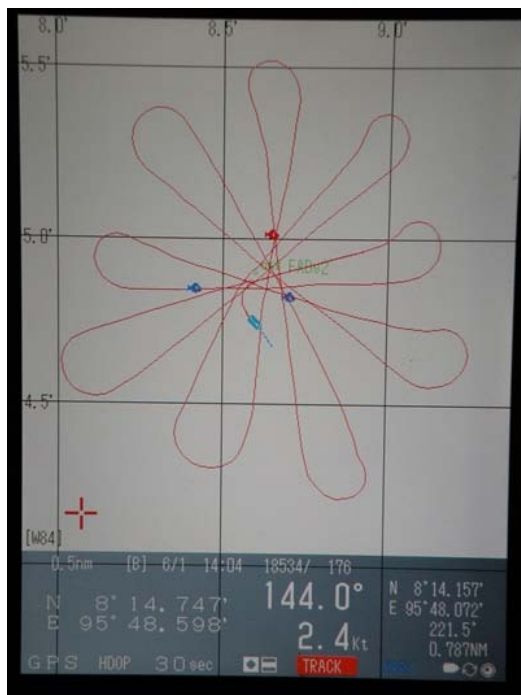
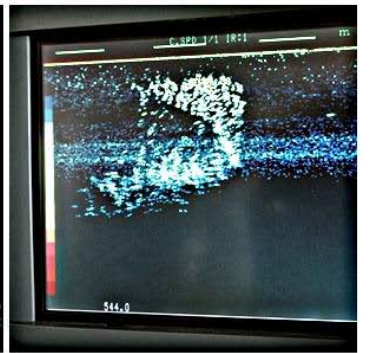
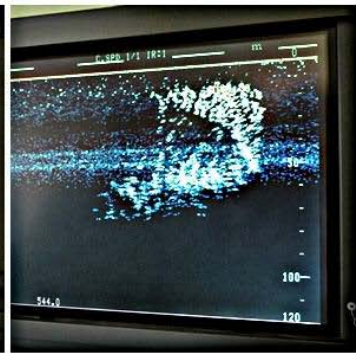
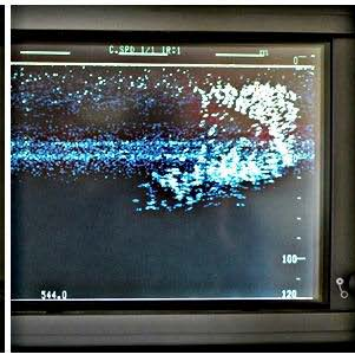
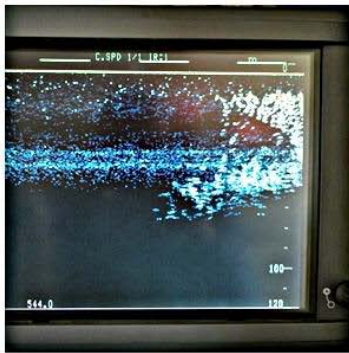


Fig. 8 Show the Vessel track survey around FADs

5. Cetacean sighting survey

Cetacean sighting survey was conducted along the route of survey, Sighting data obtained during the primary searching are primary sightings only and attempts to approach the objects for species identification, school size counting, and other data collection, e.g., photographs should be carried out.

During the sighting survey, two species of whales were observed. One school of Short fin pilot whale and one school of Dolphins were found during shooting PLL in the evening time at Latitude $8^{\circ}18.89$ N and Longitude $095^{\circ}50.36$ E (Fig.10). They were swimming together (Fig.11). One school of Killer whale group were found during conducted the oceanographic survey at Latitude $8^{\circ}07.07$ N and Longitude $095^{\circ}47.67$ (Fig.9) In the first leg found the school of Short fin Pilot whales and dolphin near the area of SEAFDEC's FADs (Fig.12)



Fig. 9 show the school of whale in the group of Killer whale



Fig. 10 show the school of Short fin pilot whales and dolphins

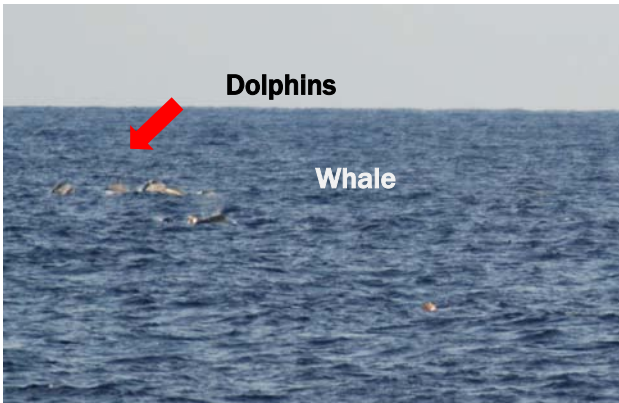


Fig.11 The school of whale and dolphin were swimming together



Fig.12 The school of Short fin Pilot whales around FADs

Oceanographic survey

iCTD survey

In every station the iCTD was deployed from the sea surface to approximately 30m above the sea bottom and the maximum depth of deploy was 450 meter in case of depth of the survey station deeper than 480m. iCTD collected physical and chemical characteristic of water including temperature, salinity, dissolved oxygen and fluorescence.

Chlorophyll-a concentration and nutrient survey

There were 4 depths designed to collect water sample by Van dron for chlorophyll-a concentration and nutrient analyze (nitrite, nitrate, phosphate and silicate). They included sea surface, 25, 50 and 100 meters. Each depth, water sample will be divided into two parts.

First parts, zooplankton was strained away from water sample by filtering through plankton net (mesh size 300 μm). 5-10 liter of water sample (without zooplankton and particle bigger than 300 μm) was filtered though Whatman GF/F filter paper. After that, 2-3 drop of 1 % calcium carbonate solution was added into filtered paper. Filtering paper was covered by foil and kept in refrigerator at -20°C before analyze with spectrophotometric method at SEAFDEC/TD laboratory.

Second part, 7 milliliters of water sample was filtered through Whatman GF/C filter paper to strain away of particle before keeping in transport tube (4 tubes / depth) and stored in the freezer at -20°C . The analysis will be done by Automated Analyzer at SEAFDEC/TD laboratory.

Bongo net survey

Marine biology was conducted on the fish larvae and zooplankton. The 55 cm diameter bongo frames were attached with the net mesh size of 520 μm and 330 μm . A flow meter was attached at the aperture of net to measure the water volume passing through the net. Bongo net was oblique tow with ship speed approximately 1.5-2 knots. Angle of towing cable was maintained at 45° . Towing depth was observed using depth meter. Towing time for downward and upward was 30 minutes each. The samples were preserved in 10 % buffered formalin and seawater immediately. Partial details of Bongo net operation are in table 3.

Phytoplankton survey

There were 4 depths was designed to collect phytoplankton data including sea surface, 25, 50 and 100. Each depth, 40 liter of water sample was collected by Van dron and filtered through plankton net with 20 μm . Water sample in basket of plankton net was moved into plastic bottle and preserved with 2-4 % formalin concentration before identify in DOF laboratory.

Preliminary analysis of oceanographic parameters

The vertical profiles of temperature, salinity, dissolved oxygen and fluorescence from all oceanographic stations are plotted in figure 15. Whereas, the horizontal interpolate at sea surface and 250 meter of these parameters are shown in figure 16.

From the vertical plot of temperature, it found that temperature gradually decreased when the depth increasing until reaching thermocline layer which was approximately observed between 50 to 200 meters depth. At the thermocline layer, temperature sharply decreased from 27.5 °C at 50 meter to 14°C at 200 meter. Then, it was gradually decrease with increasing depth to reach lowest temperature (10 °C) at 450 meter.

Sea surface temperature contour, it was found that there was center of low temperature in the central of survey area. Trend of sea surface temperature was higher with farther distance. The highest sea surface temperature was found in north of survey area with temperature over 31.5 °C. Whereas, temperature contour at 250 meter showed center of low temperature in north of survey are, recorded below 12.5 °C. Trend of temperature was higher southward with centralized at operation number 20 with temperature over 14 °C.

