CRUISE REPORT ON RESEARCH ACTIVITY

M.V.SEAFDEC 2 Cruise No. 36-4/2010

15 September – 25 October 2010

National research survey by Department of Fisheries, Brunei Darussalam

TD/RP/142

This report is base on preliminary data

For readers who may need data in the report, please contact to:

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Cruise Report of Research Activity

1. Cruise Summary

Vessel name: **: M.V.SEAFDEC 2**

Cruise No. : **M.V.SEAFDEC 2** No. 36-4/2010

Period : 15 September – 25 October 2010 (41 days)

Area of Operation : Waters of Brunei Darussalam

Port of Call : Muara Fish Landing Complex (FLC), Brunei Darussalam

Activities : To facilitate on the national research survey conducted by Department of Fisheries, Brunei Darussalam on;

1. Demersal resources survey in Zone 3 and 4 by bottom trawls (Otter board trawl and beam trawl) and deep-sea trap
2. Pelagic resources survey in Zone 3 and 4 by Acoustic instrument (Scientific Echo sounder)
3. Oceanographic survey by Integrated Conductivity Temperature and Depth, Temperature and Depth sensor and acoustic current indicator. Biological survey by Isaacs-Kidd Mid-Water Trawl (IKMT) and Bongo net.
4. Cetacean sighting
5. Training and workshop on Deep Sea Marine Resources Identification in collaborate with Department of Fisheries, Brunei Darussalam

2. List of personnel on board

2.1 Brunei Scientists

Address: Fisheries Station Muara, Bangunan BFC, Lot 4965, Simpang 17, Jalan Perusahaan, Fisheries Department, Ministry of Industry and Primary Resources, Muara BT1728, Brunei Darussalam. Tel: 673-2771063, Fax: 673-2770065

No.	Name	Period
1	Mr. Matzaini Haji Juna (Brunei Chief Scientist)	20-23/9, 3-7/10,9/10 and 11-13/10
2	Mr. Elviro Cinco	20-23/9, 26/9-1/10 and 3-7/10
3	Ms Desimawati Haji Metali	20-23/9
4	Ms. Hajah Alina Haji Jair	20-23/9
5	Mr. Haji Aji Haji Safar	20-23/9, 3-10/10 and 11-13/10
6	Mr. Ahmad Putih	20-23/9, 26/9-1/10, 9/10 and 11-13/10
7	Mr. Bidin Suru	20-23/9, 26/9-1/10, 9/10 and 11-13/10
8	Mr. Talip HJ Omar	20-23/9, 26/9-1/10 and 3-7/10
9	Mr. Abdul Hamid Haji Zainin	20-23/10 and 3-7/10
10	Mr. Harun Haji Putih	20-23/9, 26/9-1/10, 9/10 and 11-13/10
11	Mr. Roslan Haji Lamit	20-23/9 and 3-7/10
12	Mr. Mohd Nazrin Idris	20-23/9
13	Mr. Mohd Hatral Kamal	26/9-1/10, 9/10 and 11-13/10
14	Mr. Haji chuchu Haji Kassim	26/9-1/10, 3-7/10, 9/10 and 11-13/10
15	Mr. Norazmi Haji Bagol	26/9-1/10, 3-7/10, 9/10 and 11-13/10
16	Mr. Jafarali HJ Darif	26/9-1/10
17	Mr. Khairul Abidin HJ Ahmad	3-7/10
18	Mr. Idris Haji Abd Hamid	3-7/10
19	Mr. Haji Ramlee Haji Ahmad	9/10 and 11-13/10

2.2 SEAFDEC Scientist

No.	Name	Period	E-mail
1	Mr. Isara Chanrachkij (Chief Scientist)	19/9-21/2010	isara@seafdec.org
2	Mr. Worawit Wanchana (PhD)	17-19/10/2010	worawit@seafdec.org
3	Ms. Penchan Laongmanee	17-19/10/2010	penchan@seafdec.org
4	Ms. Natinee Sukramingkol (PhD)	19/9-21/10/2010	natinee@seafdec.org
5	Mr. Sayan Promjinda	19/9-21/10/2010	sayan@seafdec.org
6	Mr. Sukchai Arnupapboon	19/9-21/10/2010	sukchai@seafdec.org
7	Mr. Narong Raungsivakul	19/9-21/10/2010	narong@seafdec.org

2.3 Ship Personnel (M.V. SEAFDEC 2)

No.	Name	Position
1	Mr. Tossaporn Sukhapindha	Captain
2	Mr. Nanthawat Phungsuk	Chief Engineer
3	Mr. Suren Pruksarat	Second Officer
4	Mr. Vudhirat Vudthipanyo	Third Officer
5	Mr. Padung Ngowlimhua	Second Engineer
6	Mr. Kittinai Sukdit	Third Engineer
7	Mr. Thana rungjoy	Boatswain
8	Mr. Pradit Kui-prasert	Steersman
9	Mr. Charan Intippunya	Steersman
10	Mr. Worapat Soodkangwan	Able Seaman
11	Mr. Boontarin Wora-in	Fitter
12	Mr. Plew Shodok	Oiler
13	Mr. Teeradet Jantana	Oiler
14	Mr. Akarapol Chaibanyat	Oiler
15	Mr. Saichol Kornnoom	Cook
16	Mr. Marut SangPhuek	Ship's Boy

3. Report in General

SEAFDEC2 Cruise No.36-3/2010 is separated into two sessions i.e. 1) The National Research Survey Cruise collaborated between Department of Fisheries, Brunei Darussalam and SEAFDEC. Area of survey is out bound of 200 m contour depth, territory of Brunei Waters what conducted from 20 September to 13 October 2010. 2) Training and Workshop on Deep Sea Marine Resources Identifications under sponsored by Japanese Trust Fund year 2010 what conducted from 17 to 19 October 2010

Eighteen (18) survey stations, has been programmed to conduct the demersal resource survey by operating bottom trawl (otter-board trawl and beam trawl) and five (5) fishing operations of deep-sea trap along the continental shelf of Zone 3 and 4 within Waters of Brunei Darussalam. Thirty four (34) Oceanographic survey stations have been programmed cover the Zone 3 and 4. Acoustic survey composed by Juvenile and larvae organism sampling has been program on survey thirty two (32) survey stations cover the Zone 3 and 4. Several stations, however, are not able to complete the survey according to the severe weather condition during 7 to 11 October 2010 and air condition machine was trouble during 23 to 25 September 2010 Respected to M.V. SEAFDEC2 cruise order No. 26-1/2010, cruise activities are started from 19 September to 21 October 2010, and separated into 5 trips;

The first trip is conducted during from 20 to 23 September 2010. Total numbers of oceanographic survey are ten (10) operations within continental shelf and slope area, Brunei Waters. Nine (9) Otter-board trawl fishing operations are conducted during this trip. ICTD had trouble during oceanographic survey No.7 at station No. A13. The first trip has been stopped

by the trouble of air condition machine then M.V. SEAFDEC2 urgently to return to Muara FLC for repairing.

The second trip is conducted during from 23 September to 1 October 2010. Nine (9) Oceanographic surveys are conducted during trip. Twelve (12) Beam trawl fishing operations are conducted during this trip. Brunei scientists install their CTD, replaced ICTD of M.V. SEAFDEC2 which trouble on electric supply unit.

