



# CRUISE REPORT ON RESEARCH ACTIVITY

M.V. SEAFDEC Cruise No. 85 -4/2011

31 May - 5 June 2011

Fixed Fish Aggregating Device experiment in Andaman Sea

TD/RP/148

This report is based on preliminary data

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# Cruise Report for Research Activities

## 1. Cruise Summary

- Vessel name:** M.V.SEAFFDEC  
**Cruise no.:** 85-4/2011  
**Duration:** 31 May - 5 June 2011  
**Project Title:** Monitoring " Fixed FADs (Fish Aggregating Devices)" in Andaman Sea  
**Covered water:** Andaman Sea  
**Port of call:** Phuket  
**Objective:**
1. To monitor the fixed FADs that were deployed in 2008 and 2010.
  2. To collect environmental and fishery resource data/information in the area of fixed FADs

## 2. Lists of personals on board

### SEAFDEC Researchers

No.	Position	Name	E-mail address
1	Chief scientist	Mr. Isara Chanrachkij	<a href="mailto:isara@seafdec.org">isara@seafdec.org</a>
2	Fishing gear technologist	Mr. Sayan Promjinda	<a href="mailto:sayan@seafdec.org">sayan@seafdec.org</a>
3	Assistant Fishing gear technologist	Mr. Komson Poufa	<a href="mailto:komsanp@seafdec.org">komsanp@seafdec.org</a>
4	Oceanographer	Ms. Penchan La-ongmanee	<a href="mailto:penchan@seafdec.org">penchan@seafdec.org</a>
5	Oceanographer	Dr. Natinee Sukramongkol	<a href="mailto:natinee@seafdec.org">natinee@seafdec.org</a>
6	Oceanographer	Mr. Sukchai Arnupapboon	<a href="mailto:sukchai@seafdec.org">sukchai@seafdec.org</a>
7	Oceanographer	Mr. Ritthirong Prommas	<a href="mailto:ritthirong@seafdec.org">ritthirong@seafdec.org</a>
8	Assistant oceanographer	Ms. Suwanee Sayan	<a href="mailto:Suwanee@seafdec.org">Suwanee@seafdec.org</a>

### Deep sea fishery technology research and development institute researchers, Thailand

No.	Position	Name	E-mail address
1.	Senior fishery researcher	L.T. Phithak Chaidee	<a href="mailto:phithak69@hotmail.com">phithak69@hotmail.com</a>
2.	Senior fishery researcher	Mr. Narupon Darumas	<a href="mailto:n_darumas@hotmail.com">n_darumas@hotmail.com</a>
3.	Senior fishery researcher	L.T . Suthanee Sumanungkul	-

**Ship personals**

<b>No.</b>	<b>Position</b>	<b>Name</b>
1	Captain	Mr. Sonchai Bumrasarinpai
2	Chief Officer	Mr. Nobphadol Somjit
3	Second Officer	Mr. Suren Pruksarat
4	Third Officer	Mr. Aussawin Buachuay
5	Chief Engineer	Mr. Montien Paewsakul
6	Second Engineer	Mr. Theerawat Paiwal
7	Third Engineer	Mr. Kttinai Sukdit
8	Fouth Engineer	Mr. Padung Ngowlimhuat
9	Assistant researcher	Mr. Chainarong Chaopaknam
10	Assistant researcher	Mr. Somyos Pronprasert
11	Boatswain	Mr. Vanich Chaopaknam
12	Steersman	Mr. Somkiat Phetrasatien
13	Steersman	Mr. Yuttachai How-harn
14	Steersman	Mr. Jaroon Po-U
15	Oiler	Mr. Teeradet Jantana
16	Oiler	Mr. Dum Tanyacharoen
17	Oiler	Mr. Watchara Panasri
18	Oiler	Mr. Huttachai Chuypanit
19	Cook	Mr. Veeraphon Vorakun
20	Assistant Cook	Mr. Saichol Kornnoom
21	Ship boy	Mr. Marut Sangpuek

### 3. Activity time table

Date	Time	Particulars
31 May 2011	13:00-13:30	Ship orientation , activity discussion and assignment
	19:00	Leave from Phuket Marine Biological Center (PMBC) port
1 June 2011	08:00	Arrive station no. 1 (SEAFDEC fixed FAD2008)
	08:08-08:30	Flow meter calibration
	08:48-09:18	Oceanographic survey by CTD cast (CTD.1)
	10:50-15:00	Larvae survey by Neuston net (NT.1) and pelagic fish survey by trolling line (TL.1)
	16:14-16:34	Shooting drifting vertical line (DVL.1)
	18:17-19:40	Shooting Tuna longline (TLL.1)
	20:00-22:00	Squid jigging handline (SQJ.1)
2 June 2011	06:15-08:18	Hauling Tuna longline
	08:50-09:55	Hauling drifting vertical line
	13:00	Arrive station no. 2 (SEAFDEC fixed FAD2010-Float line type) and observe fish school using hydro-acoustic technique
	13:35-16:06	Oceanographic survey by CTD cast (CTD.2)
	14:28-17:49	Larvae survey by Neuston net (NT.2) and pelagic fish survey by trolling line (TL.2)
	18:10-18:31	Shooting drifting vertical line (DVL.2)
	19:00-20:18	Shooting Tuna longline (TLL.2)
	20:30-23:00	Squid jigging handline (SQJ.2)
3 June 2011	06:05-08:57	Hauling Tuna longline
	09:40-10:40	Hauling drifting vertical line
	11:13	Arrive station no. 3 (SEAFDEC fixed FAD2010-Bullet type) and observe fish school using hydro-acoustic technique
	11:30-12:00	Operating Pelagic fish survey by trolling line (TL.3)
	12:20-12:45	Oceanographic survey by CTD cast (CTD.3)
	13:05-16:00	Start larvae survey by Neuston net (NT.3) and pelagic fish survey by trolling line (TL.4)
	16:45	Cancel all operations due to the main engine trouble
	20:40	Start towing mother ship to Phuket with skiff boat
	22:30	Stop towing mother ship with skiff boat due to the oil tank of skiff boat leaked
		----Drifting----
5 June 2011	19:00	Start towing by Thai Royal navy vessel "Rin"
6 June 2011	07:00	Arrive PMBC Port

## 4. Observation summary

### 4.1 Survey Station

Objectives of this survey are to monitor and collect environmental and fishery resource information in the vicinity of fixed FADs that were deployed the submergible FADs in 2008, at depth about 1000 m and Surface FADs in 2010 at depth about 500 m. Firstly, the four survey stations were planned to conducted; one station at the submergible SEAFDEC FADs in 2008 (st.1), two stations at Surface FADs in 2010: the Float line (st.2) and the Bullet types (st.3) and the last station is the reference point (st.4). Due to the main engine problem of M.V.SEAFFDEC, so the Tuna longline, Drift vertical line and Squid jig handline operations of st.3 and all survey activities of st.4 were cancellation. Figure 1 show location of three survey stations.



Fig.1 Location of survey area and position of deployed Fish Aggregating Device (FADs)

### 4.2 Physical and chemical parameter

FSI Integrated Conductivity, Temperature and Depth Profiler system (ICTD) model P/N 8001 (Fig. 2) and DT-2000 Desk unit were operated to obtain water temperature and conductivity in each water depth. The real-time data were acquired from CTD system and process by using the Acq2000 software. Raw data were averaged to one meter interval. There are twelve Niskin water sample bottles attached with the CTD system to collect water sample from twelve standard depths (surface to 500 meter). Water sample were collected to determine pH, dissolve oxygen and nutrient at onboard laboratory as fast as possible.

pH were measured by Accumet 1002 handheld pH/mV/ion meter. Dissolved oxygen (DO) was determined by Wrinkle procedure (Codispoti, 1988). At each sample depth, three replication of water sample were collected to determine concentration of dissolved nitrite, nitrate, phosphate and silicate follow Strickland and Parsons,1972. Results of water sample analysis are appeared in Annex I. Table 1 is summary information of CTD cast.

Table 1 Summary of CTD cast.

St.	Date	Time	Lat	Long	Bottom depth (m)	Water sample depth (m)	Thermocline depth (m)	Remarks
1	1 Jun 11	08:48	08_14.70N	95_50.40E	900	25, 90, 125, 200, 250, 270, 400, 500	39-250	SEAFDEC FADs 2008
2	2 Jun 11	13:35	08_21.26N	96_52.71E	516	5,10,20,30,50,75,100,116,200,250,300,400	50-220	Float line type FADs 2010
3	3 Jun 11	12:20	08_11.16N	96_59.22E	500	20,30,50,75,100,125,200,300,400	43-220	Bullet type FADs 2010
4	-	-	08_02.13N	97_04.49E	Cancel			Reference point



Fig.2 CTD data collection and sea water chemical analysis

### 4.3 Biological parameter

#### 4.3.1 Fish larvae

In order to study the effective of FAD to aggregate low trophic level organism including zooplankton, larvae and juvenile fish, the Neuston net ; square shape frame (100 cm. x 70 cm.) attached with 1000  $\mu\text{m}$  mesh size net and 75 cm long (Fig 3) was trawled at surface against current direction follow track in figure 4. Each trawl is taken about 7 to 10 minutes with 2 knots trawling speed. Total distance of each station is nine nautical mile. There are about 14 to 21 sub stations of Neuston net trawl in each survey station (Fig 5). Details of the Neuston net operation and flow meter calibration are appeared in Annex II. Samples were preserved in 10 % formalin in sea water buffered with sodium borate. Results will later calculate for abundance then plot versus distance from FADs.