From the vertical plot of salinity, the trend of salinity showed different opposite characteristic when comparing to temperature. Salinity gradually increased when the depth increasing until 35 meter depth approximately. When depth increasing from 35 to 200 meter depth, salinity sharply increased from 33.4 psu to be 34.95 psu. Then, it was gradually increased with increasing depth to reach highest salinity (35.1 psu) at 450 meter.

Sea surface salinity contour showed the occurring of low salinity at north area, It's salinity was lower than 32.5 psu. Salinity trend to increased southward and eastward. The highest value could be found at station 3 near Kabri Province. it was over 33.75 psu. Whereas, salinity contour at 250 meter showed invariable value. Salinity in study area only ranged from 34.975 to 35.075 psu.

From the vertical plot of dissolve oxygen (DO), it found that DO gradually decreased when the depth increasing until reaching oxycline layer which was approximately observed between 50 to 150 meters depth. At the oxycline layer, DO sharply decreased from 6.35 mg/l at 50 meter to 1.00 mg/l at 200 meter. Then, it was gradually decrease with increasing depth to reach lowest temperature (0.60 mg/l) at 250 meter. DO was nearly stable when depth was deeper than 250 meter.

Sea surface DO contour showed the occurring of high DO from southwest to northeast area in survey area. The maximum DO (over 6.6 mg/l) would be found near Karbi Province at station number 6. DO tended to decrease northward and southward with centralized in the south area at station number 13. DO at this station was below 6.0 mg/l. Whereas, DO contour at 250 meter showed very low value. DO at north of survey was lowest and slightly increased southeast ward until reaching the highest at value near Malaga strees that was higher than 0.7 mg/l.

From the vertical plot of fluorescent, the trend of fluorescent increase rapidly as depth increase until reaching fluorescent maximum layer at 50 meter. At this layer, fluorescence was high to over 0.8 ug/l. Below this layer fluorescent decrease rapidly until stable at 150 meter with fluorescent value at 0.1 ug/l.

Sea surface fluorescence contour showed the occurring of high concentration at the middle of survey area covering latitude 08°00'N - 09°30'N and longitude 96°30'E – 97°00' E, It's concentration was higher than 0.04 ug/l. Fluorescent concentration trend to less with farther distance, particularly in southwestward. The lowest fluorescent concentration was found at station number 10 at below 0.01 ug/l. For fluorescence contour at 250 meter, it presented pattern nearly same as surface couture. Concentration was less with farther distance from center of high concentration to edge of study area. The Highest concentration and lowest concentration were found at station number 5 with over 0.10 ug/l and station number 10 with below 0.01 ug/l, respectively.

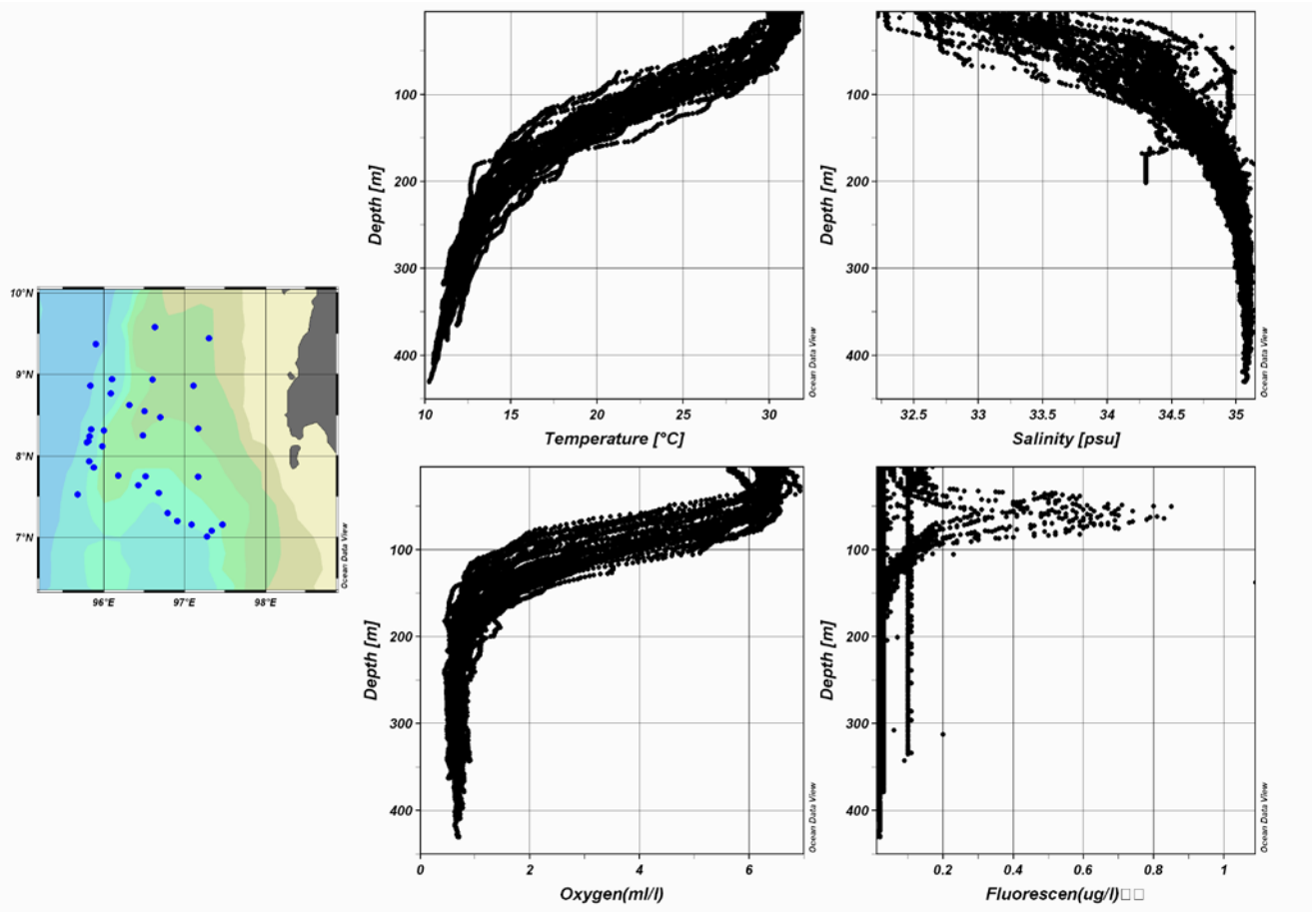


Fig. 15: Total scattering plot of temperature, salinity, oxygen and fluorescence from surface to 450m

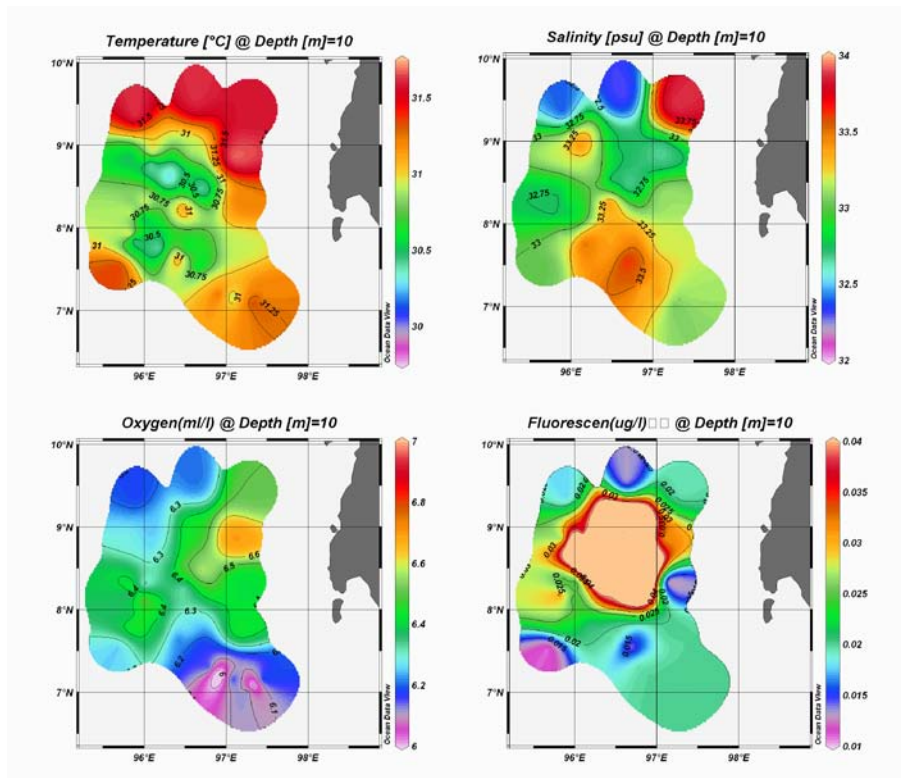


Fig. 16: Horizontal contour of temperature, salinity, oxygen and fluorescence at surface layer