The third trip is conducted during from 3 to 7 October 2010. Weather and sea condition is very severe during 6 to 7 October 2010. The third research survey trip has been stopped on 7 October 2010 because rough sea condition. Seven (7) Juvenile sampling operations by IKMT has been conduct and nine (9) stations are abandoned. Nine (9) routes of acoustic survey has been success but twenty three (23) routes have been abandoned. Severe weather condition started from 6 October until 11 October 2011

The forth trip is conducted during from 11 to 13 October 2010. Three (3) Deep sea trap fishing operations has been conduct and four (4) Oceanographic surveys are re-conducted at station No. A4, A6, A8, and A13 (see figure 1). Additional three (3) beam trawl fishing operations are operated in the nighttime in order to compare the catch with daytime.

The fifth trip is served for the Training and workshop on Deep Sea Marine Resources Identification under Japanese trust Fund year 2010 in collaborate with Department of Fisheries, Brunei Darussalam. Demersal resources sampling survey by using Agazzi trawl and deep sea trap are conducted. Sea bed observation by using underwater camera is demonstrated in shallow water area (Zone 2)

Overall result from five (5) survey trips are twenty eight (28) oceanographic survey operations by ICTD/CTD, Bongo net and Neuston net that conducted on twenty four (24) survey stations. Four (4) of them, particularly in the fourth trip, are additional survey operations on some incomplete survey stations. Fifteen (15) survey stations are conducted the demersal resources survey by beam trawl. Nine (9) survey stations are conducted the demersal resources survey by otter-board trawl. Three (3) survey stations are conducted the demersal resources survey by deep sea trap. Two (2) Agazzi fishing trials have been operated during the training and workshop.

Results of catches, however, are not able to report as a part of fishing log. Anyone who require the result of catch, please kindly contact Department of Fisheries, Brunei Darussalam.

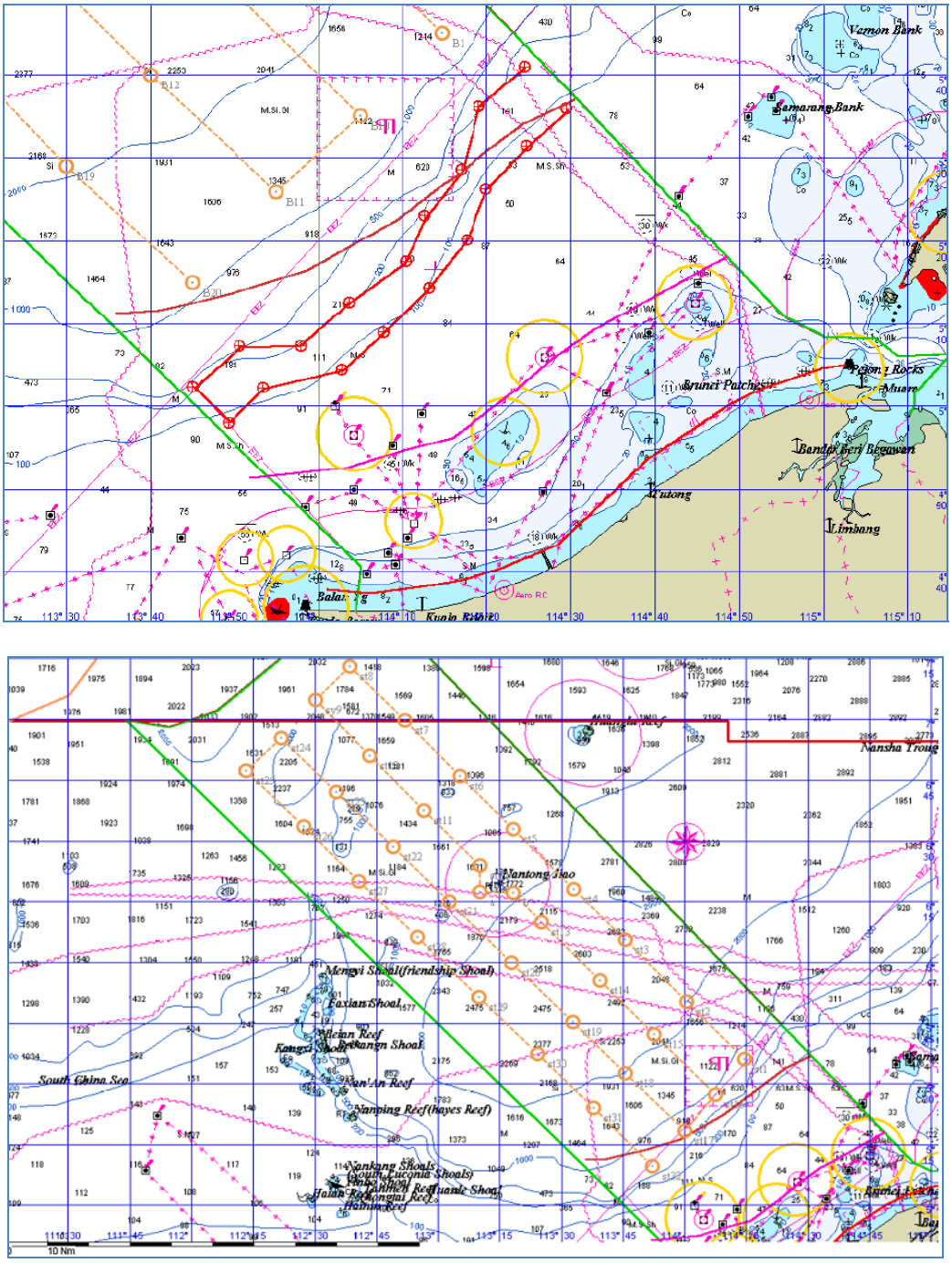


Fig. 1 Map showing the survey stations

Table 1 Survey Station of Trip 1, 2 and 4

Station	Latitude	Longitude
A1	05-36.00 N	114-29.00 E
A2	05-31.00 N	114-25.00 E
A3	05-26.00N	114-20.00 E
A4	05-20.00 N	114-17.00 E
A5	05-14.00 N	114-13.00 E
A6	05-09.00 N	114-07.00 E
A7	05-04.00 N	114-02.00 E
A8	05-02.00 N	113-53.00 E
A9	04-58.00 N	113-49.00 E
A10	05-02.00 N	113-45.00 E
A11	05-07.00 N	113-50.00 E
A12	05-07.00 N	113-57.00 E
A13	05-13.00 N	114-03.00 E
A14	05-18.00 N	114-10.00 E
A15	05-23.00 N	114-12.00 E
A16	05-29.00 N	114-16.00 E
A17	05-36.00 N	114-19.00 E
A18	05-41.00 N	114-24.00 E

Table 2 Survey Station of Trip 3

Station	Latitude	Longitude
B1	05-36.30 N	114-14.48 E
B2	05-50.51 N	114-00.31 E
B3	06-05.81 N	113-45.37 E
B4	06-18.15 N	113-32.95 E
B5	06-33.00 N	113-18.23 E
B6	06-46.10 N	113-05.27 E
B7	06-59.95 N	112-51.75 E
B8	07-13.25 N	112-38.35 E
B9	07-04.85 N	112-30.00 E
B10	06-51.11 N	112-43.18 E
B11	06-37.69 N	112-56.48 E
B12	06-24.16 N	113-09.99 E
a	06-17.50 N	113-09.99 E
b	06-17.28 N	113-18.23 E
B13	06-10.18 N	113-24.93 E
B14	05-55.65 N	113-39.32 E
B15	05-42.42 N	113-52.40 E
B16	05-27.44 N	114-07.45 E
B17	05-18.59 N	113-59.87 E
B18	05-32.80 N	113-45.37 E
B19	05-45.49 N	113-32.73 E
B20	06-00.13 N	113-17.79 E
B21	06-15.20 N	113-02.63 E
B22	06-28.63 N	112-48.90 E
B23	06-42.28 N	112-35.16 E
B24	06-55.48 N	112-21.65 E
B25	06-47.51 N	112-13.19 E
B26	06-33.66 N	112-27.25 E
B27	06-20.23 N	112-40.55 E
B28	06-06.36 N	112-54.94 E
B29	05-51.61 N	113-09.88 E
B30	05-37.62 N	113-24.16 E
B31	05-24.16 N	113-37.68 E
B32	05-09.72 N	113-51.96 E