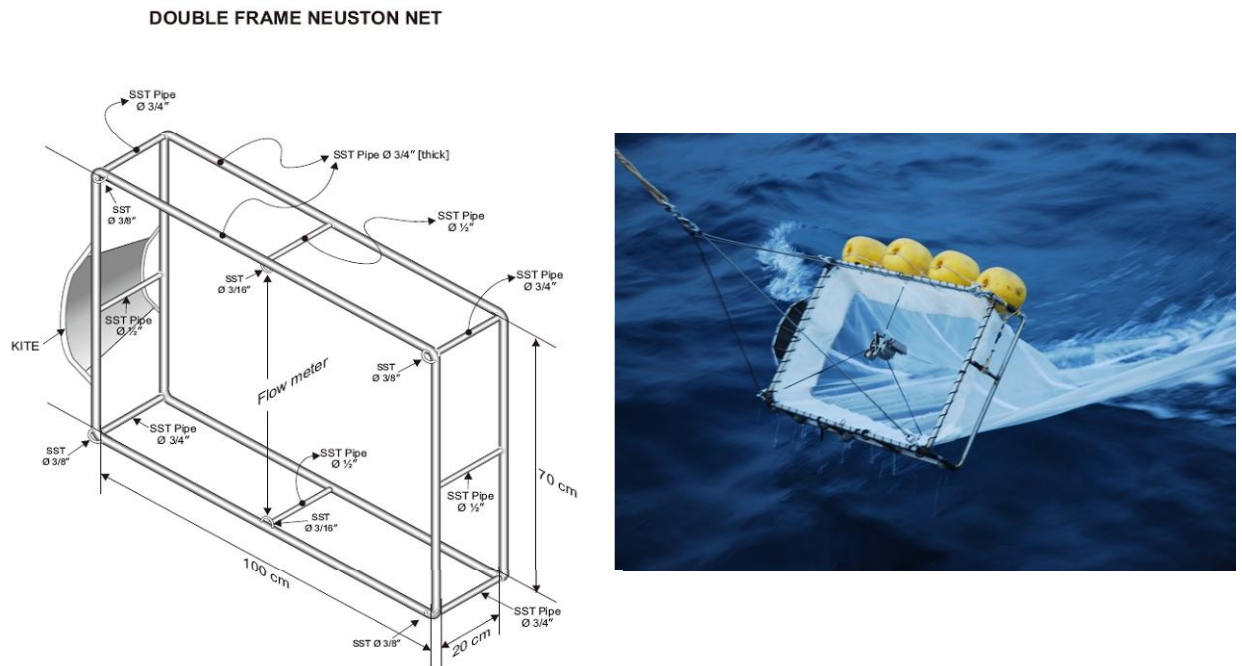


Fig. 3 Double frame Neuston net

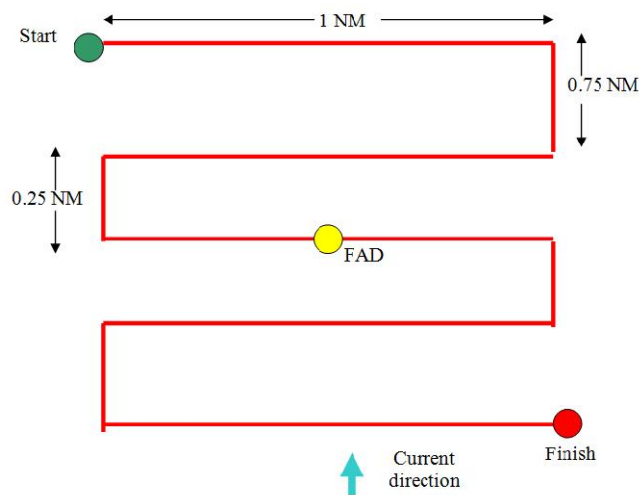


Fig. 4 Route and direction of Neuston trawl



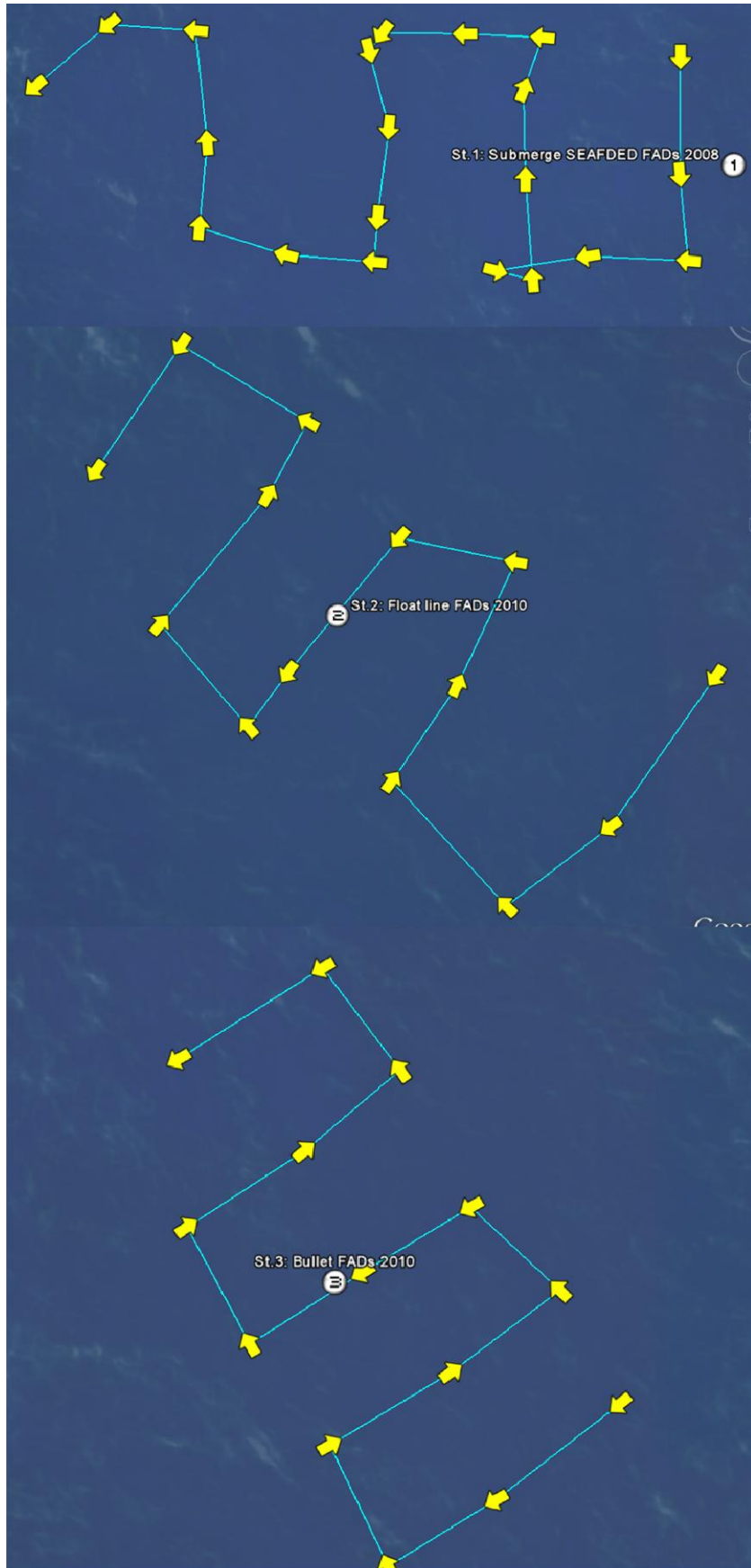


Fig. 5 Neuston trawling track of station no.1-3



Fig. 6 The activity pictures during the flow meter calibration and the trawling Neuston net.

#### 4.3.2 Pelagic fish survey by trolling line

Along Neuston trawl, trolling lines (Fig. 7) were operated at the stern deck to study abundance of pelagic fish around FADs. Five *Thunnus albacares* (Yellowfin tuna) were caught at station no. 3 (Bullet type FADs). Their average size is 1.08 kg (Fig.8). Partial detail of trolling line operation is appeared in table no.2. Fishing logsheets are in Annex III

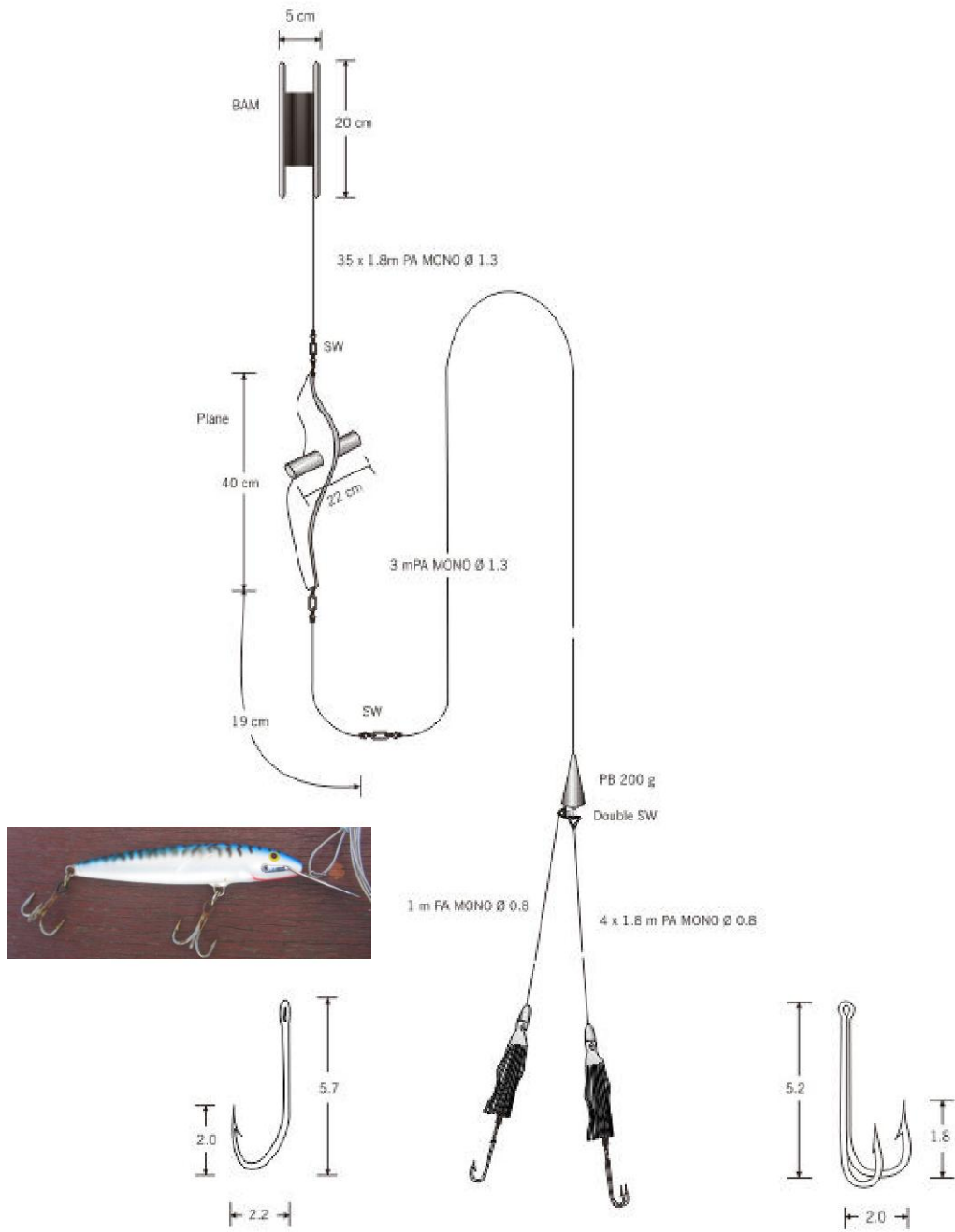


Fig.7 Schematic diagram of trolling line



Fig.8 Trolling line operation and five yellow fin tunas were caught in the vicinity of the Bullet type FADs (St.3)

Table 2. Partial detail of trolling line

Op. no.	St. no.	Start			Finish			No. of catch	Total (kg)	Average (kg)
		Lat.(N)	Long.(E)	Time	Lat.(N)	Long.(E)	Time			
1	1	08 15.10N	95 50.10E	10:50	08 14.72N	95 47.18E	15:00	none	-	-
2	2	08 21.00N	96 54.00E	14:28	08 21.30N	96 51.40E	17:49	none	-	-
3	3	08 11.30N	96 59.20E	11:30	08 11.40N	96 59.10E	12:00	5	5.4	1.08
4	3	08 10.69N	97 00.25E	13:05	08 12.05N	96 58.73E	16:00	-	-	-

Note: Op. no. = Trolling line operation number  
 St. no. = Oceanographic station number

### 4.3.3 Pelagic fish survey by Drifting Vertical Line (DVL)

Two operations of drifting vertical line (Fig.9, 10 and 11) were carried out near SEAFDEC FAD 2008 (st.1) and float line type FADs 2010 (st.2). Total distances of DVL are 0.5-1.1 NM with 8 lines per set. There are 8 hooks per line. Fishing logsheet were appended in Annex IV. Highest catch is at SEAFDEC FAD2008 with 2.08 ind./100 hook (Table 3)

Remake: Due to limit of survey time, the reference station (St.4) was not planned to survey by DVL, and the Bullet type FADs (st.3) was cancel due to the main engine problem of M.V. SEAFDEC.

Table 3. Partial detail of drifting vertical line

Op. no.	Date	Activity	Start		Finish	Immersion time	Sea depth (m)	Thermocline	Hook no.	Total catch (no.)	Total catch (kg)	Hook rate (no./100 hooks)
1	1-2/Jun/2011 at st. no. 1 SEAFDEC FADs	shooting	Time	16:14	16:34	16hrs. 58 min.	970	39-250	48	1	2.4	2.08
			Lat.	08_14.30N	08_15.30N							
			Long.	95_50.20E	95_50.20E							
		Hauling	Time	08:50	09:55							
			Lat.	08_07.50E	08_07.03N							
			Long	96_07.20E	96_08.72E							
2	2-3/Jun/2011 at st. no. 2 SEAFDEC Float line FADs	shooting	Time	18:10	18:31	15 hrs. 50 min.	500	50-220	48	1	1.6	2.08
			Lat.	08_19.8N	08_20.30N							
			Long.	96_50.00E	96_51.00E							
		Hauling	Time	09:40	10:40							
			Lat.	08_17.60N	08_17.10N							
			Long	96_54.30E	96_51.00E							

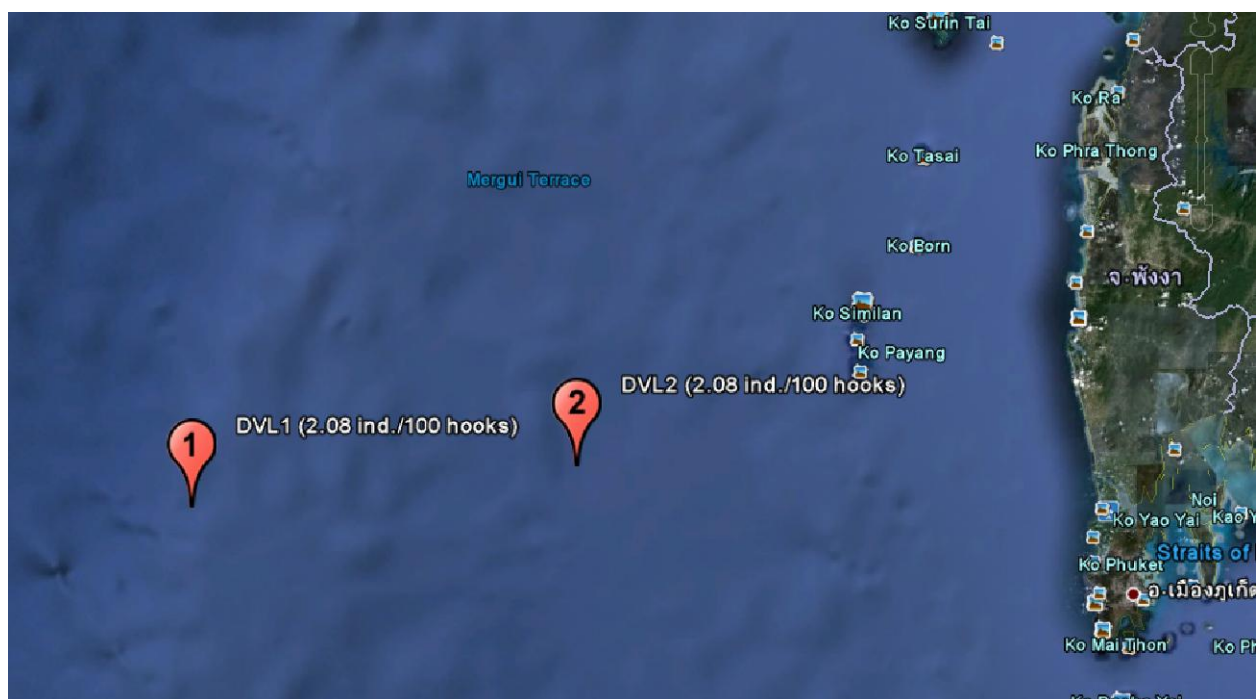


Fig. 9 Location of drifting vertical line fishing operation. Size of symbol denote catch rate.