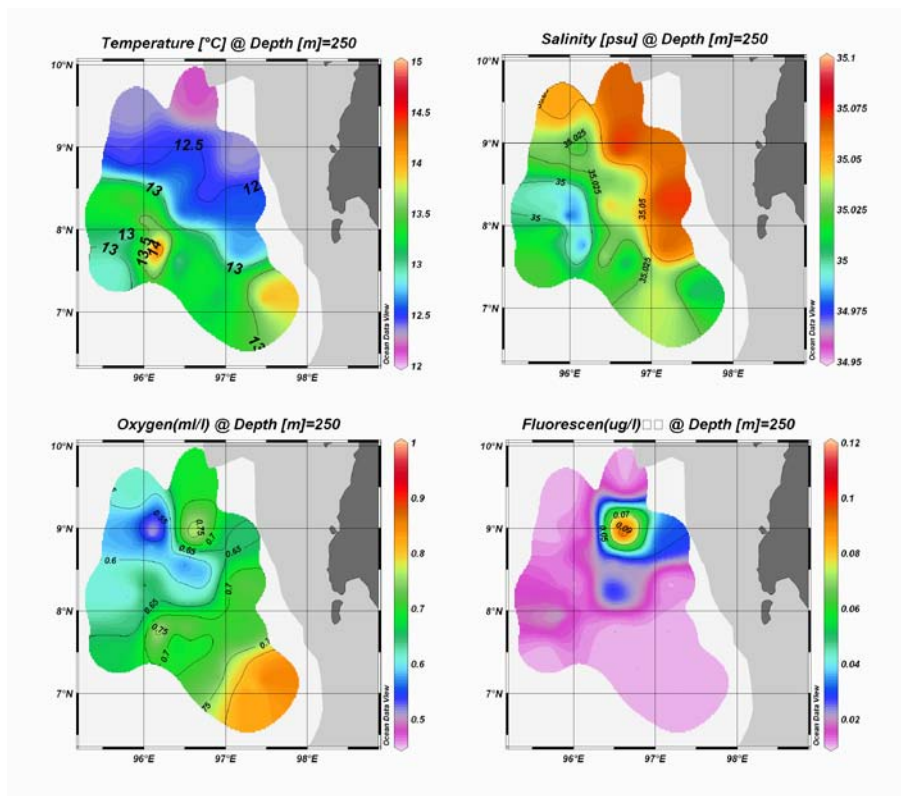


Fig. 17: Horizontal contour of temperature, salinity, oxygen and fluorescence at 250m layer
EE074969260TH

รายงานการปฏิบัติงาน 3 – 20 พฤษภาคม พ.ศ. 2553

รายงานโดย: กุศลวัช มโนมยทธิกาญจน์

การทำงานของ Smart Reel มีปัญหาในการทำงานดังนี้

- shooter ปลอ่ยสายหลัก ทำงานไม่คงที่ ขณะที่ drum ปลอ่ยให้หมุนอิสระ บางครั้ง shooter หยุดทำงานทันที สายเอ็นใน drum ก็ จะพุ่งออกมา และพันกัน ทำให้ต้องเสียเวลาค่อยๆ คลายสายเมนจาก drum จนสายเอ็นไม่ฟู
- ปัญหาในการกู้สายเบ็ดจากทะเล เมื่อใช้ตัว drum ดึงขึ้นมาเอง สายเอ็นมีความตึงมากๆ ค่อยๆ รัด drum ให้ ปีกเบ่งออก กระทั่ง ปีก drum ไปติดกับขา จำเป็นต้องหยุดทำงานแล้วทำการตัดขาบางส่วนเพื่อให้ drum สามารถหมุนต่อไปได้ หลังจากนั้นต้องใช้ ก๊ว นเบ็ดหน้าของเรือจุฬารักษ์ช่วยในการกู้สายเมน เพื่อผ่อนแรงดึงของสายเอ็น



ปีก drum ถูกเบ่งออกจนติดขา



หลังจากใช้ไฟตัดขาบางส่วนออก drum ก็สามารถหมุนต่อไปได้



ปึก drum ถูกเบ่งออกจนเหลือช่องว่างน้อยลง



หลังจากตัดขา drum บางส่วนออก ก็สามารถทำงานต่อไปได้ แต่ต้องใช้ก๊วนเบ็ดราวของเรือจุฬารักษ์ช่วยดึงเพื่อลดการเบ่งออกของปึก drum

- ปัญหาความร้อนในระบบไฮโดรลิกเริ่มแสดงอาการให้เห็นชัดเจนในวันที่ 3 ของการทดลอง ทั้งนี้เนื่องจากได้ปรับวิธีการปล่อยสายเมนเพื่อไม่ให้สายฟูออกจาก drum โดยควบคุมให้ drum หมุนช่วยในการปล่อยสายเอ็นพร้อมกับการทำงานของ shooter ทำยเร็ว จึงช่วยให้สายเอ็นไม่ฟู แต่ความร้อนของน้ำมันไฮโดรลิกขึ้นสูงมาก น้ำมันไฮโดรลิกจึงรั่วตามข้อต่อต่างๆ พยายามใช้น้ำหล่อเย็นเพื่อระบายความร้อน แต่ทำการวัดอุณหภูมิที่ด้านส่งของปั๊มไฮโดรลิกพบว่าอุณหภูมิขึ้นไปถึง 107 C ซึ่งสูงจนใกล้อุณหภูมิจำกัดของน้ำมันไฮโดรลิก ซึ่งต้นกลเรือจุฬารักษ์ รองต้นกลเรือและผมจึงขอให้หยุดระบบทั้งหมดเพื่อไม่ให้ปั๊มน้ำมันไฮโดรลิกหัวเรือเสียหาย

หลังจากเกิดปัญหาดังกล่าว ทางฝ่ายประมงจึงขอหยุดการใช้ smart reel เพื่อให้หาวิธีในการแก้ไขปัญหาที่เกิดขึ้น

จากปัญหาที่เกิดขึ้นผมสรุปได้เป็น 2 ปัญหาใหญ่คือ 1. ปัญหาโครงสร้างตัว drum และ 2. ปัญหาเรื่องความร้อนของน้ำมันไฮดรอลิก

1. แนวทางการแก้ไขปัญหาโครงสร้างของ drum นั้น ผมพบว่าเราไม่สามารถแก้ไขตัว drum ได้ จำเป็นต้องนำกลับมาปรับปรุงโครงสร้างหลังจากจบการทำงานในครั้งนี้นี้ก่อน แต่เราสามารถใช้งานมัน ได้ถ้าลดสายเอ็นที่ใส่ใน drum ลงครึ่งหนึ่งก็จะช่วยให้ ปีกไม้บานออกในขณะที่ทำงาน ซึ่งมีข้อจำกัดเรื่องการปล่อยเบ็ดราวจะต้องปล่อยจำนวน 500 ตัว หรือประมาณ 30 กิโลเมตร แต่ถ้าลดสายเอ็นลงครึ่งหนึ่งจะเหลือเพียง 15 กิโลเมตร หรือ 250 ตัว ซึ่งฝ่ายประมงเห็นว่าจำนวนน้อยเกินไป