4. Report on Fishing activities

4.1 Bottom Trawl

4.1.1 Otter board Trawl

Nine (9) otter-board trawl fishing operations are conducted during the first trip of cruise M.V. SEAFDEC 2 No.36-4/2010, Waters of Brunei Darussalam. Depth ranges of capture is along continental shelf and slope of zone 3-4, is from 100 to 200 m. Survey operations were limited at the trawlable stations i.e., A1, A2, A3, A4, A5, A6, A7, A8 and A12). From station what the sea depth was range between 200-470 m., bottom trawl could

not operated due to the limited of warp wire length. Towing time is limited as 30 minutes/operation. Total towing time is 248 minute with towing distance is nm.

Result of catch included with catch per unit effort, species composition and abundance is not present in cruise report. Anyone who wish to know the details please kindly contact department of Fisheries (DOF) Brunei Darussalam or Capture Fisheries Technology Division, SEAFDEC/TD.

Table 3 Summary of otter board trawl fishing operations

Operation	Date	Shooting			Hauling			Sea Depth	Net openning (m)		Towing		Catch
(Station)		Time	Latitude	Longitude	Time	Latitude	Longitude	(m)	Spread	Hight	Time	Distance	(kg)
1 (A2)	21/9/2010	0802	05°30′.90	114°25′.30	0900	05°30′.40 N	114°25′.70 E	105	NA	NA	30	1.6	N/A
2 (A3)		1117	05°25.′60	114°21′.50	1203	05°22′.90 N	114°22′.00 E	110	NA	NA	30	1.6	N/A
3 (A4)		1340	05°18′.20	114°16′.70	1425	05°15′.90 N	114°17′.80 E	108	NA	NA	30	1.5	N/A
4 (A5)		1654	05°12′.60	114°11′.60	1740	05°11′.00 N	114°09′.60 E	109	NA	NA	30	1.5	N/A
5 (A6)	22/9/2010	0630	05°07′.20	114°05′.30	0716	05°06′.20 N	114°02′.80 E	103	NA	NA	30	1.6	N/A
6 (A7)		0909	05°04′.50	114°01′.30	0957	05°03′.40 N	113°58′.90 E	103	NA	NA	30	1.6	N/A
7 (A8)		1135	05°01′.00	113°51′.70	1210	04°59′.90 N	113°51′.10 E	121	NA	NA	20	1.0	N/A
8 (A12)	23/9/2010	0614	05°08′.30	114°00′.40	0710	05°06′.50 N	113°57.′90 E	190	NA	NA	38	1.9	N/A
9 (A1)		1611	05°32′.20	114°25′.10	1655	05°32′.20 N	113°27′.60 E	115	NA	NA	30	1.6	N/A

N/A: Not available (contact SEAFDEC/TD or DOF Brunei Darussalam)

4.1.2 Beam Trawl

Fifteen (15) beam trawl fishing operations are conducted during the second, fourth and fifth trip of cruise M.V. SEAFDEC 2 No.36-4/2010, Waters of Brunei Darussalam. Depth ranges of capture is along continental shelf and slope of zone 3-4, is from 100 to 470 m. Survey operations were limited at the trawlable stations i.e., A1, A2, A3, A4, A5, A6, A7, A8, A9, A11, A12, A13 and A14. Two of them (A11 and A13) are operated at nighttime in order to compare the catch between daytime and nighttime. One operation is demonstrated to participant of Training and Workshop on Deep Sea Marine Resources Identification during the fifth trip. Total towing time is 900 minute with total towing distance is
Result of catch included with catch per unit effort, species composition and abundance is not present in cruise report. Anyone who wish to know the details please kindly contact department of Fisheries (DOF) Brunei Darussalam or Capture Fisheries Technology Division, SEAFDEC/TD.

Table 4 Summary of beam trawl fishing operations

Operation	Date	Shooting			Hauling			Sea Depth	Net opening (m)		Towing		Catch
Station		Time	Latitude	Longitude	Time	Latitude	Longitude	(m)	Spread	Hight	Time (mm)	Distance (nm)	(kg)
1 (A1)	28/9/2010	0758	05°33′.10 N	114°27′.00 E	0905	05°30′.40 N	114°25′.70 E	108	4	0.8	60	3.8	N/A
2 (A2)		0938	05°27.′90 N	114°22′.20 E	1043	05°25′.90 N	114°20′.70 E	110	4	0.8	60	2.1	N/A
3 (A3)		1108	05°24′.00 N	114°18′.70 E	1215	05°21′.60 N	114°17′.60 E	130	4	0.8	60	2.0	N/A
4 (A4)		1415	05°18′.60 N	114°15′.70 E	1520	05°16′.30 N	114°14′.80 E	115	4	0.8	60	2.1	N/A
5 (A5)		1626	05°11′.50 N	114°10′.30 E	1733	05°11′.70 N	114°13′.00 E	120	4	0.8	60	2.2	N/A
6 (A6)	29/9/2010	0558	05°05′.70 N	114°03′.90 E	0705	05°07′.50 N	114°05′.80 E	100	4	0.8	60	2.0	N/A
7 (A7)		0931	05°03′.70 N	114°02′.00 E	1037	05°01′.90 N	114°00′.90 E	97	4	0.8	60	2.0	N/A
8 (A8)		1349	05°01′.10 N	113°52′.00 E	1450	04°59′.80 N	113°49.′30 E	116	4	0.8	60	2.5	N/A
9 (A9)		1527	05°00′.50 N	113°47′.60 E	1540	05°00′.40 N	113°47′.10 E	169	4	0.8	60	2.4	N/A
10 (A11)	30/9/2010	0602	05°07′.10 N	113°52′.60 E	0712	05°09′.70 N	113°54′.60 E	264-361	4	0.8	60	2.7	N/A
11 (A12)		1018	05°11′.20 N	114°00′.60 E	1128	05°08′.40 N	114°00′.20 E	264	4	0.8	60	2.4	N/A
12 (A14)		1545	05°22′.20 N	114°11′.90 E	1657	05°19′.50 N	114°10′.90 E	379	4	0.8	60	2.4	N/A
13 (A13)	11/10/2010	1900	05°12′.30 N	114°02′.44 E	2013	05°10′.30 N	114°00′.50 E	264-235	4	0.8	60	2.3	N/A
14 (A11)	12/10/2010	1832	05°11′.10 N	113°55′.50 E	1945	05°09′.10 N	113°54′.10 E	420-350	4	0.8	60	2.1	N/A
15	17/10/2010	1616	05°40′.90 N	114°24′.10 E	1730	05°38′.20 N	114°22′.80 E	305-243	4	0.8	60	2.1	N/A

N/A: Not available (contact SEAFDEC/TD or DOF Brunei Darussalam)

4.2 Deep Sea Trap

Three (3) deep sea trap operations are conducted on the fourth trip. Depth substratums of all operations are between 250 to 400 m. Forty-five (45) traps are deployed at fishing operation No.1 and No.2. Forty-two (42) traps are deployed at fishing operation Station No.2. Total number of trap deployed in the first trip is one hundred thirty-two (132) traps. Immersion time of trap fishing operation No.1, 2 and 3 is between 14 to 26 hours.