### Tuna Vertical longline

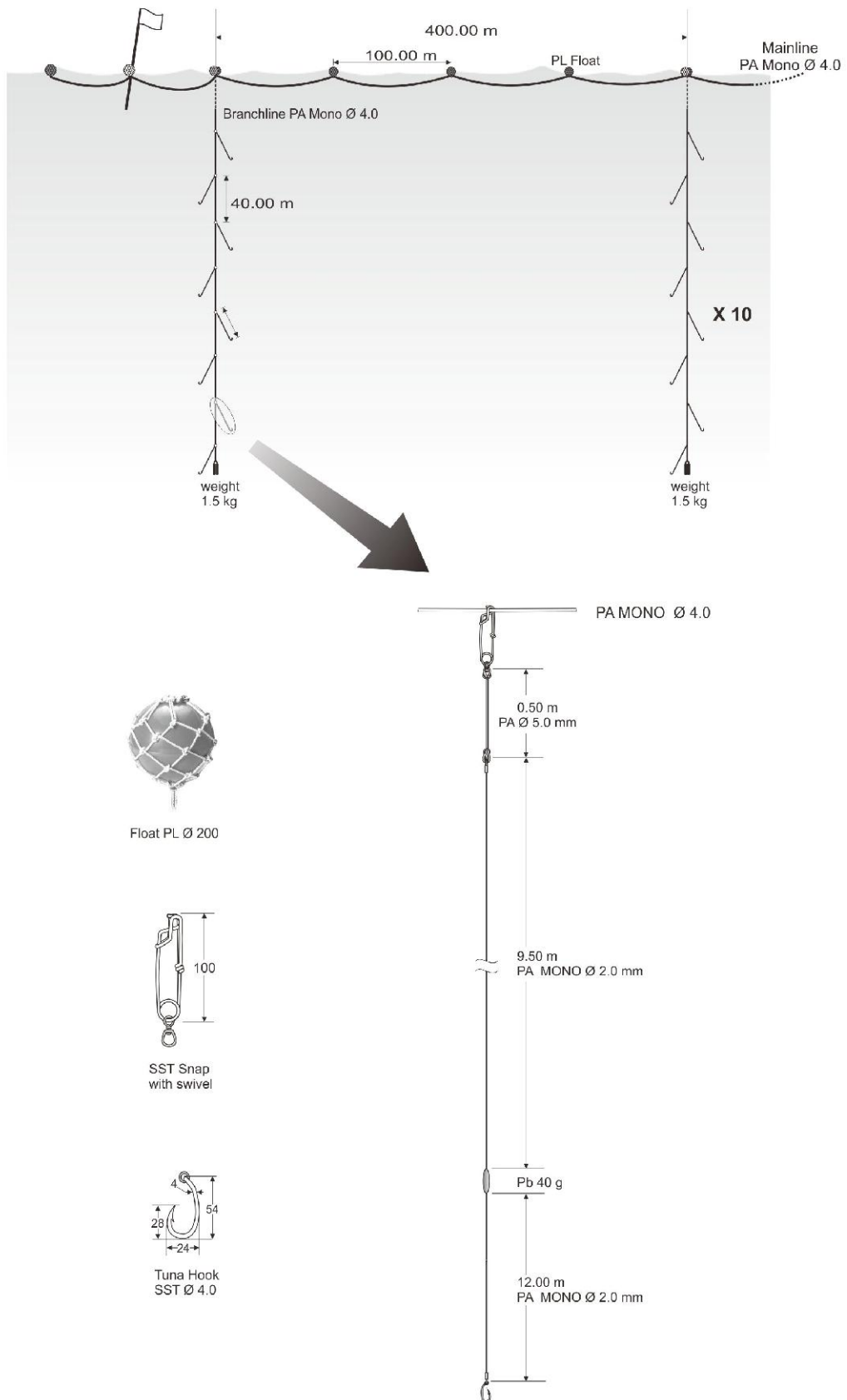


Fig. 10 Schematic diagram of drifting vertical line



Fig. 11 Survey pelagic fish by Drifting Vertical Longline

#### 4.3.4 Pelagic fish survey by Tuna longline

Two operations of Tuna longline (TLL) were operated near Submersible SEAFDEC FADs 2008 (st.1) and float line type FADs station (st.2) (Fig 12). Due to the main engine problem of M.V.SEAFDEC, the TLL operation of the Bullet type FADs (st.3) and the Reference point station (st.4) were cancellation. Figure 10 shows location of Tuna longline fishing operation. Total hook number of each operation are 490-500 hooks. Highest catch is at float line type FADs station with 1.6 ind. /100 hooks, 140 kg total weight. Partial details of Tuna longline operation are in table 4. Fishing logsheets were appended in Annex V. In order to measure hook depth, two Temperature/Depth recorders were attached at the deepest and shallowest hooks. Depth of hook varies from 50 m to 280 m. Figure 13-14 show plot of temperature and depth versus time of each Tuna longline operation. Catch compose with Sword fish, Great hammerhead shark, Pelagic string ray, Dogfishes shark, Sharp-nosed seven-gill shark and etc. Figure 15 show activities during Tuna longline fishing operation.

Table 4 Partial detail of Tuna longline operation

Op. no.	Date	Activity	Start		Finish	Immersion time	Sea depth (m)	Thermocline /depth of hook	Hook no.	Total catch (no.)	Total catch (kg)	Hook rate (no./100 hooks)
			Time	Lat.								
1	1-2/Jun/2011 at st. no. 1 SEAFDEC FADs	shooting	Time	18:17	19:40	12 hrs. 13 min.	960	39-250	490	6	20.6	1.22
			Lat.	08_14.00N	08_19.80N							
			Long.	95_45.70E	95_56.80E							
		Hauling	Time	06:15	08:18							
			Lat.	08_15.40N	08_09.40N							
			Long.	96_06.00E	96_03.10E							
2	2-3/Jun/2011 at st. no. 2 SEAFDEC Float line FADs	shooting	Time	19:00	20:18	11 hrs. 52 min.	500	50-220	500	8	140	1.6
			Lat.	08_24.70N	08_31.10N							
			Long.	96_51.50E	96_58.70E							
		Hauling	Time	06:05	08:57							
			Lat.	08_30.20N	08_25.10N							
			Long.	96_44.40E	96_55.50E							



Fig. 12 Location of Tuna longline fishing operation. Size of symbol denote catch rate.



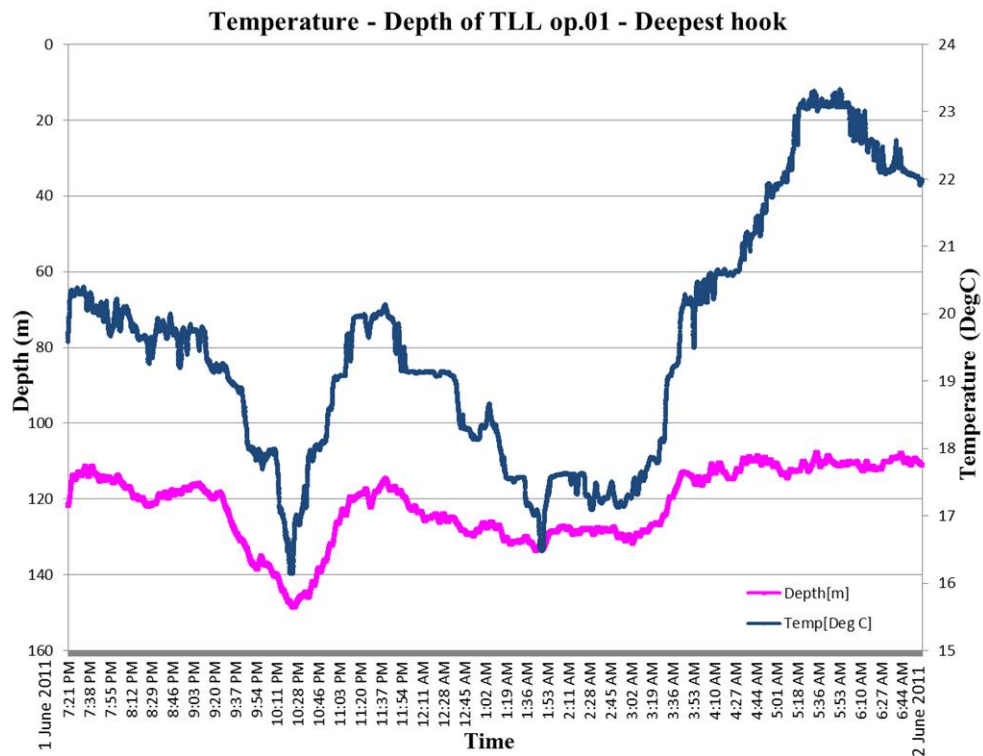
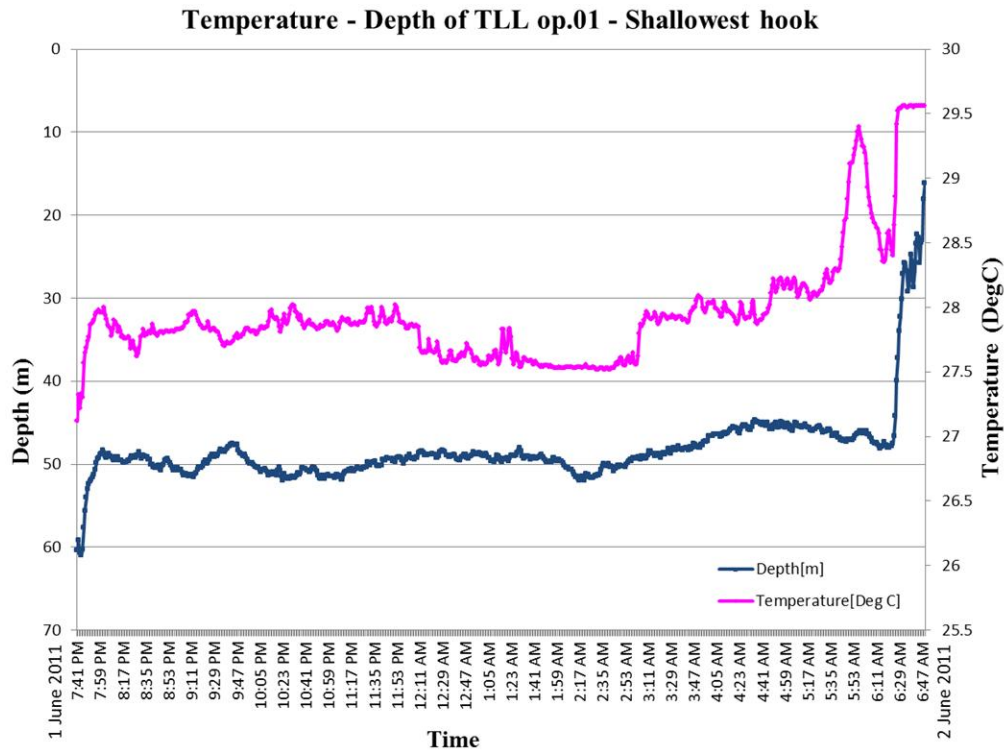


Fig. 13 Temperature ( °c) and depth (m) recorded from deepest and shallowest hook of TLL1

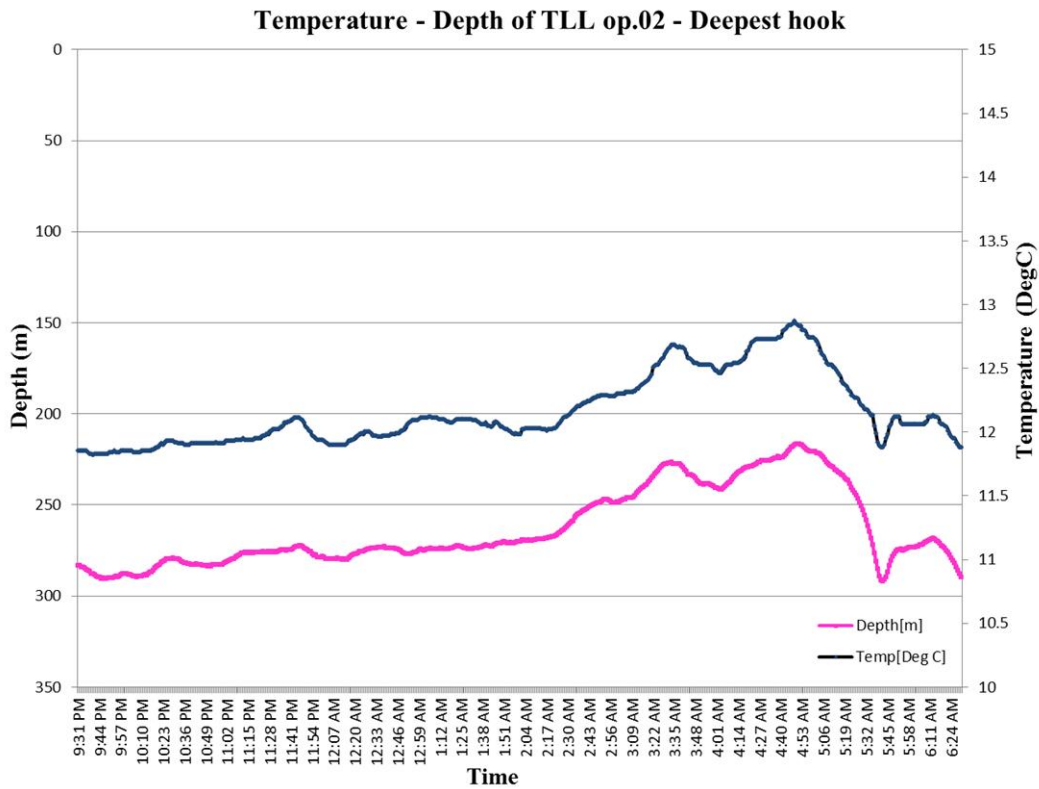
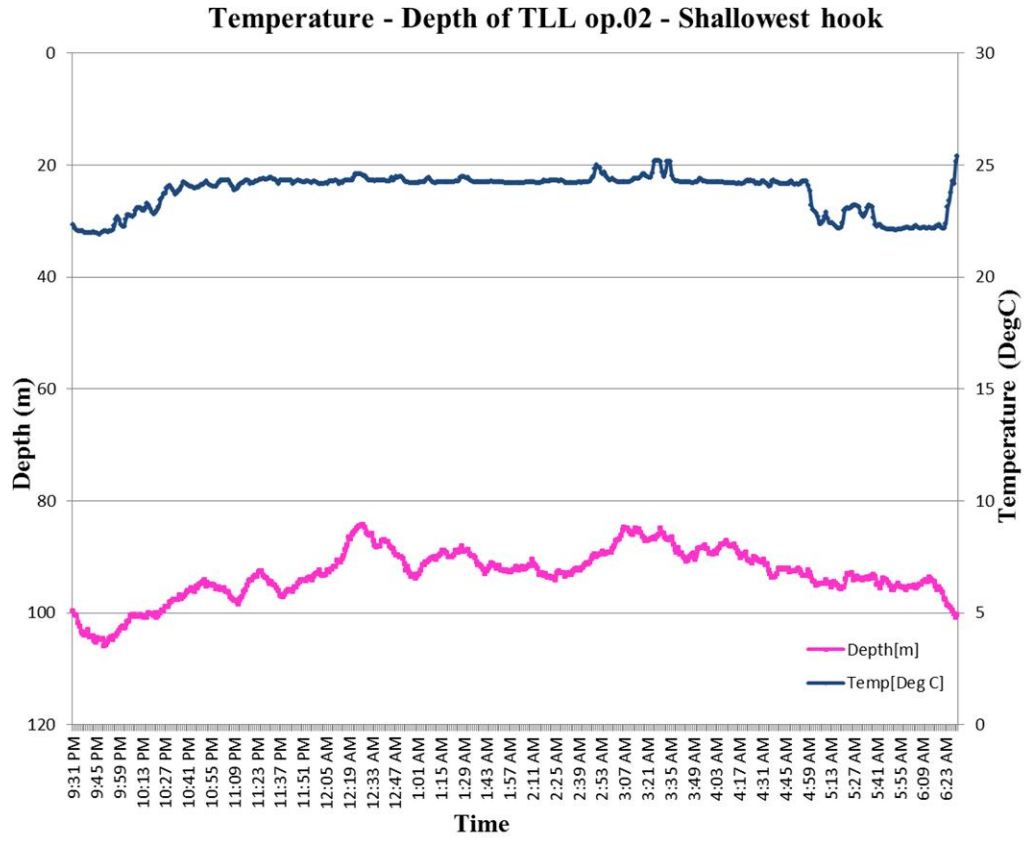


Fig. 14 Temperature ( °c) and depth (m) recorded from deepest and shallowest hook of TTL2



Fig. 15 Activity during Tuna longline fishing operation.