2. แนวทางการแก้ไขปัญหาเรื่องความร้อนของน้ำมันไฮดรอลิก ต้นกลเรือและผมพยายาม ไล่วงจรไฮดรอลิก แต่ก็ยังไม่พบว่าอุปกรณ์ตัวไหนต่อผิด ผมจึงทำการสังเกตแรงดันน้ำมันไฮดรอลิกขณะยกวันเบ็ดเรือกำลังทำงานพบว่าอยู่ที่ 50 – 100 kg/cm² ผมจึงใช้แรงดันจำกัดนี้ในการปรับระบบ smart reel ใหม่ ผมจึงได้ปรับแรงดันที่วาล์วควบคุม drum ให้อยู่ที่ 65-120 kg/cm² แต่มีปัญหาที่วาล์วควบคุม shooter ไม่ตอบสนองการปรับแรงดันพบว่าลิ้นปรับแรงดันของวาล์วปรับแรงดันติด น้ำมันไฮดรอลิกจึงไม่ไหลย้อนกลับไปถึง แรงดันจากปั๊มไฮดรอลิกจึงขึ้นถึง 210 kg/cm² สาเหตุนี้เองที่ทำให้ น้ำมันไฮดรอลิกร้อนขึ้นอย่างรวดเร็ว ผมจึงทำการปรึกษากับต้นกลเรือว่ามี 2 ทางเลือกคือ 1. ลองซ่อมวาล์วควบคุมของ shooter กับ 2. เข้าทุบแล้วซื้อวาล์วควบคุมแรงดันและขั้วสายใหม่ในกรณีถ้าซ่อมวาล์วควบคุมแล้วใช้ไม่ได้ หลังจากนั้นจึงลงมือทำการซ่อมวาล์วและสามารถซ่อมให้วาล์วสามารถทำงานได้เป็นปกติ และทำการปรับแรงดันใช้งานของ shooter ให้อยู่ที่ 65 -100 kg/cm²

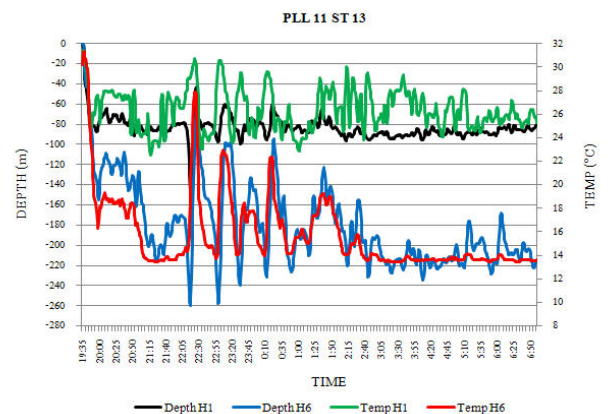
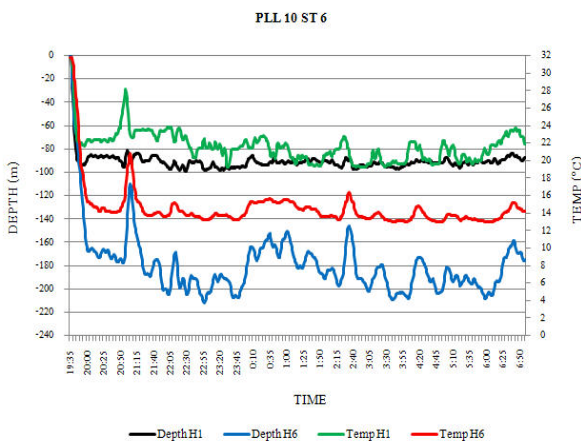
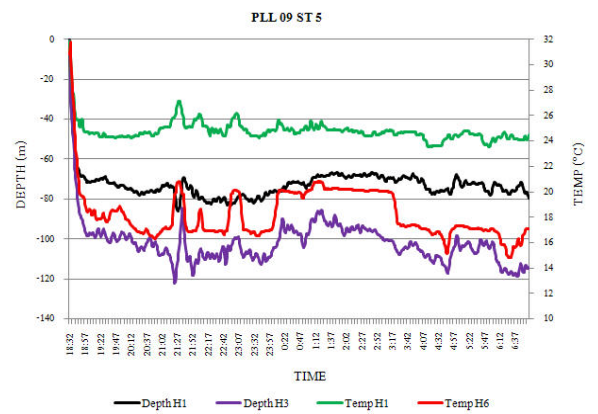
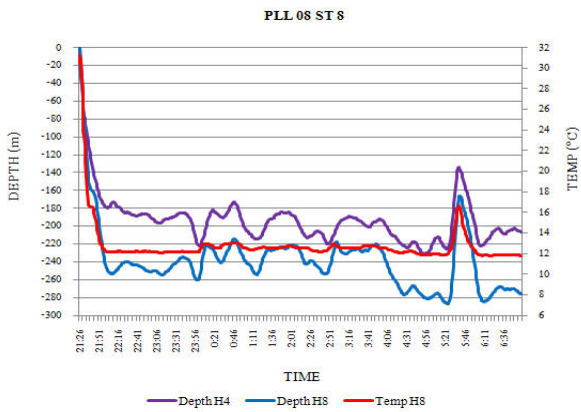
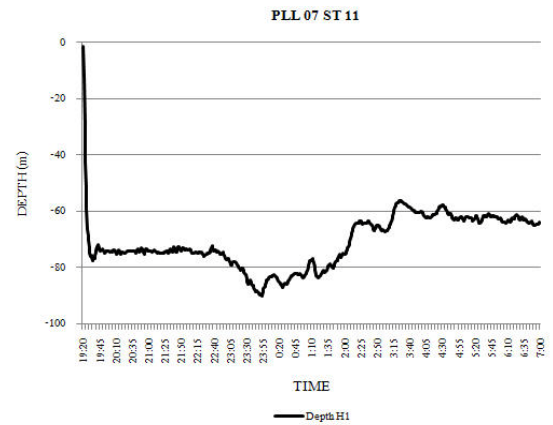
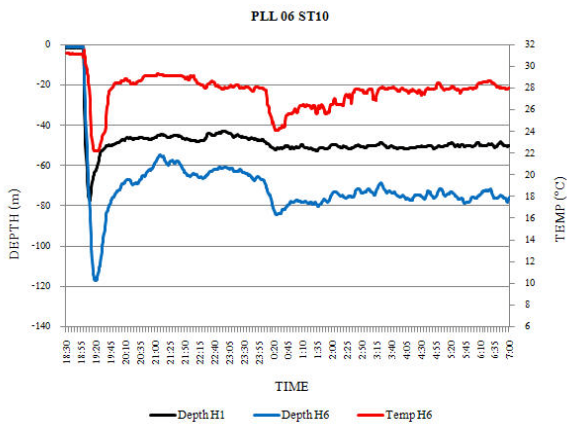
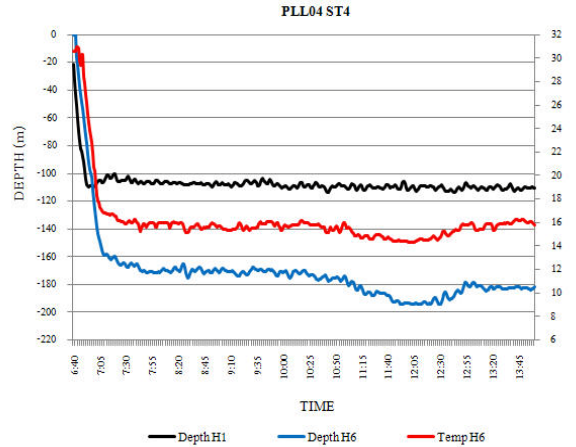
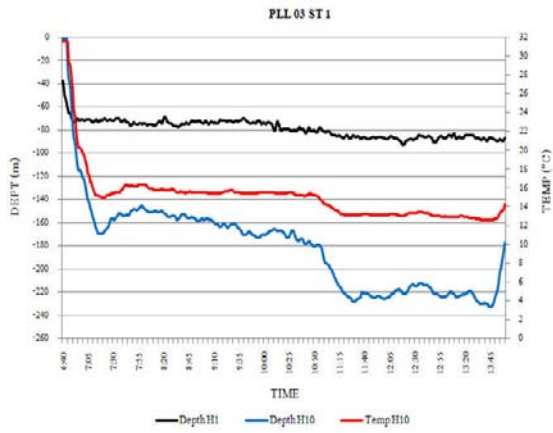