Operation	Shooting		Hauling		Position		Immersion	Sea Depth	Number of	Catch
	Date	Time	Date	Time	Latitude	Longitude	Time (hh:mm)	(m)	Trap	(kg)
1	11/10/2010	1808	12/10/2010	0846	05°12′.50 N	114°02′.50	14:36	258-320	45	N/A
2	12/10/2010	1617	13/10/2010	0638	05°07′.00 N	113°50.70 E	15:05	266-339	45	N/A
3	19/10/2010	1418	20/10/2010	1620	05°36′.90 N	114°21.20 E	26:44	290-388	42	N/A

N/A: Not available (contact SEAFDEC/TD or DOF Brunei Darussalam)

Table 4 Summary of Deep-sea Trap fishing operations

4.3 Isaacs-Kidd Mid-Water Trawl (IKMT)

Eleven (11) IKMT operations are conducted on the third trip. The operation is purposed to collect juvenile and large planktonic marine organism what live from the pelagic to meso pelagic layer particular the deep scattering layer (D.S.L.). Depth substratum of all IKMT operations are referred with DSL what obtained by scientific echo sounder. Depth of capture is between 90 to 450 m. Eight (8) IKMT operations are operated in zone 4, Station No.B1, B3, B5, B21, B19 and B17. At station No. B19, two fishing operations are operated at nighttime and daytime in order to compare the catch between daytime and nighttime. Two (2) operations are operated in zone 3 where depth is greater than 400 m. Total towing time is 330 minutes with total towing distance is

Regarding to the IKMT detection by sonar, SEAFDEC operator found trouble during extract the sonar dome, ship wheelhouse is much vibrated. **Recommend to check sonar dome during vessel ship docking.**

Result of catch included with catch per unit effort, species composition and abundance is not present in cruise report. Anyone who wish to know the details please kindly contact department of Fisheries (DOF) Brunei Darussalam or Capture Fisheries Technology Division, SEAFDEC/TD.

Operation		Shooting			Hualing			Depth of	Towing	Distance	Catch	
(Station)	Date	Time	Latitude	Longitude	Time	Latitude	Longitude	capture (m)	Time (mm)	(nm)	(kg)	TD file name
1 (B1)		7:54	05°36'.60 N	114°14'.70 E	8:40	05°33'.70 N	114°15'.00 E	208-334	30	2.0	N/A	S2TD36B1
2 (B3)		15:22	05°06'.30 N	114°43'.80 E	16:07	06°08'.50 N	113°45'.20 E	182	30	1.6	N/A	S2TD36B3
3 (B3)	4/10/2010	16:22	06°08'.80 N	113°45'.10 E	17:05	05°21'.60 N	114°17'.60 E	-	30	1.6	N/A	-
4 (B5)		7:57	06°35'.30 N	113°17'.50 E	8:40	06°34'.80 N	113°15'.20 E	98	30	2.2	N/A	S2TD36B5
5 (B21)		13:55	06°16'.80 N	113°01'.70 E	14:42	06°15'.30 N	112°59'.40 E	200-292	30	1.7	N/A	S2TD36B21
6 (B19)	5/10/2010	19:37	05°45'.20 N	113°32'.70 E	20:12	05°43'.70 N	113°30'.90 E	120-175	30	2.0	N/A	S2TD36B19.1
7 (B19)		8:32	05°47'.20 N	113°32'.00 E	9:16	05°46'.00 N	113°29'.60 E	350-560	30	1.9	N/A	S2TD36B19.2
8 (B17)		15:45	05°19'.30 N	113°59'.10 E	16:27	05°16'.80 N	113°58'.70 E	300-380	30	1.7	N/A	S2TD36B17
9 (A12)	6/10/2010	19:00	05°09'.50 N	114°00'.00 E	19:35	05°07'.90 N	113°58'.20 E	65-75	30	2.1	N/A	S2TD36A12
10 (A16)		5:30	05°30'.50 N	114°16'.70 E	6:05	05°28'.40 N	114°15'.00 E	67-70	30	2.0	N/A	S2TD36A16
11 (A18)	7/10/2010	10:18	05°41'.30 N	114°23'.00 E	11:37	05°39'.60 N	114°21'.70 E	230-265	30	1.7	N/A	S2TD36A18

N/A: Not available (contact SEAFDEC/TD or DOF Brunei Darussalam)

Table 4 Summary of Isaacs-Kidd Mid-Water Trawl (IKMT) fishing operations

5. Report on Cetacean sighting survey

-None of cetacean school was discovered during cruise survey-

6. Pelagic Resources Survey by Hydro-acoustic instrument

Hydro acoustic survey was conducted from 3 to 7 October 2010, using the scientific echo sounder model Furuno FQ-80 installed onboard MV SEAFDEC2. The survey speed are approximate 10 knot during survey between station, and 3 to 4 knot during IKMT fishing operaions. Total survey tracks included with calibrations are 38 tracks. The data of backscattering were recorded and made the backup in hard drive. The output data of this survey were recorded in SSV data to correct TS and SV data.

Some trouble on computer recording data has occurred during pre-check the system. It was not able to run application program FQ-80. Brunei computer technician found there is serious computer virus inflected with the operating system (OS). Formatting hard drive computer and install new OS can be solve program however the calibration before survey has trouble. **Recommend to contact technician of FQ-80 to overall check whole system both software hardware of FQ-80 before carry on the next cruises.**

Other information is in the acoustic observation log sheet **(Appendix 3)** and the specification of Furuno FQ-80 as below;

Frequency	Low freq, 38 kHz High freq, 70/120 kHz (selectable) Split beam, Dual frequency
Display selection	Single frequency or Dual frequency (selectable)
Processing functions	1. Single fish Split beam – w/azimuth offset Normal beam, ideal beam – no azimuth offset 2. TS histogram -10 dB > TS > -70 range, 0.7 dB interval 3. SV/SA calculation Tow step integration, 20 target fish setting, Individual layer integration 4. Single fish movement motion Single fish displayed in position plan view display
Output data	1. Parameter (HAC) 2. Raw echo data : V (VHAC) 3 Single cell SV data : SCSV (HAC)

Pulse duration

Pulse length	38 kHz	70 kHz	120 kHz
Short	0.263 ms	0.143 ms	0.143 ms
Medium	0.842 ms	0.457 ms	0.457 ms
Long	2.73 ms	1.43 ms	1.43 m

7. Oceanographic survey

There were only 24 oceanographic stations completed during leg I, II and III (20 Sep. to 13 Oct.) due to the connector of Carousel Water Sampler had shorted during deployed at station A11. Partial details of the survey and environmental condition of each station had shown in table 1 and 2, respectively. The materials and methods of the oceanographic survey are described as followed;