#### 4.3.5 Squid jig handline

Squid abundance around FADs was estimated from catch of handline squid jig fishing (Fig.16). M.V.SEAFFDEC drifted at night near FADs location (Fig.16). Light was turn on from 19:30 to 23:30, then four to seven squid jig handlines start jigging from 20:00 to 23:00. Jigging period is between 2 - 2 ½ hours. Most of catch are purple back flying squid (*Sthenoteuthis oualanensis*). Diamond squids (*Thysanoteuthis rhombus*) were caught at operation no. 2. Highest catch rate is near the Submersible SEAFFDEC FADs (st.1), 2.4 ind./hook/hr (table no.5). Survey period is in new moon week that might be reason of high catch rate than Cr.82-1/2010. Logsheet of squid jig handline is appended in Annex VI.

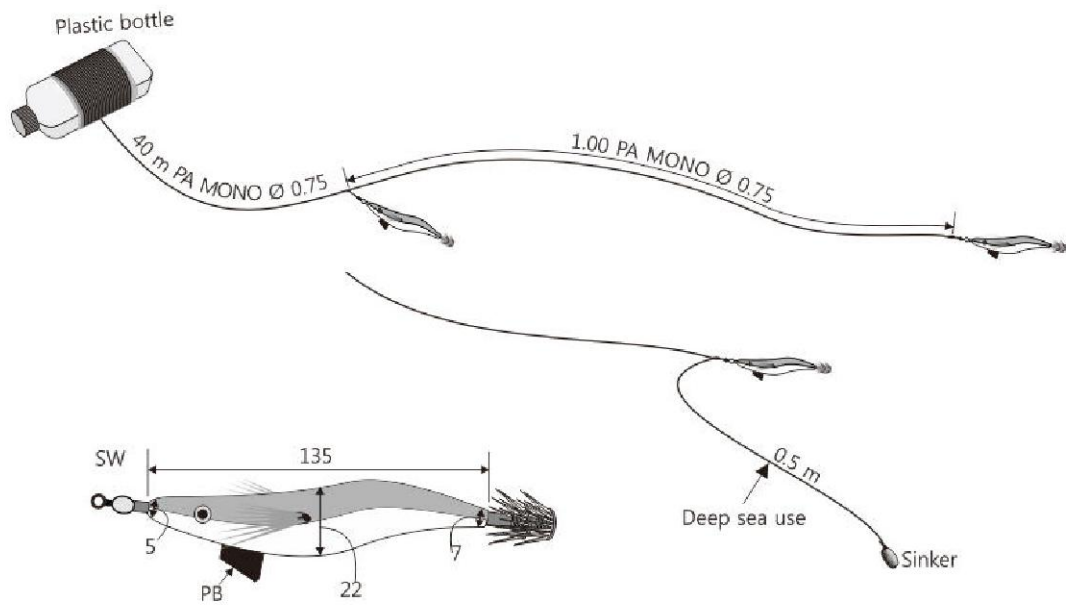


Fig. 14 Schematic diagram of Squid jig handline

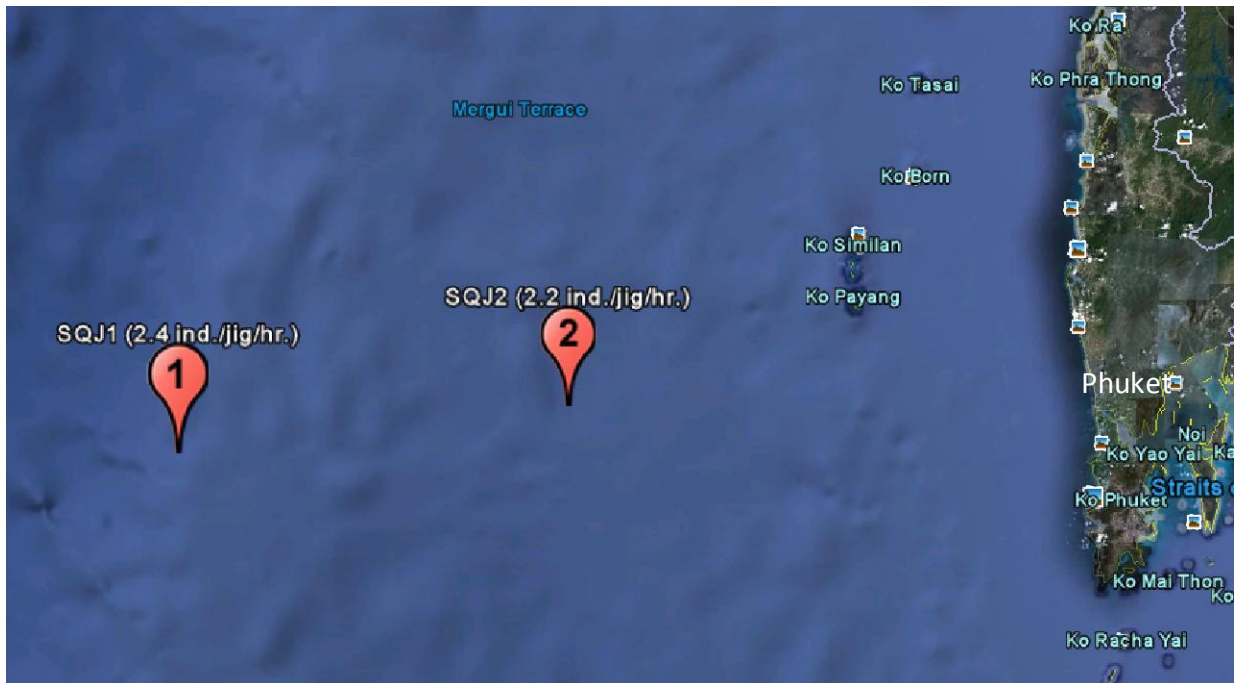


Fig. 16 Location of Squid jigging. Size of symbol denote catch rate in individual/jig/hour.

Table 5. Partial detail of squid jigging handline.

Op. no.	Date	Activity	Start		Finish	Jigging perios	Sea depth (m)	No. of Jig	Total catch weight (kg)	Total catch by individual (ind.)	Catch rate (ind./jig/hr.)
			Time								
1	1/Jun/2011 at st. no. 1 SEAFDEC FADs	Luring	Time	19:30	23:30	2 hrs.	950	4	4.34	19	2.40
			Jigging	Time	20:00						
		Lat.		08_19.80N	08_19.00N						
		Long		95_58.00E	96_02.97E						
2	2/Jun/2011 at st. no. 2 SEAFDEC Float line FADs	Luring	Time	20:20	23:00	2 ½ hrs.	514	7	13.82	39	2.20
			Jigging	Time	20:30						
		Lat.		08_31.24N	08_30.63N						
		Long		96_59.26E	97_02.43E						

## 5. References

Codispoti, 1988. One Man's Advice on the Determination of Dissolved Oxygen in the Sea Water.

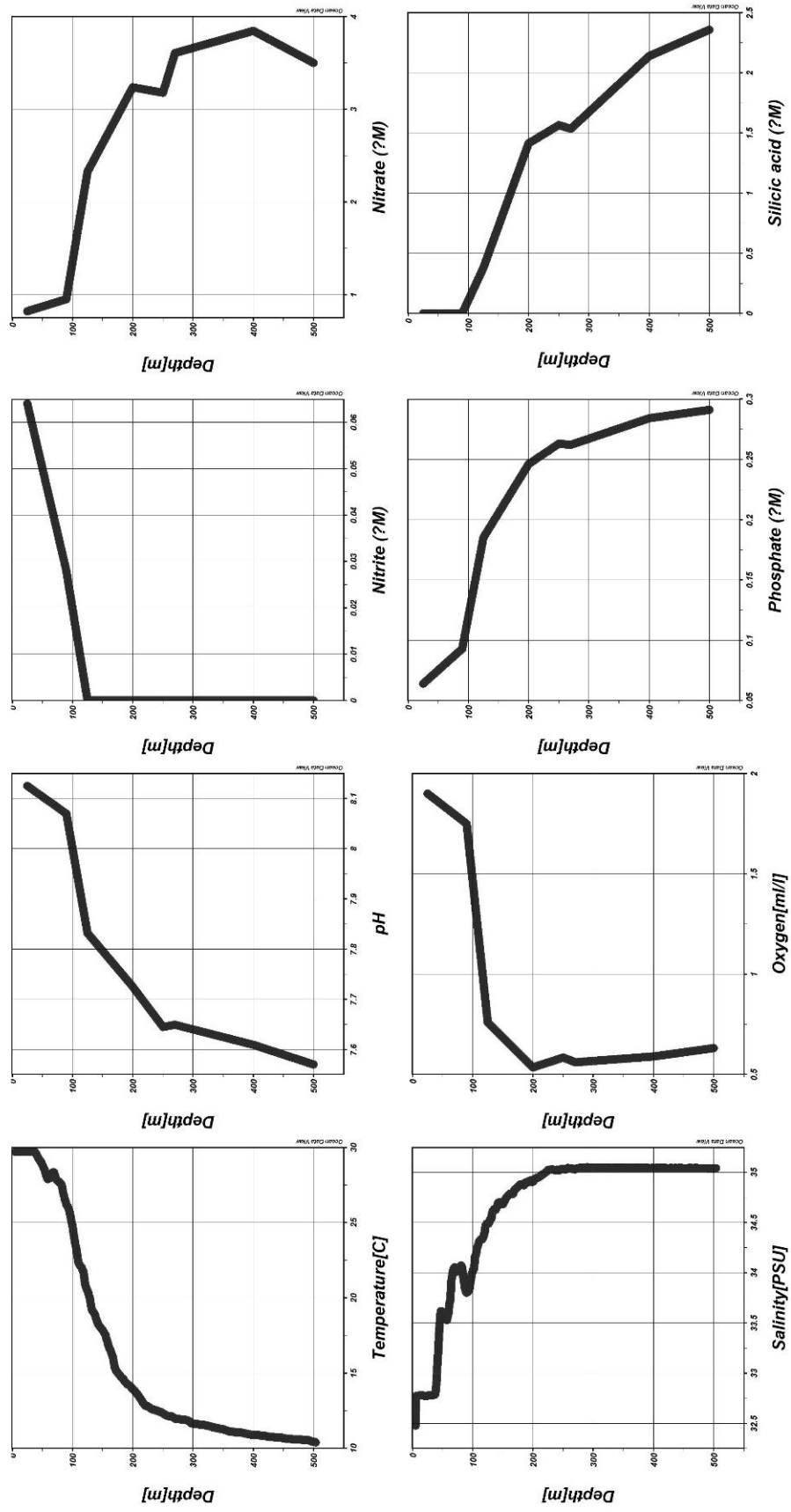
Strickland J.D.H. and T.R.Parson.1972. Practical Handbook of Seawater Analysis. Fisheries Research Board of Canada 167.