รูปแสดงลิ้นวาล์วควบคุมแรงดันของ shooter ที่แก้ไขจนสามารถเลื่อนเข้าออกได้

หลังจากกลับถึงศูนย์ฯ ผมได้ทำการตรวจสอบข้อมูลย้อนหลังในการออกแบบ พบว่า drum ถูกออกแบบให้รองรับการ
ใช้งานได้ 10-15 กิโลเมตร แต่ที่ออกแบบให้ drum สามารถเก็บสายได้ถึง 30 กิโลเมตร เพราะเผื่อไว้ 2 เท่าของการใช้งานจริง
ดังนั้นโครงสร้างสามารถ drum รองรับการใช้งานไม่ควรเกิน 10 – 15 กิโลเมตร

ขนาดมอเตอร์ไฮดรอลิกของ drum รองรับได้แค่ 10 แรงม้า 130 kg/cm² แต่ในการใช้งานครั้งนี้ ใส่น้ำมันมากเกินไป
ทำให้มอเตอร์ไม่สามารถออกแรงดึงสายเอ็นขึ้นมาได้ ดังนั้น จำเป็นต้องเพิ่มแรงดันน้ำมัน ซึ่งเป็นสาเหตุหนึ่งที่ทำให้น้ำมัน
ไฮดรอลิกร้อนขึ้นอย่างรวดเร็ว

Index.I Temperature and dept of hook in Pelagic long line fisheries



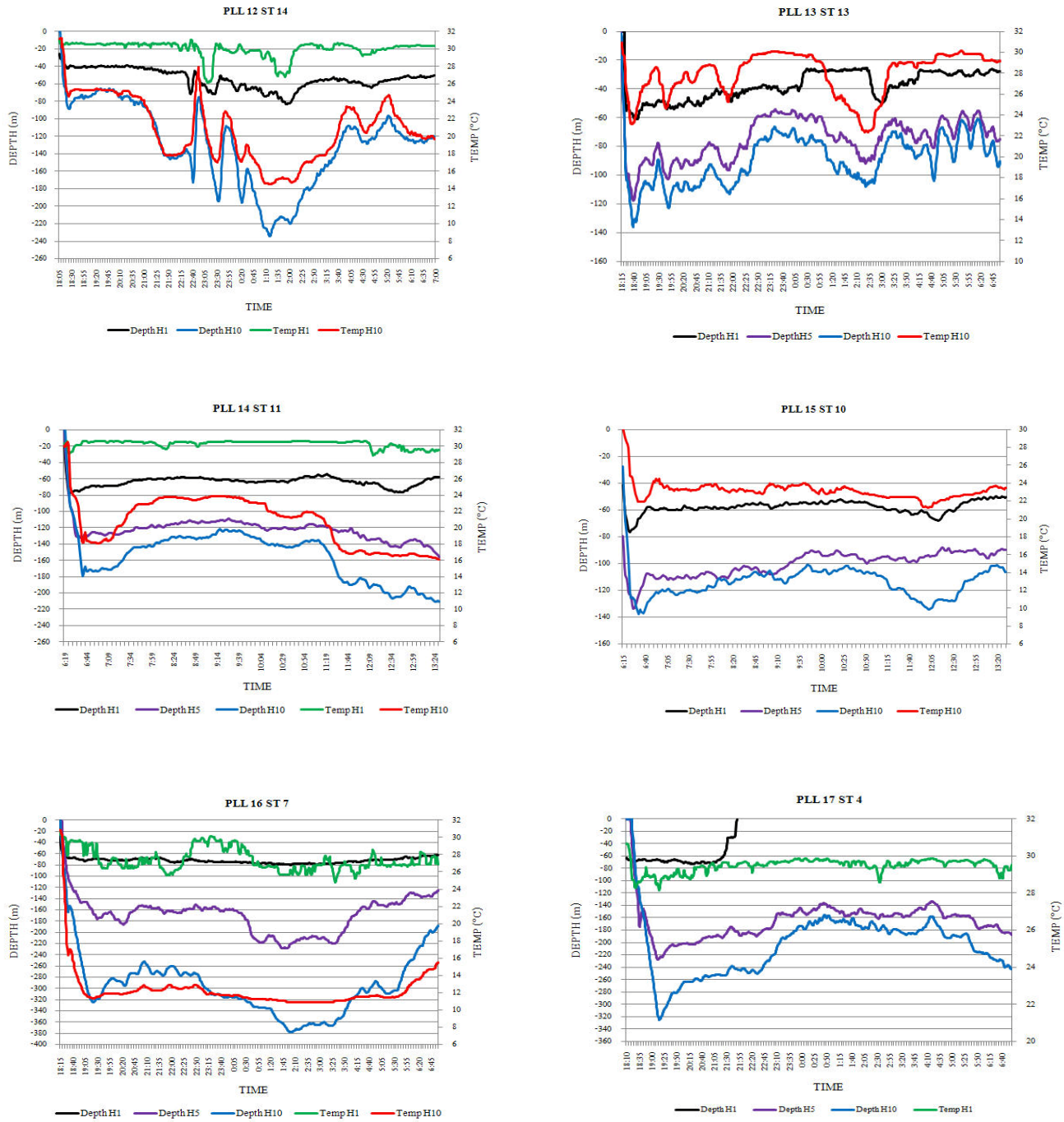


Fig.14 Temperature and dept of hook in Pelagic long line fisheries

Index.II

F.R.V.CHULABHORN Cruise 1-2/2010, Research survey in Andaman water

LegII (25 May - 7 June 2010)

Pelagic longline Fishing

Op./ St.no.	Date	Shooting				Hauling				Number of hook	Immersion time	Sea depth (m)	Total cath (number)	Total catch weight(kg)	Hook tate (%)	CPUE pcs./ 1000 hook
		Start	Finish	Start	Finish											
12/14	25-26/May 2010	Time	1734	Time	1837	Time	0717	Time	1016	284	16 hrs. 42 minute	851	4 *	99.0 *	1.41	14.08
		Lat	07°00.57' N	Lat	07°05.11' N	Lat	07°03.08' N	Lat	07°00.38' N							
		Long	097°17.37' E	Long	097°23.30' E	Long	097°24.04' E	Long	097°20.37' E							
* One Marlin and shark was loosed to the sea during hauled onboard ~50 kg																
13/13	26-27/May 2010	Time	1749	Time	1845	Time	0646	Time	0902	303	15 hrs 13 minute	950	5	22.5	1.65	16.50
		Lat	07°16.44' N	Lat	07°21.27' N	Lat	07°09.33' N	Lat	07°02.69' N							
		Long	096°51.12' E	Long	096°52.94' E	Long	096°51.39' E	Long	096°49.67' E							
14/11	29-May-10	Time	0553	Time	0646	Time	1256	Time	1537	320	10 hrs. 16 minute	743	2	61.0	0.63	6.25
		Lat	07°45.86' N	Lat	07°50.23' N	Lat	07°49.27' N	Lat	07°44.32' N							
		Long	096°29.20' E	Long	096°26.65' E	Long	096°30.15' E	Long	096°32.09' E							
15/10	30-May-10	Time	0549	Time	0647	Time	1307	Time	1538	340	9 hrs. 49 minute	581	5	93.6	1.47	14.71
		Lat	07°49.90' N	Lat	07°49.59' N	Lat	07°47.39' N	Lat	07°40.83' N							
		Long	095°52.62' E	Long	095°52.04' E	Long	095°56.30' E	Long	095°59.31' E							
16/7	2-3/June/10	Time	1748	Time	1842	Time	0637	Time	0928	300	15 hrs. 40 minute	839	4	147.2	1.33	13.33
		Lat	08°18.89' N	Lat	08°23.62' N	Lat	08°22.53' N	Lat	08°17.91' N							
		Long	095°50.30' E	Long	095°52.59' E	Long	095°57.37' E	Long	095°57.82' E							
17/4	3-4/June/10	Time	1744	Time	1838	Time	0658	Time	0924	283	15 hrs. 40 minute	2,165	4	44.8	1.41	14.13
		Lat	08°51.66' N	Lat	08°56.03' N	Lat	08°53.12' N	Lat	08°49.23' N							
		Long	095°50.83' E	Long	095°52.16' E	Long	095°55.83' E	Long	095°55.67' E							
Total									1,830			24	468.1	1.31	13.11	