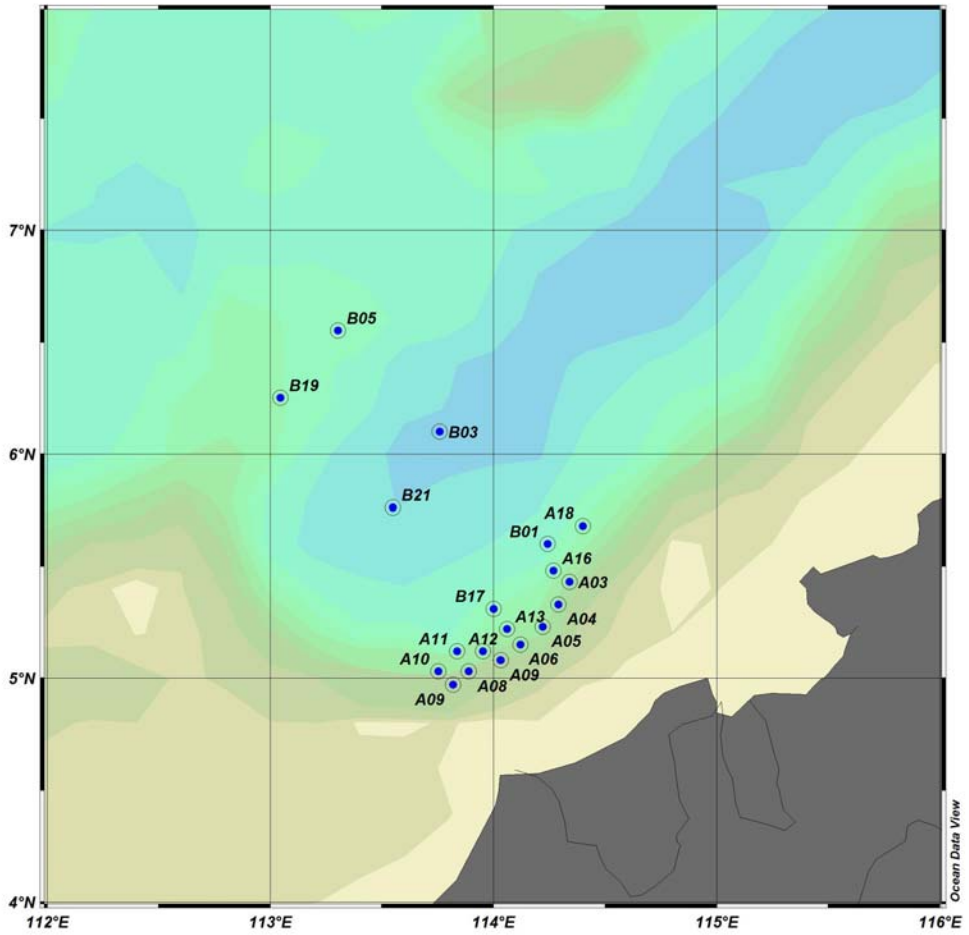


Figure 2. Map of the oceanographic stations at the Brunei Darussalam Waters on cruise 36-4/2010.

7.1 Physical and chemical oceanography

The total of 19 station of iCTD was deployed from the sea surface to approximately 10 meter above the sea bottom and the maximum depth of 700 meter at the station deeper than 400 meter (Table 1). Physical and chemical characteristic of water including conductivity, temperature, fluorescence, dissolved oxygen, and PAR was measuring using SeaBird 911 CTD and Thermosalinograph with Fluorometer (TSG-Fluorometer) (Figure 1). All iCTD data were average into every 1 meter interval. Data in each station were divided into down cast and up cast.

TSG – Fluorometer were operated along the cruise track of M.V. SEAFDEC 2 to measure the temperature and chlorophyll a. The system was designed to pump

water from approximately 5 meter below the sea surface continuously. The data were average every 6 second. Operating summary had shown in table 1.

During retrieving the iCTD, the Carousel Water Sample comprised with the Niskin Bottles which is a part of CTD system were used for collecting water samples from standard depth at station no A03, A05, A07, A09, and A10 (Table 1). Due to the malfunction of carousel water sampler, the niskin bottles were attached to the oceanographic wire and collecting water samples at the desired depth then drops the messenger down the wire that triggers the closing of the bottles instead at station no A02, A04, A06, A06, A08, A11, A12, A13, A14, A15, A16, A18, B01, B05, B21, B19, B17 (Figure 2). About 60 ml of water sample from Niskin bottles was filtering through Whatman GFC filter paper and stored in the freezer at -45 ºC for nutrient analysis (nitrite, nitrate, phosphate) excepted silicate at room temperature at SEAFDEC/TD laboratory (Figure 3).

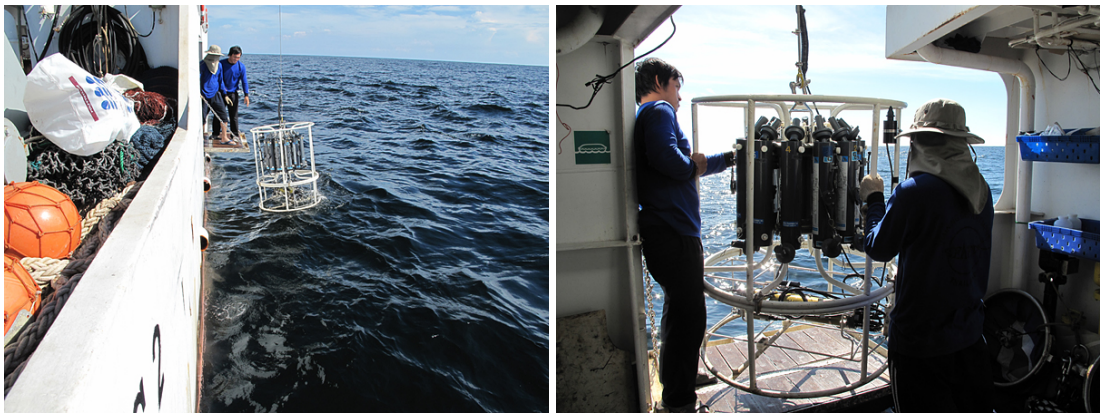


Figure 3. iCTD unit with carousel water sampling unit deployment.

Figure 4. Water sample filtering through Whatman GFC filter paper and stored in the freezer at -45 ºC for nutrient analysis.

7.2 Biological oceanography

Marine biological data were conducted on the larval fishes, juvenile fishes, and zooplankton. The 45 cm diameter bongo frames were attached with the net mesh size of 500 µm and 330 µm, respectively (Figure 4). 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 1-2 knots. Angle of towing cable was maintained at 45 ^{o}. Towing depth was observed using Net SONDE (depth meter). Towing time for downward and upward was 30 minute each. The samples were preserved in 5% buffered formalin and seawater immediately. Partial details of Bongo net operation are in table 1.

Figure 5. Bongo net towing and samples collecting.

Fish larvae and juvenile was also collected using the Neuston net (Figure 5). The 75 cm long, square shape frame with net mesh size 1000 µm. The operation was conducted after the bongo net operation with the towing time approximately 15 minute at the sea surface. The details of the Neuston net operation are in table 1.

Figure 6. Neuston net towing and samples collecting.

7.3 Preliminary analysis of oceanographic parameters

The vertical profiles of temperature, salinity, fluorescence, dissolved oxygen and pH from the oceanographic stations A03 to A13, A16, A18, of zone 3 and B01, B03, B05, B17, B19, B21of zone 4 were plotted separately and shown in figure 6 and 7.