## Annex I

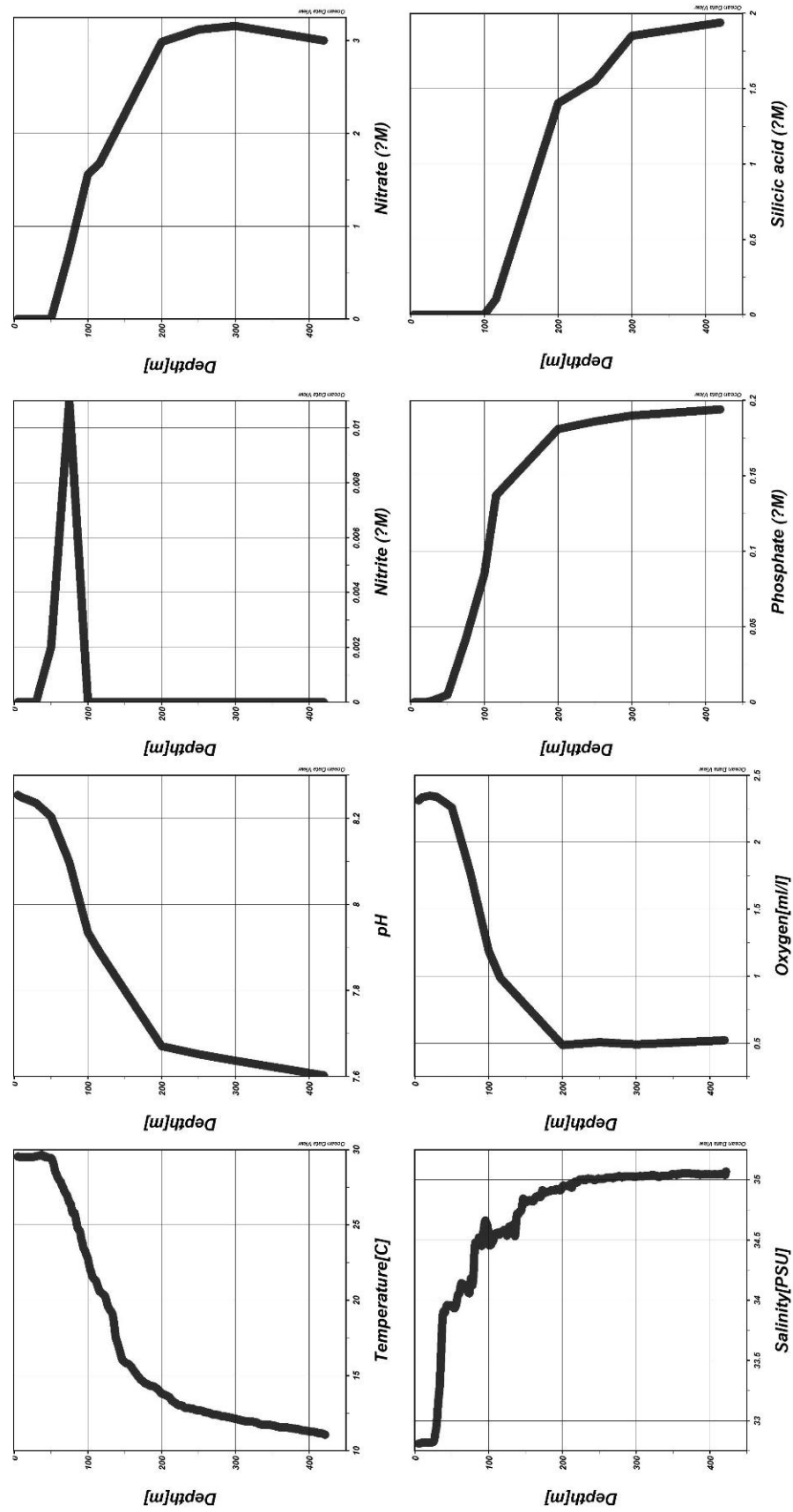
### 1. Chemical parameter summary

Station	Sample depth (m)	DO (ml/l)	pH	Concentration ( $\mu\text{M}$ )				
				$\text{NO}_2^-$	$\text{NO}_2^- + \text{NO}_3^-$	$\text{PO}_4^{3-}$	$\text{Si(OH)}_4$	$\text{NO}_3^-$
1	500	0.632	7.570	N.D.	3.500	0.291	2.355	3.500
	400	0.589	7.606	N.D.	3.845	0.284	2.139	3.845
	270	0.560	7.649	N.D.	3.605	0.262	1.533	3.605
	250	0.585	7.645	N.D.	3.177	0.263	1.563	3.177
	200	0.535	7.725	N.D.	3.238	0.246	1.412	3.238
	125	0.758	7.832	N.D.	2.325	0.185	0.378	2.325
	90	1.748	8.070	0.028	0.980	0.093	N.D.	0.952
	25	1.899	8.125	0.064	0.888	0.064	N.D.	0.824
2	420	0.521	7.603	N.D.	3.001	0.194	1.938	3.001
	300	0.492	7.637	N.D.	3.159	0.190	1.851	3.159
	250	0.507	7.652	N.D.	3.117	0.186	1.552	3.117
	200	0.485	7.671	N.D.	2.984	0.181	1.404	2.984
	116	0.985	7.889	N.D.	1.678	0.137	0.105	1.678
	100	1.186	7.935	N.D.	1.559	0.085	N.D.	1.559
	75	1.779	8.098	0.011	0.738	0.042	N.D.	0.726
	50	2.259	8.204	0.002	N.D.	0.005	N.D.	N.D.
	30	2.338	8.235	N.D.	N.D.	0.001	N.D.	N.D.
	20	2.346	8.242	N.D.	N.D.	N.D.	N.D.	N.D.
	10	2.335	8.249	N.D.	N.D.	N.D.	N.D.	N.D.
5	2.310	8.254	N.D.	N.D.	N.D.	N.D.	N.D.	
3	400	0.450	7.611	N.D.	2.071	0.006	1.912	2.071
	300	0.523	7.657	N.D.	2.131	0.009	1.616	2.131
	200	0.519	7.724	N.D.	1.947	0.012	1.453	1.947
	125	0.851	7.898	N.D.	1.392	0.000	0.200	1.392
	100	1.070	7.940	N.D.	1.204	0.004	N.D.	1.204
	75	1.910	8.150	0.045	0.399	No Data	N.D.	0.354
	50	2.174	8.214	0.021	N.D.	No Data	N.D.	N.D.
	30	2.326	8.245	N.D.	N.D.	No Data	N.D.	N.D.
	20	2.402	8.250	N.D.	N.D.	No Data	N.D.	N.D.
N.D. = None Detectable								

## 2. Vertical profile of Oceanographic parameters at st.1

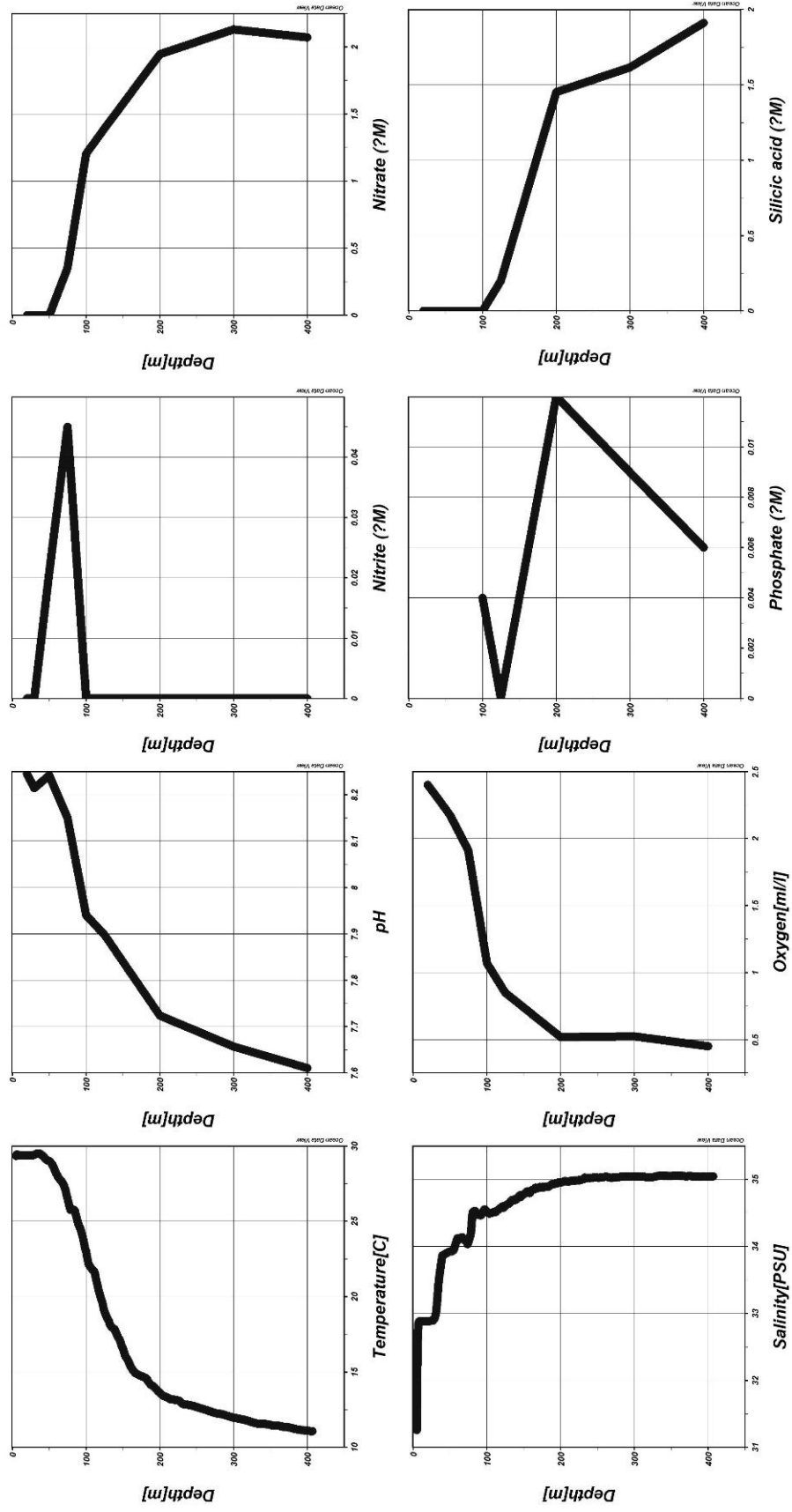


### 3. Vertical profile of Oceanographic parameters at st.2





#### 4. Vertical profile of Oceanographic parameters at st.3



## Annex II

### 1. Flow meter calibration


<b>Replication</b>	<b>Flowmeter No. 7021</b>	<b>Flowmeter No.7035</b>
1	(300)	(360)
2	(220)	(220)
3	(290)	(280)
4	(350)	160
5	170	180
6	150	(270)
7	160	170
8	180	180
9	150	100
10	190	210
11	160	160
12	160	170
13	140	150
<b>Total rev. (r )</b>	1460	1480
<b>Total Dis. (m)</b>	180	180
<b>Flow meter calibration (m/r)</b>	0.123287671	0.121621622
Note: (number) = cut off from calculation		


2. Neuston trawl station no. 1										Ship speed (Knots) 2.5-3.5									
Station: 1					Date: 1-Jun-11														
Sub station	Start				Revolution No.	Time	Start				Revolution No.	Time	Start				Flowmeter No.	Towing Distance (m)	Volume (m <sup>3</sup> )
	Time	Lat.(N)	Long.(E)	Lat.(N)			Long.(E)	Lat.(N)	Long.(E)	Lat.(N)			Long.(E)	Lat.(N)	Long.(E)	Lat.(N)			
1-1	10:44	08 15.198	095 50.150	0000	0000	10:51	08 14.992	095 50.276	4440	4440	7021	547.40	383.18						
1-2	10:58	08 14.650	095 50.147	0000	0000	11:05	08 14.407	095 50.227	3570	3570	7035	434.19	303.93						
1-3	11:12	08 14.250	095 50.186	0000	0000	11:19	08 14.272	095 49.952	3900	3900	7021	480.82	336.58						
1-4	11:22	08 14.271	095 49.714	0000	0000	11:29	08 14.266	095 49.520	3720	3720	7035	452.43	316.70						
1-5	11:32	08 14.204	095 49.282	0000	0000	11:38	08 13.988	095 49.465	2450	2450	7021	302.05	211.44						
1-6	11:42	08 14.160	095 49.456	0000	0000	11:49	08 14.561	095 49.420	3660	3660	7035	445.14	311.59						
1-7	11:52	08 14.630	095 49.422	0000	0000	11:59	08 14.930	095 49.406	3110	3110	7021	383.42	268.40						
1-8	12:02	08 15.046	095 49.414	0000	0000	12:09	08 15.254	095 49.444	3020	3020	7035	367.30	257.11						
1-9	12:20	08 15.290	095 49.500	0000	0000	12:28	08 15.304	095 49.267	3265	3265	7021	402.53	281.77						
1-10	12:31	08 15.307	095 49.136	0000	0000	12:39	08 15.318	095 48.840	3820	3820	7035	464.59	325.22						
1-11	12:41	08 15.312	095 48.750	0000	0000	12:48	08 15.341	095 48.447	3980	3980	7021	490.68	343.48						
1-12	12:55	08 15.227	095 48.686	0000	0000	13:03	08 14.959	095 48.762	3520	3520	7035	428.11	299.68						
1-13	13:05	08 14.870	095 48.779	0000	0000	13:12	08 14.526	095 48.742	3110	3110	7021	383.42	268.40						
1-14	13:18	08 14.450	095 48.726	0000	0000	13:25	08 14.142	095 48.718	3590	3590	7035	436.62	305.64						
1-15	13:32	08 14.245	095 48.710	0000	0000	13:39	08 14.275	095 48.341	6700	6700	7021	826.03	578.22						
1-16	13:43	08 14.278	095 48.294	0000	0000	13:48	08 14.303	095 47.945	3610	3610	7035	439.05	307.34						
1-17	13:57	08 14.404	095 47.889	0000	0000	14:04	08 14.745	095 47.922	3590	3590	7021	442.60	309.82						
1-18	14:08	08 14.800	095 47.926	0000	0000	14:15	08 15.195	095 47.923	4090	4090	7035	497.43	348.20						
1-19	14:22	08 15.322	095 47.870	0000	0000	14:29	08 15.347	095 47.534	5030	5030	7021	620.14	434.10						
1-20	14:34	08 15.350	095 47.461	0000	0000	14:41	08 15.346	095 47.125	4170	4170	7035	507.16	355.01						
1-21	14:51	08 15.061	095 47.116	0000	0000	14:58	08 14.807	095 47.173	<b>12000</b>	<b>12000</b>	7021	1479.45	1035.62						

3. Neuston trawl station no. 2		Date:		2-Jun-11		Ship speed (Knots) 2.5-3.5							
Station: 2		Start		Start		Start		Flowmeter		Towing Distance		Volume	
Sub station	Time	Lat.(N)	Long.(E)	Revolution No.	Time	Lat.(N)	Long.(E)	Revolution No.	Flowmeter No.	Towing Distance (m)	Volume (m <sup>3</sup> )		
2-1	0.601	08_21.045	096_54.043	0000	14.39	08_20.573	096_54.231	4690	7021	578.22	404.75		
2-2	0.612	08_20.520	096_53.671	0000	14.51	08_20.184	096_53.467	2550	7035	310.14	217.09		
2-3	0.622	08_20.244	096_53.305	0000	0.631	08_20.553	096_52.852	6340	7021	781.64	547.15		
2-4	0.633	08_20.679	096_52.902	0000	0.638	08_20.975	096_53.101	3570	7035	434.19	303.93		
2-5	0.639	08_21.014	096_53.133	0000	0.646	08_21.355	096_53.393	4610	7021	568.36	397.85		
2-6	0.649	08_21.443	096_53.337	0000	0.655	08_21.670	096_53.103	4090	7035	497.43	348.20		
2-7	0.658	08_21.527	096_52.928	0000	0.664	08_21.082	096_52.554	4050	7021	499.32	349.52		
2-8	0.665	08_21.058	096_52.536	0000	0.669	08_20.805	096_52.352	4120	7035	501.08	350.76		
2-9	0.675	08_20.869	096_52.395	0000	0.683	08_21.210	096_51.980	6380	7021	786.58	550.60		
2-10	0.695	08_21.226	096_52.086	0000	0.702	08_21.601	096_52.398	4850	7035	589.86	412.91		
2-11	0.703	08_21.677	096_52.466	0000	0.708	08_21.938	096_52.703	3860	7021	475.89	333.12		
2-12	0.715	08_21.932	096_52.605	0000	0.724	08_22.278	096_52.251	5920	7035	720.00	504.00		
2-13	0.727	08_22.200	096_52.159	0000	0.734	08_21.788	096_51.872	4560	7021	562.19	393.53		
2-14	0.735	08_21.761	096_51.858	0000	0.742	08_21.388	096_51.526	4200	7035	510.81	357.57		