Drifting Vertical Longline Fishing

Op./ St.no.	Date	Shooting				Hauling				Number of hook	Immersion time	Sea depth (m)	Total cath (number)	Total catch weight(kg)	Hook tate (%)	CPUE pcs./ 1000 hook
		Start	Finish	Start	Finish											
FADs DOF	30-31/May 2010	Time	1813	Time	1905	Time	0803	Time	0909	81	14 hrs. 56 minute	850	1	20.0	1.23	12.35
		Lat	08°04.38' N	Lat	08°06.59' N	Lat	07°07.70' N	Lat	08°07.22' N							
		Long	095°47.00' E	Long	095°46.76' E	Long	095°56.02' E	Long	095°58.11' E							
FADs DOF-SEAFDEC	31-1/June/10	Time	1802	Time	1850	Time	0758	Time	0920	80	15 hrs. 81 minute	830	0	0.0	0.00	0.00
		Lat	08°09.17' N	Lat	08°11.16' N	Lat	08°09.92' N	Lat	08°08.76' N							
		Long	095°48.55' E	Long	095°48.75' E	Long	095°56.84' E	Long	095°57.53' E							
FADs SEAFDEC	1-2/June/10	Time	1809	Time	1904	Time	0751	Time	0858	80	14 hrs 49 minute	740	0	0.0	0.00	0.00
		Lat	08°15.03' N	Lat	08°16.92' N	Lat	08°14.66' N	Lat	08°13.74' N							
		Long	095°48.73' E	Long	095°49.13' E	Long	095°55.90' N	Long	095°56.08' E							
Total									241			1	20.0	0.41	4.15	
Grand Total leg II									2,071			25	488	1.21	12.07	
Grand Total leg I									4707			29	378.4	0.62	6.16	
Grand Total (leg I- legII)									6,778			54	867	0.80	7.97	

F.R.V.CHULABHORN Cruise 1-2/2010, Research survey in Andaman water

Leg I (5-20 May 2010)

Pelagic longline Fishing

Op./ St.no.	Date	Shooting				Hauling				Number of hook	Immersion time	Sea depth (m)	Total cath (number)	Total catch weight(kg)	Hook tate (%)	CPUE cs./ 1000 hoo
		Start	Finish	Start	Finish	Start	Finish	Start	Finish							
1/3	6-May-10	Time	0540	Time	0730	Time	1251	Time	1914	460	13 hrs. 34 minute	308	2	10.6	0.43	4.35
		Lat	09°33.15' N	Lat	09°28.06' N	Lat	09°29.70' N	Lat	09°35.35' N							
		Long	097°07.09' E	Long	097°16.63' E	Long	097°16.04' E	Long	097°07.82' E							
2/2	7-May-10	Time	0544	Time	0720	Time	1237	Time	1349	70	8 hrs 5 minute	422	1	45.5	1.43	14.29
		Lat	09°34.05' N	Lat	09°34.19' N	Lat	09°36.55' N	Lat	09°36.61' N							
		Long	096°33.55' E	Long	096°36.90' E	Long	096°35.61' E	Long	096°34.55' E							
3/1	8-May-10	Time	0605	Time	0715	Time	1319	Time	1536	239	8 hrs. 31 minute	2,636	5 *	57.7 *	2.09	20.92
		Lat	09°30.640' N	Lat	09°24.95' N	Lat	09°24.37' N	Lat	09°27.97' N							
		Long	095°51.55' E	Long	095°53.47' E	Long	095°54.49' E	Long	095°53.61' E							
* One Marlin was loosed to the sea during hauled onboard ~40 kg																
4/4	9-May-10	Time	0602	Time	0815	Time	1312	Time	1738	501	11 hrs. 36 minute	2,165	3	11.9	0.60	5.99
		Lat	08°54.560' N	Lat	08°56.24' N	Lat	08°54.75' N	Lat	08°52.39' N							
		Long	095°47.91' E	Long	096°03.30' E	Long	096°05.95' E	Long	095°55.50' E							
5/7	10-May-10	Time	0540	Time	0731	Time	1305	Time	1703	478	11 hrs. 23 minute	>1,000	5	45.3	1.05	10.46
		Lat	08°17.330' N	Lat	08°18.890' N	Lat	08°15.690' N	Lat	08°11.70' N							
		Long	095°42.180' E	Long	095°57.640' E	Long	095°59.870' E	Long	095°49.81' E							
6/10	12-13/May/10	Time	1755	Time	1942	Time	0640	Time	1032	494	16 hrs. 37 minute	640	2	2.6	0.40	4.05
		Lat	07°45.660' N	Lat	07°38.930' N	Lat	07°29.860' N	Lat	07°31.65' N							
		Long	095°42.860' E	Long	095°57.190' E	Long	095°52.730' E	Long	095°40.94' E							
7/11	13-14/May/10	Time	1832	Time	2022	Time	0642	Time	1037	504	11 hrs. 11 minute	836	2	4.6	0.40	3.97
		Lat	07°46.750' N	Lat	07°34.77' N	Lat	07°30.360' N	Lat	07°31.65' N							
		Long	096°26.410' E	Long	096°16.130' E	Long	096°16.010' E	Long	096°25.36' E							
8/8	14-15/May/10	Time	2108	Time	2212	Time	0705	Time	1037	302	13 hrs. 13 minute	565	2	7.4	0.66	6.62
		Lat	08°16.330' N	Lat	08°13.840' N	Lat	08°13.290' N	Lat	08°14.63' N							
		Long	096°25.890' E	Long	096°33.390' E	Long	096°33.990' E	Long	096°28.840' E							
9/5	15-16/May/10	Time	1741	Time	2022	Time	0649	Time	1050	501	13 hrs. 29 minute	477	1	1.8	0.20	2.00
		Lat	08°56.020' N	Lat	08°50.090' N	Lat	08°51.990' N	Lat	08°56.310' N							
		Long	096°32.160' E	Long	096°19.020' E	Long	096°23.240' E	Long	096°35.610' E							
10/6	16-17/May/10	Time	1833	Time	2010	Time	0705	Time	1111	494	14 hrs. 39 minute	357	0	0.0	0.00	0.00
		Lat	08°55.090' N	Lat	08°34'.50' N	Lat	09°09.520' N	Lat	08°59.340' N							
		Long	097°06.660' E	Long	095°45.80' E	Long	097°11.760' E	Long	097°08.250' E							
11/13	18-19/May/10	Time	1858	Time	2025	Time	0703	Time	1102	504	14 hrs. 4 minute	>1,000	5	139.0	0.99	9.92
		Lat	07°15.960' N	Lat	7°26.190' N	Lat	07°23.300' N	Lat	07°12.540' N							
		Long	096°50.990' E	Long	096°59.300' E	Long	097°01.410' E	Long	096°54.240' E							
Total									4,547			28	326.4	0.62	6.16	