All the survey stations conducted during the day time (air temperature recorded between 26-32 ^{o}C). Sea depth varies between 100 m (station A06) and 2,499m (station B03). Water transparency measured from 12m to 23m. Sea surface temperature (SST) was between 28-31 ^{o}C. In general, the SST did not differ greatly at the survey area, however, SST were much lower in the stations that the sea depth was shallower (100-119m) (Figure 8). The subsurface salinity varied between 28.0 to 34.5 PSU which low salinity was occurred at the northeast of the survey area (Figure 9). Rapid changes of salinity, dissolved oxygen, and pH with increasing depth also found at the thermocline layer from 60m to 100m. At depth greater than 100 m, salinity are nearly stable (Figure 6 and 7).

The present survey was conducted during the transitional period between Southwest monsoon and Northeast monsoon (September to October). However, the inter-monsoon temperature variability along the continental shelf edge (station A03 to A09) off Brunei Coast could not be found compared to those previous surveys in 2009 at the same area. Previously, the seasonal thermocline incidental observed at the depth between 10m and 60m during March and April 2009 while the permanent thermocline could observe at the greater depth from 60 to 100 meter (See *M.V. SEAFDEC2 Cruise Report of Cr.31-1/2009*). The wind that prevailed during the transitional period between Southwest and Northeast monsoon (September –October 2010) affect to the water circulation than those transition during April as the well-mixing of the subsurface layer driven the permanent thermocline layer from 60m to 100m in the present survey.

The spatial patterns of the temperature variability along the continental slope (station A12 to A18) and off Brunei Waters (station B01 to B21) were corresponding to the observational datasets of station A03 to A08 (Figure 6 and 7) as well.

The watermass was characterized by two watermasses, the upper mixed layer (0-70m) and the mixed layer at maximum salinity water (34.5 psu) at sea depth from 80m down below, which evident from plotting of the TS diagram as shown in figure 10 (station A03 to A 18) and figure 11 (station B01 to B21).

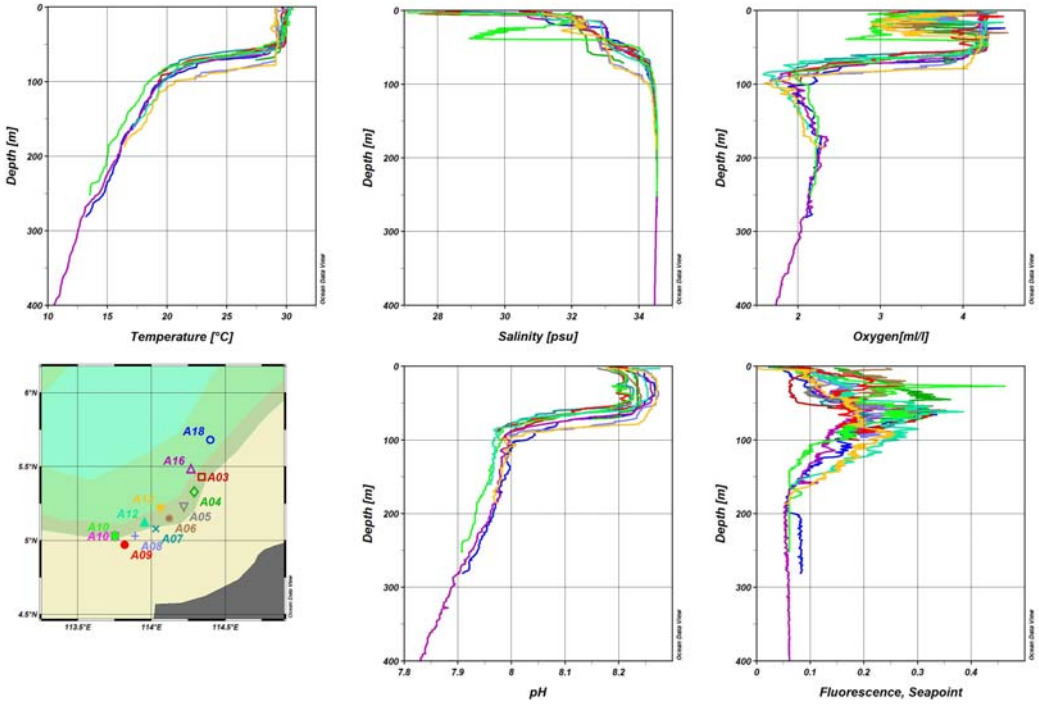


Figure 7. Profile of temperature (°C), salinity (psu), dissolved oxygen (ml/l), pH and fluorescence of oceanographic stations A03 to A18.

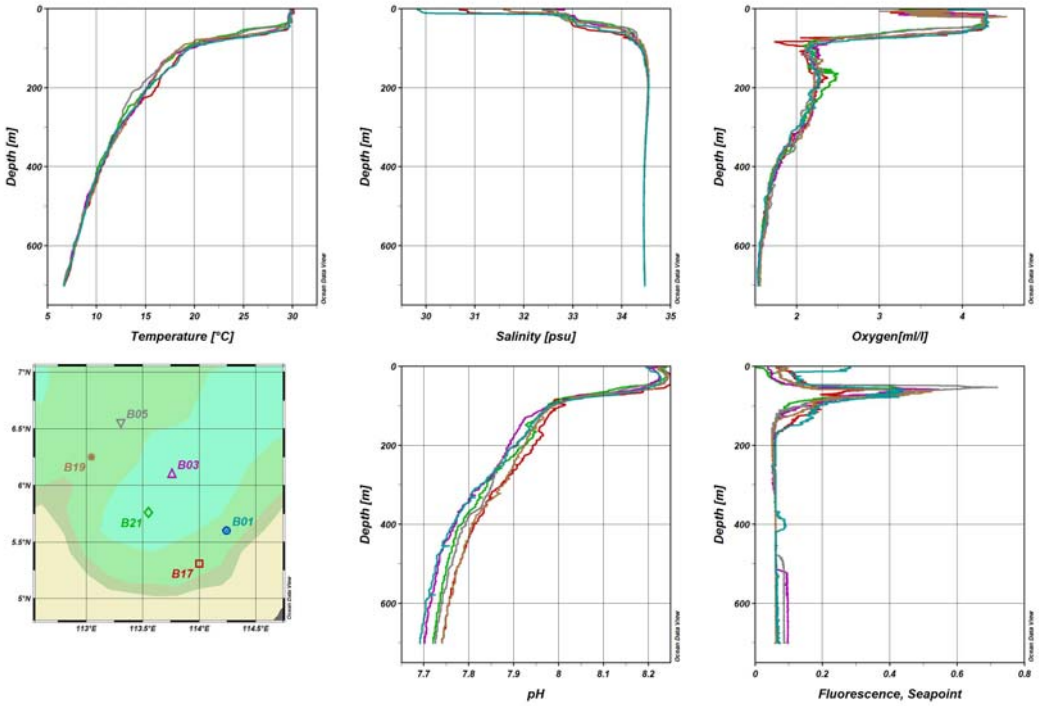


Figure 8. Profile of temperature (°C), salinity (psu), dissolved oxygen (ml/l), pH and fluorescence of oceanographic stations B01 to B19.