4. Neuston trawl station no. 3													
Station: 3		Date: 3-Jun-11				Ship speed (Knots) 2.9-3.2							
Sub station	Time	Start			Time	Start			Flowmeter No.	Towing Distance (m)	Volume (m <sup>3</sup> )		
		Lat.(N)	Long.(E)	Revolution No.		Lat.(N)	Long.(E)	Revolution No.					
3-1	0.544	08_10.703	097_00.292	0000	0.552	08_10.385	096_59.873	3970	7021	489.4520548	342.616438		
3-2	0.553	08_10.345	096_59.826	0000	0.559	08_10.041	096_59.418	3380	7035	411.0810811	287.756757		
3-3	0.563	08_10.098	096_59.422	0000	0.57	08_10.557	096_59.203	4520	7021	557.260274	390.082192		
3-4	13:45	08_10.549	096_59.202	0000	0.581	08_10.798	096_59.629	4360	7035	530.2702703	371.189189		
3-5	0.581	08_10.821	096_59.659	0000	0.588	08_11.113	097_00.091	4490	7021	553.5616438	387.493151		
3-6	0.592	08_11.126	097_00.067	0000	0.601	08_11.591	096_59.717	5560	7035	676.2162162	473.351351		
3-7	0.606	08_11.436	096_59.732	0000	0.612	08_11.216	096_59.363	3060	7021	377.260274	264.082192		
3-8	0.613	08_11.192	096_59.324	0000	0.619	08_10.946	096_58.915	3450	7035	419.5945946	293.716216		
3-9	0.622	08_10.926	096_58.901	0000	0.629	08_11.363	096_58.616	3850	7021	474.6575342	332.260274		
3-10	0.633	08_11.361	096_58.665	0000	0.639	08_11.619	096_59.070	4370	7035	531.4864865	372.040541		
3-11	0.64	08_11.645	096_59.107	0000	0.646	08_11.910	096_59.520	3925	7021	483.9041096	338.732877		
3-12	0.649	08_11.946	096_59.466	0000	0.656	08_12.371	095_59.180	3940	7035	479.1891892	335.432432		
3-13	0.659	08_12.327	096_59.174	0000	0.666	08_12.025	096_58.690	3530	7021	435.2054795	304.643836		
3-14	0.667	08_11.987	096_58.631	0000	0.672	08_11.762	096_58.240	2880	7035	350.2702703	245.189189		

**Annex III**

Trolling line fishing logsheet										
Operation No.1										
Recorded by Sayan Promjinda										
Cruise no: 85-4/2011		Name of Vessel				Air temp:	27	°C		
Survey station No: 1		M.V. SEAFDEC				Air pressure:	1008	mbar		
Date: 1/ June/2011						Humidity :	77	%		
Moon age: phase		Start trolling		Finish trolling		Water				
Wind		Time	1050	Time	1500	Surface temp:	29.9	°C		
Spd (kt)	Direction	Latitude	08°15'.10 N	Latitude	08°14'.72 N	100 m. temp :	23.76	°C		
18	270	Longitude	095°50'.10E	Longitude	095°47'.18 E	Thermocline :	39-250m./29.6-12.4° C			
Weather cond: Cloudy		Memorandum: 1) Speed of vessel: 3.0 knots				Current				
Sea condition: Rough						Depth	Spd (kt)	Direction		
Gear						5	0.2	011°		
No. line		Total catch in number:		0 pcs.		50	0.3	090°		
Trolling time:		Total catch in weight:		- kg		100	0.4	090°		

Trolling line fishing logsheet										
Operation No.2										
Recorded by Sayan Promjinda										
Cruise no: 85-4/2011		Name of Vessel				Air temp:	28	°C		
Survey station No: 2		M.V. SEAFDEC				Air pressure:	1007.5	mbar		
Date: 2/ June/2011						Humidity :	85	%		
Moon age: phase		Start trolling		Finish trolling		Water				
Wind		Time	1428	Time	1749	Surface temp:	29.7	°C		
Spd (kt)	Direction	Latitude	08°21'.00 N	Latitude	08°21'.30 N	100 m. temp :	22.5	°C		
20	270	Longitude	096°54'.00E	Longitude	096°51'.40 E	Thermocline :	50-250m./29.4-13.2° C			
Weather cond: Cloudy		Memorandum: 1) Speed of vessel: 3.0 knots				Current				
Sea condition: Moderate						Depth	Spd (kt)	Direction		
Gear						5	0.2	128°		
No. line		Total catch in number:		0 pcs.		50	0.5	339°		
Trolling time:		Total catch in weight:		- kg		100	NR	NR		

## Trolling line fishing logsheet


### Operation No.3




Recorded by Sayan Promjinda

Cruise no: 85-4/2011	Name of Vessel				Air temp:	29	°C
Survey station No: 3	M.V. SEAFDEC				Air pressure:	1008/5	mbar
Date: 3/ June/2011					Humidity :	92	%
Moon age: phase	Start trolling		Finish trolling		Water		
Wind	Time	1130	Time	1200	Surface temp:	29.6	°C
Spd (kt)	Direction	Latitude	08°11' .30 N	Latitude	08°11' .40 N	100 m. temp :	23.48 °C
24	260	Longitude	096°59'.20E	Longitude	096°59'.10 E	Thermoc line :	43-220m./29.3-13.2° C
Weather cond: Cloudy	Memorandum: 1) Speed of vessel: 5.0 knots				Current		
Sea condition: Moderate	Trolling around the FADs (bullet)				Depth	Spd (kt)	Direction
Gear					5	0.1	260°
No. line	Total catch in number:		5 pcs.		50	0.2	048°
Trolling time:	Total catch in weight:		5.4 kg		100	NR	NR

No.	Species	Length (cm)	Weight (kg)	Remarks
1	<i>Thunnus albacares</i> (Yellowfin tuna)	TL = 47 FL = 44.2 SL = 41 BD = 12.5 HL = 13	1.40	Stomuch weight = 15 g
2	<i>Thunnus albacares</i> (Yellowfin tuna)	TL = 44 FL = 40 SL = 37 BD = 11 HL = 11.5	1.00	Stomuch weight = 15 g
3	<i>Thunnus albacares</i> (Yellowfin tuna)	TL = 43.5 FL = 40.5 SL = 38 BD = 11 HL = 12	1.00	Stomuch weight = 10 g
4	<i>Thunnus albacares</i> (Yellowfin tuna)	TL = 35 FL = 33 SL = 30 BD = 11 HL = 12	0.40	Stomuch weight = 10 g
5	<i>Thunnus albacares</i> (Yellowfin tuna)	TL = 53 FL = 47.5 SL = 44 BD = 16 HL = 15.5	1.60	Stomuch weight = 15 g
<b>Total</b>		HL = 15.5	<b>5.40</b>	

Trolling line fishing logsheet									
Operation No.4									
Recorded by Sayan Promjinda									
Cruise no: 85-4/2011		Name of Vessel			Air temp: 29 °C				
Survey station No: 3		M.V.SEAFFDEC			Air pressure: 1007.5 mbar				
Date: 3/ June/2011					Humidity : 78 %				
Moon age: phase		Start trolling		Finish trolling		Water			
Wind		Time	1305	Time	1600	Surface temp: 29.6 °C			
Spd (kt)	Direction	Latitude	08°10'.69 N	Latitude	08°12'.05 N	100 m. temp : 23.48 °C			
18	240	Longitude	097°00'.25E	Longitude	096°58'.73 E	Thermocline : 43-220m./29.3-13.2° C			
Weather cond: bc		Memorandum: 1) Speed of vessel: 3.0 knots				Current			
Sea condition: Slight						Depth	Spd (kt)	Direction	
Gear						5	0.1	190°	
No. line		Total catch in number:		0 pcs.		50	0.4	060°	
Trolling time:		Total catch in weight:		- kg		100	NR	NR	

Annex IV

DRIFTING VERTILCAL LONGLINE FISHING LOGSHEET									
Operation No.1									
Recorded by Sayan Promjinda									
Cruise no: 85-4 /2011		Name of Vessel			Air temp: 27 °C				
Survey station No: 1		M.V.SEAFFDEC			Air pressure: 1006 mbar				
Date: 1-2/ June/2011					Humidity : 92 %				
Moon age: phase		Start shooting 1/6/11		Finish shooting 1/6/11		Water			
Wind		Time	1614	Time	1634	Surface temp: 28 °C			
Spd (kt)	Direction	Latitude	08°14'.30 N	Latitude	08°15'.30 N	100 m. temp : 23.76 °C			
22	220	Longitude	095°50'.20E	Longitude	095°50'.20 E	Thermocline : 39-250m./29.6-12.4° C			
Weather cond: Cloudy		Start hauling 2/6/11		Finish hauling 2/6/11		Current			
Sea condition: Moderate		Time	0850	Time	0955	Depth	Spd (kt)	Direction	
Gear		Latitude	08°07'.50 N	Latitude	08°07'.03 N	5	0.1	119	
No. hook/line: 8		Longitude	096°07'.20 E	Longitude	096°08'.72 E	50	0.3	259	
Total hook no: 48		Memorandum: 1) Speed of vessel: 3.0 knots				100	NR	NR	
Immersion time:		2) Setting distance: 0.5 NM /Course 068°				Total catch in number:			
16 hrs 58 min.		3) Sea depth: 970 m (Navigation chart)				1 pcs.			
Type of bait:		4) Depth of hook: 50 -320 m				Total catch in weight:			
Chub mackerel		Remark* hook no. 1 from the surface to bottom				2.4 kg			
No.	Species			Length (cm)	Weight (kg)	Remarks			
1	<i>Dasyatis violacea</i>			DL = 39	2.40	Line 4 hook no. 2			
	(Pelagic stingray)			DW = 43		J - hook , sex= Male			
	<b>Total</b>				2.40				



## DRIFTING VERTICAL LONGLINE FISHING LOGSHEET

### Operation No.2

Recorded by Sayan Promjinda



Cruise no: 85-4 /2011		Name of Vessel				Air temp:	29	°C
Survey station No: 2		M.V.SEADEC				Air pressure:	1008	mbar
Date: 2-3/ June/2011						Humidity :		85
Moon age: phase		Start shooting <u>1/6/11</u>		Finish shooting <u>1/6/11</u>		Water		
Wind		Time	1810	Time	1831	Surface temp:	29.8	°C
Spd (kt)	Direction	Latitude	08°19'.80 N	Latitude	08°20'.30 N	100 m. temp :	22.5	°C
16	240	Longitude	096°50'.00E	Longitude	096°51'.00 E	Thermocline :	50-220m./29.4-13.2° C	
Weather cond: Cloudy		Start hauling <u>2/6/11</u>		Finish hauling <u>2/6/11</u>		Current		
Sea condition: Moderate		Time	0940	Time	1040	Depth	Spd (kt)	Direction
Gear		Latitude	08°17'.60 N	Latitude	08°17'.10 N	5	0.2	195
No. hook/line: 8		Longitude	096°54'.30 E	Longitude	096°54'.70 E	50	0.8	316
Total hook no: 48		Memorandum: 1) Speed of vessel: 3.0 knots				100	NR	NR
Immersion time:		2) Setting distance: 1.1 NM /Course 040°				Total catch in number:		
15 hrs 50 min.		3) Sea depth: 500 m (Navigation chart)				1 pcs.		
Type of bait:		4) Depth of hook: 50 -320 m				Total catch in weight:		
Chub mackerel		Remark* hook no. 1 from the surface to bottom				1.6 kg		

No.	Species	Length (cm)	Weight (kg)	Remarks
1	<i>Lepturacanthus savala</i>	TL = 133	1.60	Basket 27 hook no. 04
	( Savalani hairtail )	BD = 13		Circle- hook
				GW = 10 g
				GL = 28 cm
	<b>Total</b>		<b>1.60</b>	

## Annex V

PELAGIC LONGLINE FISHING LOGSHEET										
Operation No.1										
Recorded by Sayan Promjinda										
Cruise no: 84-3 /2011		Name of Vessel				Air temp:	28	°C		
Survey station No: 1		M.V.SEAFFDEC				Air pressure:	1006.5	mbar		
Date: 1-2/ June/2011						Humidity :	85	%		
Moon age: phase		Start shooting 1/6/11		Finish shooting 1/6/11		Water				
Wind		Time	1817	Time	1940	Surface temp:	28.5	°C		
Spd (kt)	Direction	Latitude	08°14'.00 N	Latitude	08°19'.80 N	100 m. temp :	23.76	°C		
28	220	Longitude	095°48'.70E	Longitude	095°56'.80 E	Thermocline :	39-250m./29.6-12.4° C			
Weather cond: Cloudy		Start hauling 2/6/11		Finish hauling 2/6/11		Current				
Sea condition: Rough		Time	0615	Time	0818	Depth	Spd (kt)	Direction		
Gear		Latitude	08°15'.40 N	Latitude	08°09'.40 N	10	0	162°		
No. hook/basket: 20		Longitude	096°06'.00 E	Longitude	096°03'.10 E	50	0.2	024°		
Total hook no: 490		Memorandum: 1) Speed of vessel: 6.5-7 knots				100	NR	NR		
Immersion time:		2) Setting distance: 9.9 NM /Course054°				Total catch in number:				
12 hrs 13 min.		3) Mainline paid out: 21,013 m (Setting machine)				6 pcs.				
Type of bait:		4) Sea depth: 960 m (Navigation chart)				Total catch in weight:				
Chub mackerel		5) Depth of hook: 50 -150 m				20.6 kg				
No.	Species			Length (cm)	Weight (kg)	Remarks				
1	<i>Xiphias gladius</i>			TL = 153	8.90	Basket 1 hook no. 6				
	( Sword fish )			FL = 144		C - hook no.14 sex= Female				
				SL = 90		stomach weight = 350 g				
				BL = 102		GW= 20 g				
				EFL = 80		GL = 7.0 cm				
				BD = 21						
				HL = 34						
2	<i>Dasyatis violacea</i>			DL = -	~2	Basket 6 hook no. 5				
	(Pelagic stingray)			DW = -		J - hook / was loosed during				
						huald up on board				
3	<i>Dasyatis violacea</i>			DL = 25	2.70	Basket 6 hook no. 15				
	(Pelagic stingray)			DW = 35		J - hook , sex= Male				
4	<i>Gempyrus serpen</i>			TL = 119	3.8	Basket 8 hook no. 7				
	(Snake meckeral)			BD = 13		C- hook no.18 /				
				FL = 150		sex = Female				
				SL = 98		GW= 30 g				
				HL = 29		GL = 40 cm				
5	<i>Heptranchias perlo</i>			TL = 100	2.40	Basket 10 hook no. 12				
	( Sharpnose sevengill shark )			BD = 13		C- hook no.14 / sex = Female				
				HL = 17						
6	<i>Heptranchias perlo</i>			TL = 69	0.80	Basket 11 hook no. 8				
	( Sharpnose sevengill shark )			BD = 7		C- hook no.18 / sex = Female				
				HL = 11						
					~2					
	<b>Total</b>				<b>18.60</b>					