Drifting Vertical Longline Fishing

Op./ St.no.	Date	Shooting				Hauling				Number of hook	Immersion time	Sea depth (m)	Total cath (number)	Total catch weight(kg)	Hook tate (%)	CPUE cs./ 1000 hoo
		Start		Finish		Start		Finish								
FADs SEAFDEC	11-May-10	Time	0637	Time	0801	Time	1316	Time	1435	80	7 hrs. 58 minute	>1,000	0	0.0	0.00	0.00
		Lat	08°16.440'N	Lat	08°13.660'N	Lat	08°10.840'N	Lat	08°11.120'N							
		Long	095°47.960'E	Long	095°49.040'E	Long	095°51.420'E	Long	095°52.140'E							
FADs DOF	11-12-May-10	Time	1800	Time	1918	Time	0729	Time	0856	80	14 hrs 56 minute	>1,000	1	52.0	1.25	12.50
		Lat	08°05.350'N	Lat	08°02.200'N	Lat	07°55.410'N	Lat	07°55.960'N							
		Long	095°46.340'E	Long	095°46.970'E	Long	095°48.690'E	Long	095°49.510'E							
Total										160		1	52.0	0.63	6.25	

Grand Total

4,707

29

378

1

12

Research activities of F.R.V. CHULABHORN cruise 1-2/2553

Fisheries resources survey in Andaman sea

Session I: 5 - 20 May 2010

Date	Time	Activities	Remark
5 May 10	1400	Leave Phuket for survey station 3	
	1430	Fishing gears and Oceanographic equipments preparation	
6 May 10	0540-0730	Shooting Pelagic long line fishing Op.1 St.3	09°33.150'N, 097°07.090'E- 09°28.060'N, 097°16.630'E
	0805	Oceanographic survey op.1 St.2 - CTD, sea depth 237 m.	09°26.580'N, 097°18.200'E- 09°26.540'N, 097°17.920'E
	1251-1557	1 st Hauling Pelagic long line fishing Op.1 St.3(Smart reel was malfunction)	09°29.700'N, 097°16.040'E- 09°32.340'N, 097°12.530'E
	1638-1914	2 nd Hauling Pelagic long line fishing Op.1 St.3	09°33.160'N, 097°11.860'E- 09°35.350'N, 097°07.820'E
7 May 10	0544-0720	Shooting Pelagic long line fishing Op.2 St.2	09°34.050'N, 096°33.550'E- 09°34.190'N, 096°36.900'E
	0742	Oceanographic survey op.2 St.2 - CTD, sea depth 412.6 m.	09°34.960'N, 096°37.510'E- 09°34.820'N, 096°37.370'E
	1237-1349	Hauling Pelagic long line fishing Op.2 St.2	09°36.550'N, 096°35.610'E- 09°36.610'N, 096°34.550'E
8 May 10	0605-0715	Shooting Pelagic long line fishing Op. 3 St. 1	09°30.640'N, 095°51.550'E- 09°24.950'N, 095°53.470'E
	0746	Oceanographic survey op.3 St.1 - CTD, sea depth 2636 m.	09°22.380'N, 095°53.830'E- 09°22.390'N, 095°53.980'E
	1319-1536	Hauling Pelagic long line fishing Op.3 St.1	09°24.370'N, 095°54.490'E- 09°27.970'N, 095°53.610'E
9 May 10	0602-0815	Shooting Pelagic long line fishing Op. 4 St. 4	08°54.560'N, 095°47.910'E- 08°56.240'N, 096°03.300'E
	0845	Oceanographic survey op.4 St.4 CTD, sea depth 2165 m.	08°56.420'N, 096°06.160'E- 08°56.200'N, 096°06.510'E
	1312-1738	Hauling Pelagic long line fishing Op.4 St.4	08°54.750'N, 096°05.950'E- 08°52.390'N, 095°55.500'E
10 May 10	0540-0731	Shooting Pelagic long line fishing Op. 5 St. 7	08°17.330'N, 095°42.180'E- 08°18.890'N, 095°57.640'E
	0803	Oceanographic survey op.5 St.7 CTD, sea depth 520.4 m.	08°18.950'N, 096°01.020'E 08°18.550'N, 096°01.220'E
	1305-1703	Hauling Pelagic long line fishing Op.5 St.7	08°15.690'N, 095°59.870'E- 08°11.700'N, 095°49.810'E
		Searching for SEAFDEC's FADs	

Date	Time	Activities	Remark
11 May 10	0637-0801	Shooting Drifting Vertical long line op. 1 at SEAFDEC's FADs	08°16.440'N, 095°47.960'E- 08°13.660'N, 095°49.040'E
	0831	Oceanographic survey op.6 St.SEAFDEC's FADs- CTD, sea depth 883.6 m.	08°10.940'N, 095°48.850'E- 08°10.560'N, 095°48.980'E
	1316-1435	Hauling Drifting Vertical long line op.1	08°10.840'N, 095°51.420'E- 08°11.120'N, 095°52.140'E
		Searching for DOF's FADs	
	1800-1918	Shooting Drifting Vertical long line op. 2 at DOF's FADs	08°05.350'N, 095°46.340'E- 08°02.200'N, 095°46.970'E
12 May 10	0729-0856	Hauling Drifting Vertical long line op.2	07°55.410'N, 095°48.690'E- 07°55.960'N, 095°49.510'E
	0935	Oceanographic survey op.7 St.DOF's FADs CTD, sea depth 681 m.	07°55.590'N, 095°49.370'E- 07°55.190'N, 095°49.520'E
	1755-1942	Shooting Pelagic long line fishing Op. 6 St. 10	07°45.660'N, 095°42.860'E- 07°38.930'N, 095°57.190'E
13 May 10	0627-0938	Hauling Pelagic long line fishing Op. 6 St. 10	07°29.860'N, 095°52.730'E- 07°31.650'N, 095°40.940'E
	1046	Oceanographic survey op.8 st.10 CTD, sea depth >1000 m.	07°31.640'N, 095°40.530'E- 07°31.280'N, 095°40.210'E
	1832-2022	Shooting Pelagic long line fishing Op. 7 St. 11	07°46.750'N, 096°26.410'E- 07°34.770'N, 096°16.130'E
14 May 10	0642-1037	Hauling Pelagic long line fishing Op.7 St. 11	07°30.360'N, 096°16.010'E- 07°31.650'N, 096°25.360'E
	1048	Oceanographic survey op.9 st 11 -CTD, sea depth 836.7 m,	07°38.260'N, 096°25.460'E- 07°37.790'N, 096°25.620'E
	2108-2212	Shooting Pelagic long line fishing Op. 8 St. 08	08°16.330'N, 096°25.890'E- 08°13.840'N, 096°33.390'E
15 May 10	0705-0930	Hauling Pelagic long line fishing Op.8 St. 08	08°13.290'N, 096°33.990'E- 08°14.630'N, 096°28.840'E
	0951	Oceanographic survey op.10 st. 08 -CTD, sea depth 565 m.	08°14.970'N, 096°28.920'E- 08°14.610'N, 096°29.390'E
	1741-2022	Shooting Pelagic long line fishing Op. 9 St. 05	08°56.020'N, 096°32.160'E- 08°50.090'N, 096°19.020'E
16 May 10	0649-1050	Hauling Pelagic long line fishing Op. 9 St. 05	08°51.990'N, 096°23.240'E- 08°56.310'N, 096°35.610'E
	1106	Oceanographic survey op.11 st. 05 -CTD, sea depth 431 m.	08°56.150'N, 096°35.920'E- 08°55.950'N, 096°35.740'E
	1624	Oceanographic survey op.12 st. 06 -CTD, sea depth 361.4 m.	08°51.400'N, 097°06.430'E- 08°51.900'N, 097°06.210'E
	1833-2010	Shooting Pelagic long line fishing Op. 10 St. 06	08°55.090'N, 097°06.660'E- 09°08.580'N, 097°11.870'E
17 May 10	0705-1111	Hauling Pelagic long line fishing Op. 10 St. 06	09°09.520'N, 097°11.760'E- 08°59.340'N, 097°08.250'E
		Anchoring at Similan islands	