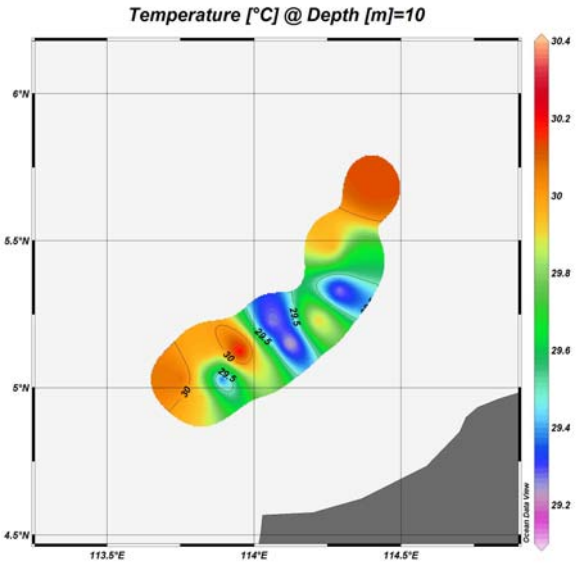


Figure 9. Sea surface temperature between station A03 and A18.

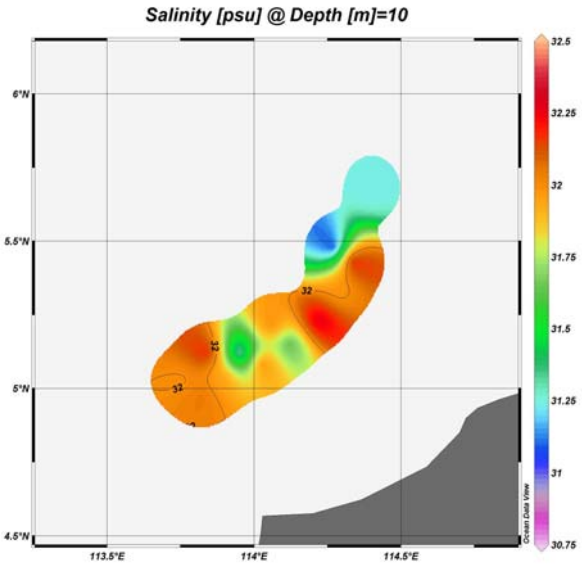


Figure 10. Sea surface salinity between station A03 and A18.

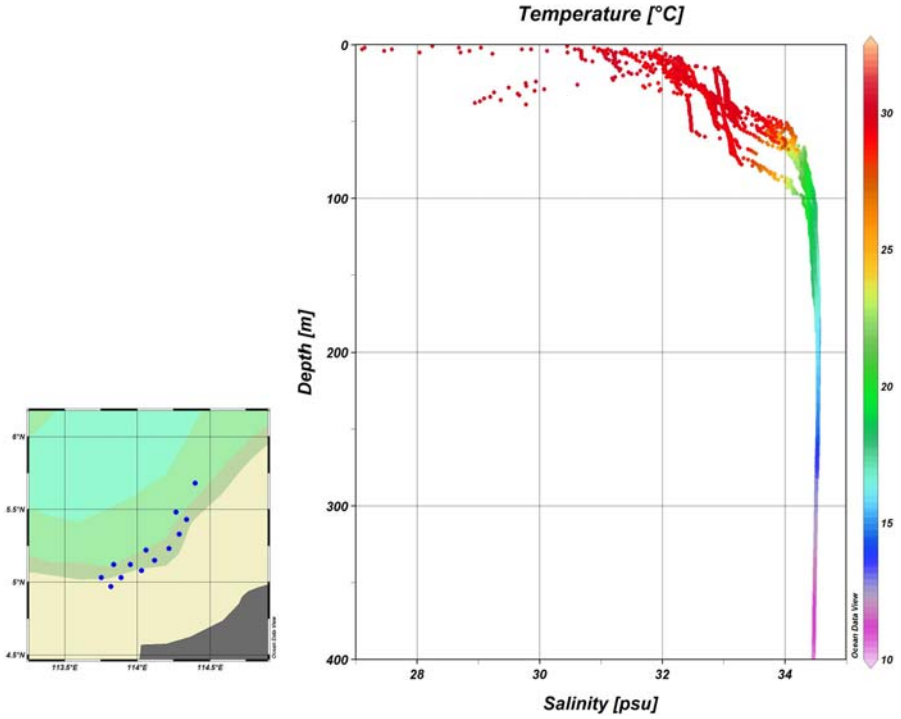


Figure11. Vertical profiles of temperature-salinity by sea depth along the survey tracks of station A03 to A18.

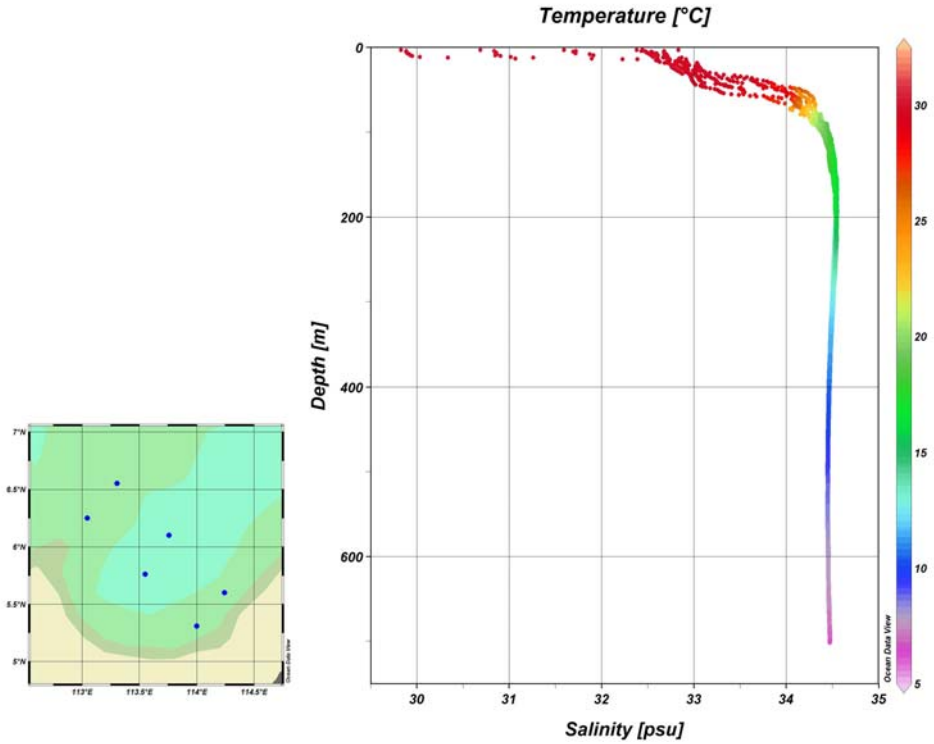


Figure12. Vertical profiles of temperature-salinity by sea depth along the survey tracks of station B01 to B19.