**PELAGIC LONGLINE FISHING LOGSHEET**



**Operation No.2**

Recorded by Sayan Promjinda

Cruise no: 84-3 /2011	Name of Vessel				Air temp:	28	°C
Survey station No: 2	M.V.SEAFDEC				Air pressure:	1007	mbar
Date: 2-3/ June/2011					Humidity :	85	%
Moon age: phase	Start shooting 2/6/11	Finish shooting 2/6/11		Water			
Wind	Time	1900	Time	2018	Surface temp:	29.6	°C
Spd (kt)	Direction	Latitude	08°24'.70 N	Latitude	08°31'.10 N	100 m. temp :	22.5 °C
9.2	240	Longitude	096°51'.50E	Longitude	096°58'.70 E	Thermocline :	50-220m./29.4-13.2° C
Weather cond: Cloudy	Start hauling 3/6/11	Finish hauling 3/6/11		Current			
Sea condition: Moderate	Time	0605	Time	0857	Depth	Spd (kt)	Direction
Gear	Latitude	08°30'.20 N	Latitude	08°25'.10 N	10	0.2	240°
No. hook/basket: 20	Longitude	096°44'.40 E	Longitude	096°55'.50 E	50	0.6	297°
Total hook no: 500	Memorandum: 1) Speed of vessel: 7.0 knots				100	NR	NR
Immersion time:	2) Setting distance: 9.6 NM /Course 048°				Total catch in number:		
11 hrs 05 min.	3) Mainline paid out: 21,166 m (Setting machine)				8 pcs.		
Type of bait:	4) Sea depth: 500 m (Navigation chart)				Total catch in weight:		
Chub mackerel	5) Depth of hook: 60 -280 m				140 kg		

No.	Species	Length (cm)	Weight (kg)	Remarks
1	<i>Gempyrus serpen</i> (Snake meckeral)	TL = 96 BD = 10	1.3	Basket 1 hook no. 5 C- hook no.14 / sex = Female
		FL = 91 SL = 98		GW = 80 g
		HL = 21		
2	shark	TL = 64 BD = 7	0.80	Basket 1 hook no. 8 C- hook no.14 / sex = Female
		HL = 9		
3	<i>Sphyrna mokarran</i> (Great hammerhead shark)	TL = 247 BD = 65	80.00	Basket 1 hook no. 16 C- hook no.14 / sex = Female
		HL = 44		stomuch weight = 1.8 kg
4	<i>Xiphias gladius</i> ( Sword fish )	TL = 129 FL = 120	4.00	Basket 9 hook no. 2 C - hook no.18 sex= Female
		SL = 112		stomach weight = 110 g
		BL = 76		GL = 3 cm
		EFL = 68		
		BD = 19		
		HL = 30		
5	<i>Centroprorus granulosus</i> ( Dogfishes shark )	TL = 103 BD = 19	5.80	Basket 16 hook no. 12 C- hook no.14 / sex = Female
		HL = 23		

No.	Species	Length (cm)	Weight (kg)	Remarks
6	<i>Heptranchias perlo</i>	TL = 69	0.80	Basket 11 hook no. 8
	( Sharpnose sevengill shark )	BD = 7		C- hook no.18 / sex = Female
		HL = 11		
7	<i>Xiphias gladius</i>	TL = 131	4.30	Basket 18 hook no. 17
	( Sword fish )	FL = 120		C - hook no.18 sex= Male
		SL = 111		stomach weight = 250 g
		BL = 77		GL = 10 cm
		EFL = 73		
		BD = 19		
		HL = 18		
8	<i>Xiphias gladius</i>	TL = 250	43.00	Basket 25 hook no. 4
	( Sword fish )	FL = 238		C - hook no.14 sex= Female
		SL = 220		stomach weight = 500 g
		BL = 148		GL = 28 cm
		EFL = 145		GW = 500 g
		BD = 32		
		HL = 51		
	<b>Total</b>		<b>140.00</b>	

# SQUID JIGGING FISHING LOGSHEET



## Operation No.1

Recorded by Sayan Promjinda										
Certified by										
Cruise No.85-4/2011		Name of Vessel				Air temp.	28	° C		
Survey station No: 01		M.V. SEAFDEC				Air press.	1007.5	mbar		
Date: 1-June-11						Humidity	85	%		
Moon age: 07		Start Luring		Finish Luring		Water				
Wind		Time	1930	Time	2330	Surface	28	°C		
Spd (kt)	Direction	Start Jigging		Finish Jigging		100 m. temp :	N/R		°C	
18	260	Time	2000	Time	2200	Thermocline :	N/R			
Weather condition: bc		Latitude	08°19'.80 N	Latitude	08°19'.00 N	Current				
No. of Jig		Longitude	095°58'.00 E	Longitude	096°02'.97 E	Depth (m)	Spd (kt)	Direction		
M1: -	M2: -	Total jigging time: 2 hrs 00 min				10	0.1	047		
M3: -	M4: -	Memorandum:				50	0.5	310		
Total	4 jigs	Sea depth : 950 m				100	N/R	N/R		
Angling depth		Hand line 5 line squid jigging				Total catch by weight: 4.34 kg				
30-50						Total catch by Individual : 19 pcs.				
ICTD data file:						Target species:				
						<i>Sthenoteuthis oualanensis</i>				

No.	Species	Mantle length(cm)	Weight (g)	Sex
	Line no.1 (20.30-21.10)			
1	<i>Sthenoteuthis oualanensis</i>	190	310	Female
2	<i>Sthenoteuthis oualanensis</i>	181	230	Female
3	<i>Sthenoteuthis oualanensis</i>	150	160	Female
4	<i>Sthenoteuthis oualanensis</i>	179	260	Female
	Line no.2 (20.30 - 22.20)			
5	<i>Sthenoteuthis oualanensis</i>	119	60	Male
6	<i>Sthenoteuthis oualanensis</i>	180	280	Female
7	<i>Sthenoteuthis oualanensis</i>	191	350	Female
8	<i>Sthenoteuthis oualanensis</i>	161	190	Female
9	<i>Sthenoteuthis oualanensis</i>	195	300	Female
	Line no. 3 (20.00 - 21.40)			
7	<i>Sthenoteuthis oualanensis</i>	175	240	Female
8	<i>Sthenoteuthis oualanensis</i>	141	120	Female
9	<i>Sthenoteuthis oualanensis</i>	154	150	Female
10	<i>Sthenoteuthis oualanensis</i>	160	180	Female
11	<i>Sthenoteuthis oualanensis</i>	180	240	Female
12	<i>Sthenoteuthis oualanensis</i>	150	110	Female
13	<i>Sthenoteuthis oualanensis</i>	180	200	Female
14	<i>Sthenoteuthis oualanensis</i>	199	290	Female
15	<i>Sthenoteuthis oualanensis</i>	179	240	Female
16	<i>Sthenoteuthis oualanensis</i>	145	110	Female
	Line no. 4 (20.30 - 22.00)			
17	<i>Sthenoteuthis oualanensis</i>	145	110	Female
18	<i>Sthenoteuthis oualanensis</i>	160	150	Female
19	<i>Sthenoteuthis oualanensis</i>	124	60	Male
	<b>Total</b>		<b>4340</b>	

# SQUID JIGGING FISHING LOGSHEET



## Operation No.2

Recorded by Sayan Promjinda

Certified by

Cruise No.85-4/2011		Name of Vessel				Air temp.	28	°C
Survey station No:		M.V. SEAFDEC				Air press.	1009	mbar
Date: 2-June-11						Humidity	92	%
Moon age: 07		Start Luring		Finish Luring		Water		
Wind		Time	2020	Time	2300	Surface	29.5	°C
Spd (kt)	Direction	Start Jigging		Finish Jigging		100 m. temp :	N/R	°C
22	250	Time	2030	Time	2300	Thermocline :	N/R	
Weather condition: bc		Latitude	08°31'.24 N	Latitude	08°30'.63 N	Current		
No. of Jig		Longitude	096°59'.26 E	Longitude	097°02'.43 E	Depth (m)	Spd (kt)	Direction
M1: -	M2: -	Total jigging time:		2 hrs 30 min		10	0.2	151
M3: -	M4: -	Memorandum:				50	0.3	010
Total	7 jigs	Sea depth : 514 m				100	N/R	N/R
Angling depth		Hand line 6 line squid jigging				Total catch by weight: 13.82 kg		
30-50						Total catch by Individual : 39 pcs.		
ICTD data file:						Target species:		
						<i>Sthenoteuthis oualanensis</i>		

No.	Species	Mantle length(cm)	Weight (g)	Sex
	Line no.1 (2030-2210)			
1	<i>Sthenoteuthis oualanensis</i>	150	310	Female
2	<i>Sthenoteuthis oualanensis</i>	179	250	Female
3	<i>Sthenoteuthis oualanensis</i>	170	280	Female
4	<i>Sthenoteuthis oualanensis</i>	214	460	Female
5	<i>Thysanoteuthis rhombus</i>	269	690	Female
6	<i>Sthenoteuthis oualanensis</i>	185	300	Female
7	<i>Sthenoteuthis oualanensis</i>	190	320	Female
8	<i>Sthenoteuthis oualanensis</i>	215	500	Female
9	<i>Sthenoteuthis oualanensis</i>	185	290	Female
10	<i>Sthenoteuthis oualanensis</i>	200	350	Female
11	<i>Sthenoteuthis oualanensis</i>	205	400	Female
12	<i>Sthenoteuthis oualanensis</i>	189	350	Female
13	<i>Sthenoteuthis oualanensis</i>	210	420	Female
14	<i>Sthenoteuthis oualanensis</i>	205	480	Female
	Line no.2 (2100-2230)			
15	<i>Sthenoteuthis oualanensis</i>	120	40	Female
	Line no.3 (2030-2100)			
16	<i>Sthenoteuthis oualanensis</i>	209	390	Female
17	<i>Sthenoteuthis oualanensis</i>	198	370	Female
18	<i>Sthenoteuthis oualanensis</i>	200	350	Female
	Line no.4 (2050-2300)			
19	<i>Thysanoteuthis rhombus</i>	260	620	
20	<i>Sthenoteuthis oualanensis</i>	225	500	Female
21	<i>Thysanoteuthis rhombus</i>	229	490	
22	<i>Sthenoteuthis oualanensis</i>	180	290	Female
23	<i>Sthenoteuthis oualanensis</i>	185	300	Female

No.	Species	Mantle length(cm)	Weight (g)	Sex
	Line no.5 (2230-2130)			
24	<i>Sthenoteuthis oualanensis</i>	124	90	Male
25	<i>Sthenoteuthis oualanensis</i>	190	350	Male
26	<i>Sthenoteuthis oualanensis</i>	214	440	Female
27	<i>Sthenoteuthis oualanensis</i>	169	220	Female
	Line no.6 (2030-2130)			
28	<i>Sthenoteuthis oualanensis</i>	176	300	Female
29	<i>Sthenoteuthis oualanensis</i>	199	350	Female
30	<i>Sthenoteuthis oualanensis</i>	125	100	Male
31	<i>Sthenoteuthis oualanensis</i>	223	520	Female
32	<i>Sthenoteuthis oualanensis</i>	177	290	Female
33	<i>Sthenoteuthis oualanensis</i>	183	250	Female
34	<i>Sthenoteuthis oualanensis</i>	185	300	Female
	Line no.7 (2050-2300)			
35	<i>Sthenoteuthis oualanensis</i>	184	300	Female
36	<i>Sthenoteuthis oualanensis</i>	200	360	Female
37	<i>Sthenoteuthis oualanensis</i>	200	340	Female
38	<i>Sthenoteuthis oualanensis</i>	250	420	Female
39	<i>Sthenoteuthis oualanensis</i>	210	440	Female
	<b>Total</b>		<b>13820</b>	