Date	Time	Activities	Remark
18 May 10	0802	Oceanographic survey op.13 st. 09 -CTD, sea depth 447 m.	08°20.030'N, 097°09.990'E-
	1351	Oceanographic survey op.14 st. 12 -CTD, sea depth 555.7 m.	07°44.570'N, 097°09.970'E- 07°44.240'N, 097°10.130'E
	1858-2025	Shooting Pelagic long line fishing Op. 11 St. 13	07°15.960'N, 096°50.990'E- 07°26.190'N, 096°59.300'E
19 May 10	0703-1102	Hauling Pelagic long line fishing Op. 11 St. 13	07°23.300'N, 097°01.410'E- 07°12.540'N, 096°54.240'E
	1126	Oceanographic survey op.15 st. 13 -CTD, sea depth 971 m.	07°11.930'N, 096°54.360'E- 07°11.890'N, 096°54.420'E
	1617	Oceanographic survey op.16 st. 14 -CTD, sea depth 666.3 m.	07°04.740'N, 097°19.860'E- 07°04.880'N, 097°20.330'E
19 May 10	18:30	Farewell party	
20 May 10	0900	Alongside at PMBC port	
	1100	Ship cleaning	

Session II: 24 May – 7 June 2010

Date	Time	Activities	Remark
25 May 10	0800	Leave Phuket for survey station	
	0900-1200	To Prepare fishing gear	
	1500-1535	Oceanographic survey op.1 station 1 - CTD, sea depth 520	L07°09'.38N λ97°27'.88E
	1652	Oceanographic survey op.2 station 1 - CTD, sea depth 851 m.	L07°00'.55N λ97°16'.51E
	1734-1837	Shooting Pelagic long line fishing operation 12 station 14	L07°00'.53N λ97°16'.60E L07°02'.43N λ97°19'.84E
26 May 10	0717-1016	Hauling Pelagic long line fishing Op.12 St.14	L07°09'.330N λ96°51'.39E- L07°02'.690N λ96°49'.67E
	1200-1220	Oceanographic survey op.3 between st.13 and st.14	L07°08'.33N λ97°14'.92E
	1300-1345	Oceanographic survey op.4 st.13 - CTD	L07°08'.92N λ97°03'.59E
	1735-1845	Shooting Pelagic long line fishing operation 13 station 13	L07°16'.13N λ97°49'.35E- L07°17'.29N λ96°51'.50E
27 May 10	0646-0902	Hauling Pelagic long line fishing Op.13 St.13	L07°09'.330N λ96°51'.39E- L07°02'.690N λ96°49'.67E
	1200-1235	Oceanographic survey op.5 between st.13 and st.11	L07°32'.70N λ96°40'.75E
	1400-1420	Oceanographic survey op.6 st.11 - CTD ,sea depth 793 m.	L07°44'.90N λ96°30'.82E

Date	Time	Activities	Remark
29 May 10	0550-0647	Shooting Pelagic long line fishing operation 14 station 11	L07°45'.86N λ96°29'.20E- L07°50'.23N λ96°26'.65E
	1256-1537	Hauling Pelagic long line fishing Op.14 St.11	L07°49'.27'Nλ096°30'.15E- L07°44'.32N λ096°32'.09E
	1750	Oceanographic survey op.7 between st.11- 10 - CTD, sea depth 635 m.	L07°45.310'N λ96°10.460E
30 May 10	0549-0647	Shooting Pelagic long line fishing operation 15 station 10	L07°49'.90N λ95°52'.62E- L07°49'.59N λ95°52'.40E
	0718	Oceanographic survey op.8 st.10 - CTD, sea depth 581 m	L07°51'.260N λ95°52'.590E
	1307-1538	Hauling Pelagic long line fishing Op.15 St.10	L07°47'.39N λ95°57'.37E- L07°44'.32N λ95°59'.31E
	1813-1905	Shooting Drifting Vertical long line op. 1 at DOF's FADs	L08°04'.38N λ95°47'.00E- L08°06'.59N λ95°46'.76E
31 May 10	0803-0909	Hauling Drifting Vertical long line op.1	L07°07'.70N λ95°56'.02E – L08°07'.22N λ95°58'.11E
	0929	Oceanographic survey op.9 at DOF's FADs - CTD, sea depth 548.3	L08°07'.70N λ95°58'.670E
	1200-1445	DOF's FADs searching	L08°04'.74N λ095°46'.80E
	1520	Oceanographic survey op.10 between both FADs - CTD, sea depth 908m	L08°09'.800N λ95°47'.470E
	1802-1850	Shooting Drifting Vertical long line op. 2 between DOF's FADs and SEAFDEC's FADs	L08°09'.17N λ95°48'.55E- L08°11'.16N λ95°48'.75E
1 June 10	0758-0920	Hauling Drifting Vertical long line op.2	L08°09'.92N λ95°56'.84E- L08°08'.76N λ95°57'.53E
	1030-1400	Searching for SEAFDEC's FADs	L08°14'790N λ95°48'.62E-
	1445	Oceanographic survey op.11 at SEAFDEC's FADs - CTD, sea depth 882 m.	L08°14'.300N λ95°49'.270E
	1809-1904	Shooting Drifting Vertical long line op. 3 at SEAFDEC's FADs	L08°15'.03N λ95°48'.73E- L08°16'.92N λ95°49'.13E
2 June 10	0751-0858	Hauling Drifting Vertical long line op.3	L08°14'.66N λ95°55'.90E- L08°13'.74N λ95°56'.08E
	1004	Oceanographic survey op.12 st.7 CTD, sea dept 847m.	L08°19'.480N λ95°50'.430E
	1748-1842	Shooting Pelagic long line fishing operation 16 station 7	L08°18'.89N λ95°50'.30E- L08°23'.62N λ95°52'.59E
3 June 10	0627-0938	Hauling Pelagic long line fishing Op.16 St.7	L08°22'.53N λ95°57'.37E- L08°17'.91N λ95°57'.82E
	1630	Oceanographic survey op.13 st.4 CTD, sea dept 2,165m.	L08°51.680'Nλ095°49.95'E
	1744-1838	Shooting Pelagic long line fishing operation 17 station 4	L08°51'.66N λ95°55'.83E- L08°56'.03N λ95°52'.16E

Date	Time	Activities	Remark
4 June 10	0658-0924	Hauling Pelagic long line fishing Op.17 St.4	L08°53'.12N λ95°55'.83E- L08°49'.23N λ95°55'.67E
	1021	Oceanographic survey op.14 -CTD, sea dept 487	L08°45'.980N λ96°05'.670E
	1158	Oceanographic survey op.15 -CTD, sea dept 382	L08°35'.520N λ96°19'.000E
	1311	Oceanographic survey op.16 -CTD, sea dept 488	L08°23'.950N λ96°30'.130E
	1436	Oceanographic survey op.17 -CTD, sea dept 494	L08°28'.270N λ96°41'.710E
	1605	Oceanographic survey op.18 -CTD, sea dept 479	L08°32'.330N λ96°53'.570E
	1735	Oceanographic survey op.19 -CTD, sea dept 402	L08°16'.970N λ97°05'.080E
	1858	Oceanographic survey op.20 -CTD, sea dept 467	L08°11'.570N λ97°16'.070E
	2029	Oceanographic survey op.21 -CTD, sea dept 312	L08°05'.710N λ97°28'.100E
	2143	Oceanographic survey op.22 -CTD, sea dept 271	L08°00'.160N λ97°38'.710E
		Proceed to Phuket	
	5 June 10	0200	Anchoring at Racha Island
0900-1200		Cleaning / Fishing gear and equipment clearance	
7 June 10		Alongside at PMBC port	