## Annex VII

## Navigation logsheet

Date	Local time	Lat (N)		Long (E)		Current (5 m)		Current (100m)		Wind		Air temp (°c)	Surface water temp (°c)	Air press (mbar)	Humidity (%)	cloud	
		Deg	Lib	Deg	Lib	Spd (kts)	dir	Spd (kts)	dir	Spd (kts)	dir						
5/31/2011	20.00	7	43.9	98	15.4	0.1	22	-	-	16	316	26	29.8	1008.5	92	4/4	
	21.00	7	46.7	89	02.0	0.2	181	-	-	15	315	26	30	1010.0	92	3/4	
	22.00	7	49.6	97	48.3	0.1	79	303	-	20	290	26	30	1010.0	92	3/4	
	23.00	7	52.8	97	34.5	0.1	178	148	-	30	300	26	29	1010.0	92	3/4	
6/1/2011	00.00	7	55.6	97	22.9	0.3	55	453	-	30	283	26	29	1010.0	92	3/4	
	1.00	7	57.9	97	9.4	0.1	256	144	-	20	250	27	29.7	1009	84	3/4	
	2.00	8	0.6	96	55.6	0.1	202	6	-	20	230	27	29.7	1006.5	84	3/4	
	3.00	8	3.5	96	42.5	0.2	137	187	-	20	230	27	29.8	1006.5	92	3/4	
	4.00	8	6.2	96	29.7	0.2	122	0	-	20	230	27	29.9	1007.0	92	3/4	
	5.00	8	8.8	96	17.1	0.1	106	87	-	18	233	27	29.8	1007.0	92	3/4	
	6.00	8	11.4	96	9.7	0.2	107	265	-	28	238	27	30	1007.0	84	3/4	
	7.00	8	13.5	95	55	0.1	63	297	-	24	246	27	30	1007.5	96	3/4	
	8.00	8	14.8	95	48.9	0.1	345	105	-	20	238	28	30	1008.0	85	3/4	
	9.00	8	14.7	95	50.8	0.0	55	133	-	14	250	27	29.1	1008.0	77	3/4	
	10.00	8	14.7	95	52.8	4.2	83	109	0.5	75	260	27	29.9	1008.0	77	4/4	
	11.00	8	14.2	95	50.2	0.2	11	90	0.4	90	270	27	29.9	1008.0	77	4/4	
	12.00	8	14.8	95	49.4	0.1	61	91	0.8	74	270	28	29.9	1008.0	84	4/4	
	13.00	8	4.9	96	48.7	0.1	36	161	0.3	213	230	30	29.9	1008.5	78	3/4	
	14.00	8	14.5	95	47.9	0.1	9	81	0.7	59	22	230	30	29.8	1007.5	78	3/4
	15.00	8	14.6	95	47.2	0.1	26	73	0.8	32	22	250	29	29.8	1007.0	78	3/4
16.00	8	14.5	95	48.4	0.1	125	249	0.6	212	15	280	28	29.8	1006.5	85	3/4	
17.00	8	15.6	95	31.3	0.1	119	259	0.3	-	22	220	27	28	1006.0	92	3/4	
18.00	8	14.4	95	50.2	0.0	162	24	0.2	-	28	220	28	28	1006.5	85	3/4	
19.00	8	16.9	95	52.6	0.1	287	86	0.5	-	24	255	28	28	1006.5	85	3/4	
20.00	8	19.8	95	58.0	0.1	47	310	0.5	-	18	260	28	28	1007.5	85	3/4	
21.00	8	19.2	96	00.7	0.0	96	290	0.5	-	14	260	28	29.8	1007.5	85	3/4	
22.00	8	18.9	96	3.1	0.1	333	306	0.5	-	16	260	28	29.9	1008.0	92	3/4	
23.00	8	18.7	96	4.8	0.1	13	301	0.6	-	18	260	28	29.9	1009.0	92	3/4	
00.00	8	18.3	96	6.6	0.1	0	302	0.6	-	14	260	28	29.9	1009.0	92	3/4	



Date	Local time	Lat (N)		Long (E)		Current (5 m)		Current (50m)		Current (100m)		Wind		Air temp (°c)	Surface water temp (°c)	Air press (mbar)	Humidity (%)	cloud
		Deg	Lib	Deg	Lib	Spd (kts)	dir	Spd (kts)	dir	Spd (kts)	dir	Spd (kts)	dir					
6/2/2011	1.00	8	17.8	96	8.6	0.1	43	0.7	50	0.7	304	8	270	28	29.8	1009.0	92	4/4
	2.00	8	15.3	95	56.6	0.1	63	0.5	330	1	305	10	290	28	29.8	1009.0	85	4/4
	3.00	8	16.1	96	11.6	0.1	203	0.5	330	0.8	297	10	250	28	29.8	1008.0	92	4/4
	4.00	8	14.8	96	8.6	0.2	146	0.2	340	-	-	18	220	28	29.8	1007.0	92	4/4
	5.00	8	14.5	96	4.6	0.1	142	0.3	378	0.6	303	14	268	25	29.6	1007.0	92	4/4
	6.00	8	15.3	96	5.9	0.2	191	0.4	330	1.1	355	4	267	27	29.7	1007.5	92	3/4
	7.00	8	14.2	96	4.3	0.0	72	0.6	5	-	-	24	230	27	29.6	1008.5	84	3/4
	8.00	8	11.1	96	2.6	0.1	149	0.5	316	-	-	22	287	27	29.8	1008.5	92	4/4
	9.00	8	7.4	96	7.4	0.0	215	0.6	2	-	-	23	285	27	29.7	1008.5	92	4/4
	10.00	8	7.0	96	7.0	0.0	200	0.5	17	-	-	20	275	25	29.6	1008.0	92	4/4
	11.00	8	111.0	96	234	0.2	146	0.8	356	-	-	16	270	26	29.7	1010.0	92	4/4
	12.00	8	158.0	96	379	0.3	185	-	-	-	-	20	350	27	29.7	1010.0	84	4/4
	13.00	8	20.6	96	52	0.2	154	0.3	230	-	-	20	330	28	29.6	1008.5	85	3/4
	14.00	8	20.9	96	53.1	0.3	143	0.4	350	-	-	20	270	28	29.7	1007.5	85	3/4
	15.00	8	20.3	96	53.1	0.2	128	0.5	339	-	-	20	270	28	29.7	1007.5	85	3/4
	16.00	8	21.0	96	52.5	0.3	169	0.7	342	-	-	20	270	28	29.7	1007.5	85	3/4
	17.00	8	21.9	96	52.6	0.4	157	0.6	17	-	-	16	235	29	29.7	1007.0	85	3/4
	18.00	8	20.4	96	50.5	0.2	195	0.8	316	-	-	16	240	29	29.8	1008.0	85	3/4
	19.00	8	24.7	96	51.5	0.2	240	0.6	297	-	-	9.2	240	28	29.6	1007.0	85	3/4
	20.00	8	29.4	96	56.8	0.3	160	0.3	349	-	-	11	240	28	29.6	1007.5	92	1/2
	21.00	8	31.0	96	59.8	0.2	187	0.2	304	-	-	11	240	28	29.6	1009.0	92	1/2
	22.00	8	30.9	97	10	0.1	210	0.3	359	-	-	12	240	28	29.5	1009.0	84	1/2
	23.00	8	30.6	97	2.3	0.2	151	0.3	10	-	-	22	250	28	29.5	1009.0	92	1/2
	00.00	8	30.3	97	3.2	0.1	188	0.4	24	-	-	18	240	28	29.5	1009.0	92	1/2

Date	Local time	Lat (N)		Long (E)		Current (5 m)		Current (50m)		Current (100m)		Wind		Air temp (° c)	Surface water temp (° c)	Air press (mbar)	Humidity (%)	cloud
		Deg	Lib	Deg	Lib	Spd (kts)	dir	Spd (kts)	dir	Spd (kts)	dir	Spd (kts)	dir					
6/3/2011	1:00	8	30.6	97	4.7	0.1	167	0.3	240	-	-	18	250	28	29.5	1009.0	92	3/4
	2:00	8	29.4	97	15.1	0.2	181	0.2	235	-	-	20	255	28	29.5	1008.0	92	3/4
	3:00	8	29.1	97	5.9	0.4	254	0.4	50	-	-	16	245	28	29.5	1008.0	92	3/4
	4:00	8	28.9	97	3.8	0.1	236	0.6	38	-	-	18	250	28	29.5	1008.0	92	3/4
	5:00	8	29.9	97	5	0.1	237	0.1	153	-	-	12	262	27	29.5	1008.0	85	3/4
	6:00	8	30.2	96	44.4	0.2	224	0.2	48	-	-	14	252	27	29.5	1008.0	92	3/4
	7:00	8	30.0	96	59.5	0.2	226	0.5	303	-	-	16	245	28	29.5	1008.0	92	3/4
	8:00	8	27.6	96	56.9	0.2	156	0.8	33	-	-	14	248	30	29.4	1008.5	92	3/4
	9:00	8	24.9	96	55.5	0.1	177	0.2	40	-	-	21	230	30	29.4	1009.5	78	3/4
	10:00	8	17.6	96	54.4	0.2	189	0.4	313	-	-	26	250	30	29.6	1009.5	78	3/4
	11:00	8	4.1	96	57	0.0	228	0.3	123	-	-	28	250	29	29.5	1010.0	85	3/4
	12:00	8	11.4	96	59.6	0.1	250	0.2	48	-	-	24	260	29	29.6	1010.0	92	3/4
	13:00	8	10.3	96	59.7	0.1	195	0.2	22	1.2	306	24	250	29	29.5	1008.5	92	3/4
	14:00	8	10.7	96	59.4	0.2	218	0.3	54	-	-	20	250	29	29.6	1007.5	92	3/4
	15:00	8	11.0	96	58.8	0.1	190	0.4	60	-	-	18	240	29	29.6	1007.5	85	3/4
	16:00	8	12.0	96	58.7	0.1	150	0.3	344	-	-	18	250	29	29.6	1006.5	78	3/4
	17:00	8	6.4	97	0.7	0.1	167	0.2	183	-	-	14	261	30	29.6	1006.5	78	3/4
	18:00	8	6.1	97	1.9	0.1	211	0.1	131	-	-	10	264	29	29.6	1006.5	78	3/4
	19:00	8	6.2	97	3.5	0.1	121	0.2	116	-	-	12	290	28	29.6	1007.0	78	3/4
	20:00	8	5.7	97	3.4	0.1	134	0.3	63	-	-	11.6	290	28	29.6	1007.0	85	3/4
	21:00	8	4.5	97	6.9	0.1	264	0.6	64	-	-	8.4	240	28	29.6	1007.5	85	3/4
	22:00	8	4.3	97	7.5	0.1	353	0.6	70	-	-	8.8	240	28	29.6	1007.5	85	3/4
	23:00	8	5.0	97	5.7	0.1	137	0.3	98	-	-	10	260	28	29.6	1008.0	85	2/4
	00:00	8	2.4	97	9.9	0	127	0.3	91	-	-	10	260	28	29.8	1008.0	85	2/4

Date	Local time	Lat (N)		Long (E)		Current (5 m)		Current (50m)		Current (100m)		Wind		Air temp (°c)	Surface water temp (°c)	Air press (mbar)	Humidity (%)	cloud
		Deg	Lib	Deg	Lib	Spd (kts)	dir	Spd (kts)	dir	Spd (kts)	dir	Spd (kts)	dir					
6/4/2011	1.00	8	2.0	97	11.1	0.1	235	0.2	87	-	-	10	260	28	29.4	1008.0	92	3/4
	2.00	8	1.9	97	11.6	0.1	256	0.3	123	-	-	14	250	28	29.4	1008.0	92	3/4
	3.00	8	1.7	97	12	0.1	31	0.5	124	-	-	10	260	28	29.4	1007.0	92	3/4
	4.00	9	7.6	97	12.2	0	225	0.6	101	-	-	14	277	28	29.6	1007.0	92	3/4
	5.00	9	1.5	97	12.4	0.1	315	0.4	116	-	-	12	277	28	29.6	1007.0	92	3/4
	6.00	8	1.5	97	12.6	0.1	6	0.4	142	-	-	16	270	28	29.5	1007.0	85	3/4
	7.00	8	1.8	97	12.8	0	281	0.6	155	-	-	16	270	29	29.5	1007.5	85	3/4
	8.00	8	2.2	97	13.1	0.1	281	0.7	156	-	-	12	260	31	29.6	1008.0	79	3/4
	9.00	8	27.0	97	13.5	0.1	323	0.7	168	-	-	10	260	33	29.6	1007.0	70	3/4
	10.00	8	31.0	97	14.1	0.1	267	0.7	157	-	-	18.1	250	33	29.6	1008.0	64	3/4
	11.00	8	35.0	97	15.2	0	300	0.4	123	-	-	14	240	34	29.7	1008.0	64	3/4
	12.00	8	35.0	97	16.2	0.1	306	0.7	134	-	-	16	260	33	29.6	1009.0	64	3/4
	13.00	8	27.1	97	17.5	0.1	301	0.7	130	-	-	10	270	33	29.6	1009.0	64	3/4
	14.00	8	3.1	97	18.1	0.1	308	0.4	149	-	-	10	260	33	29.5	1009.0	64	3/4
	15.00	8	2.8	97	18.8	0.1	311	0.2	175	-	-	11	260	30	29.6	1008.0	85	3/4
	16.00	8	2.7	97	19.3	0	180	0.4	130	-	-	9	270	30	29.6	1006.0	85	3/4
	17.00	8	2.7	97	20.2	0	249	0.5	165	-	-	12.2	270	29	29.6	1006.0	85	3/4
	18.00	8	2.8	97	20.5	0.1	323	0.6	168	-	-	10	270	29	29.6	1006.0	85	3/4
	19.00	8	2.6	97	20.8	0	285	0.6	156	-	-	10	237	29.6	29	1006.0	85	3/4
	20.00	8	1.0	97	25.7	0.1	11	0.5	182	-	-	6	222	29.6	29.8	1006.5	92	3/4
	21.00	7	59.1	97	31.6	0.1	292	0.3	159	-	-	8	227	28	29	1006.5	92	3/4
	22.00	7	57.2	97	36.9	0.1	347	0.3	166	-	-	10	222	28	29.8	1007.5	92	3/4
	23.00	7	54.9	97	42.8	0.1	111	0.3	161	-	-	8	225	28	29.8	1007.5	92	3/4
	00.00	7	52.7	97	47.4	0	235	0.3	263	-	-	12	228	28	29.8	1008.0	92	2/4

Date	Local time	Lat (N)		Long (E)		Current (5 m)		Current (50m)		Current (100m)		Wind		Air temp (° c)	Surface water temp (° c)	Air press (mbar)	Humidity (%)	cloud
		Deg	Lib	Deg	Lib	Spd (kts)	dir	Spd (kts)	dir	Spd (kts)	dir	Spd (kts)	dir					
6/5/2011	1.00	7	50.2	97	53.9	0.2	153	0.1	281	-	-	10	225	28	29.8	1008.0	92	2/4
	2.00	7	48.3	97	58.2	0.1	32	0.3	86	-	-	8	227	28	29.8	1008.0	92	3/4
	3.00	7	46.5	98	4.3	0.2	306	1.4	100	-	-	8	230	28	29.8	1008.0	92	3/4
	4.00	7	44.8	98	9.8	0	174	0.4	118	-	-	8	231	28	29.8	1007.0	85	3/4
	5.00	7	43.7	98	14.9	0.1	122	1	86	-	-	10	220	28	29.8	1007.5	85	3/4
	6.00	7	44.3	98	19.4	0.4	246	0.9	61	-	-	6	244	28	29.6	1007.5	92	3/4