Table 5. Partial detail of oceanographic stations

St. no.	Date	Start	Finish	Position		Bottom Depth (m)	CTD	TSG	Bongo net					Neuston net			Niskin bottle (depth, m)	Transparency	Forel scale no.
				Latitude	Longitude		file name	file name	Towing depth (m)	Start Time	Towing period (min)	Flowmeter rev. 500μm	Flowmeter rev. 330μm	Start Time	Towing period (min)	Flowmeter rev.		(m)	
A01	23-Sep-10	14:47	15:35	05° 35.8′ N	114° 29.2′E	110	-	s2cr36A01toA02	80	15:05	30	9640	10730	14:47	15	42518	-		
A02	28-Sep-10	06:16	07:34	05° 30.9′ N	114° 25.1′E	109	-	s2cr36A02toA03	73	06:45	31	7740	9030	07:18	16	38723	0,9,18,27,45,68		
A03	21-Sep-10	09:56	11:12	05° 25.99′ N	114° 20.14′E	128	s2d36A03, s2u36A03	s2cr36A03toA04	75	10:20	30	11820	12120	10:57	15	34361	0,10,20,30,50,75,100	12.9	10
A04	28-Sep-10	12:30	13:22	05° 19.90′ N	114° 17.25′E	112	-	s2cr36A04toA05	92	12:30	30	8135	9525	13:06	16	42801	0,8,16,24,40,60,72		
	11-Oct-10	14:53	15:01	05° 19.98′ N	114° 17.41′E	112	s2d36A04, s2u36A04	-	-	-	-	-	-	-	-	-	-		
A05	21-Sep-10	15:32	16:37	05° 13.91′ N	114° 13.38′E	101	s2d36A05, s2u36A05	s2cr36A05toA06	75	15:47	30	10480	11070	16:22	15	39407	0,10,20,30,50,75,90	14.5	10
A06	28-Sep-10	18:40	19:10	05° 08.90′ N	114° 07.20′E	100	-	s2cr36A06toA07	-	-	-	-	-	-	-	-	0,9,18,27,45,68,81		
	29-Sep-10	07:02	08:15	05° 08.98′ N	114° 07.33′E	100	-	-	80	07:02	30	8940	10700	07:58	17	33346	-		
	11-Oct-10	16:53	17:01	05° 08.99′ N	114° 07.27′E	100	s2d36A06, s2u36A06	-	-	-	-	-	-	-	-	-	-		
A07	22-Sep-10	07:53	08:43	05° 04.51′ N	114° 01.94′E	102	s2d36A07, s2u36A07	s2cr36A07toA08	75	07:53	30	9910	10485	08:26	15	34033	0,10,20,30,50,75,90	12.8	10
A08	29-Sep-10	11:45	12:37	05° 01.95′ N	113° 53.39′E	117	-	s2cr36A08toA09	82	11:45	33	11400	10900	12:19	15	28107	0,6,12,18,30,45,60		
	12-Oct-10	13:03	13:13	05° 02.09′ N	113° 53.33′E	119	s2d36A08, s2u36A08	-	-	-	-	-	-	-	-	-	-		
A09	22-Sep-10	12:57	14:00	04° 58.02′ N	113° 49.13′E	101	s2d36A09, s2u36A09	s2cr36A09toA10	75	13:12	30	10280	10900	13:45	15	38532	0,10,20,30,50,75,90	11.9	11
A10	22-Sep-10	14:29	15:52	05° 01.95′ N	113° 45.17′E	315-402	s2d36A10, s2u36A10	-	75	14:46	30	9335	9692	14:29	15	39395	0,10,20,30,50,75,100,125,200,250	16.7	9
A11	22-Sep-10	16:36	17:53	05° 07.05′ N	113° 50.28′E	336-361	s2d36A11, s2u36A11	s2cr36A11toA12	125	17:05	30	8390	8485	17:37	15	37280	0,10,20,30,50,75,100,125,200,250,275		
A12	30-Sep-10	08:03	08:55	05° 07.32′ N	113° 57.32′E	201-216	-	s2cr36A12toA13	115	08:03	34	12150	13750	08:38	17	41753	-		
	6-Oct-10	19:47	19:59	05° 06.99′ N	113° 57.13′E	197	s2d36A12, s2u36A12	-	-	-	-	-	-	-	-	-	0,12,20,32,76,80,104,156		
A13	23-Sep-10	08:55	09:42	05° 12.9′ N	114° 03.2′E	320-322	-	-	125	08:55	30	8650	8110	09:27	15	40156	-		
	30-Sep-10	12:10	13:13	05° 13.0′ N	114° 03.3′E	309-374	-	-	-	-	-	-	-	-	-	-	0,12,18,30,45,60,75,120,180		
	12-Oct-10	10:45	11:08	05° 13.13′ N	114° 03.35′E	309-341	s2d36A13, s2u36A13	-	-	-	-	-	-	-	-	-	-		
A14	30-Sep-10	13:50	15:27	05° 19.4′ N	114° 11.4′E	257-219	-	-	78	14:40	30	12490	11920	15:12	15	45422	0,5,10,15,25,38,50,63,100	16.9	3
A15	23-Sep-10	10:55	11:42	05° 22.9′ N	114° 12.1′E	413-417	-	-	133	11:13	30	7600	8100	10:55	15	36199	0,8,16,24,40,60,72,100,160		
A16	7-Oct-10	06:19	08:00	05° 29.04′ N	114° 16.11′E	445-453	s2d36A16, s2u36A16	-	140	07:12	31	8950	9450	07:45	15	37540	0,14,23,32,54,81,108,135,216		
A17	23-Sep-10	13:05	13:58	05° 36.0′ N	114° 19.1′E	543	-	-	118	13:05	30	8750	9350	13:37	15	42405	-		
A18	7-Oct-10	09:25	10:55	05° 41.02′ N	114° 24.17′E	318-339	s2d36A18, s2u36A18	-	148	10:07	31	9160	9660	10:39	16	36458	0,14,23,32,54,81,108,135,218		
B01	4-Oct-10	05:40	07:48	05° 36.21′ N	114° 14.63′E	844	s2d36B01, s2u36B01	s2cr36B01	118	07:00	31	9460	9870	07:33	15	49411	0,10,20,30,50,75,100,125,200		
B03	4-Oct-10	13:10	15:19	06° 05.77′ N	113° 45.51′E	2,044-2,499	s2d36B03, s2u36B03	s2cr36B03	90	14:30	30	9700	10220	15:04	15	43174	-		
B05	5-Oct-10	05:53	07:49	06° 33.28′ N	113° 18.25′E	1,364	s2d36B05, s2u36B05	s2cr36B05toB07	113	07:07	30	8250	8500	07:38	11	36721	0,12,19,31,50,77,100,127,200		
B21	5-Oct-10	11:49	13:53	06° 15.17′ N	113° 02.71′E	1,390	s2d36B21, s2u36B21	s2cr36B21	102	13:05	31	9940	9995	13:38	15	44211	0,12,23,35,58,85,116,154,231	22.9	2
B19	6-Oct-10	06:34	08:28	05° 45.32′ N	113° 32.99′E	2,368	s2d36B19, s2u36B19	s2cr36B19	102	07:41	30	10470	10905	08:12	16	30324	0,13,22,30,52,78,104,131,209		
B17	6-Oct-10	13:50	15:40	05° 18.56′ N	114° 00.06′E	796-800	s2d36B17, s2u36B17	s2cr36B17toA16	136	14:54	31	9560	10110	15:27	13	33903	0,9,18,27,45,68,90,113,194	13.02	3

Table 6. Environmental condition during oceanographic survey

Station No	Position		Wind		Air					Sea Surface	Current					
											10 m		25 m		50 m	
	Latitude	Longitude	Spd. (Knt)	Dir.	Temp (^{o}C)	Press. (mbar)	Humidity (%)	Weather	Sea stage	Temp (^{o}C)	Spd.(Knt)	Dir	Spd.(Knt)	Dir	Spd.(Knt)	Dir
A01	05° 35.8´ N	114° 29.2´E	2.0	280	31.8	1011	79	partıy cloudy	slight	30.8	0.1	110	0.1	120	0.3	286
A02	05° 30.9´ N	114° 25.1´E	4.0	252	26.0	1013.5	92	rain	slight	29.6	0.1	053	0.2	108	0.4	252
A03	05° 25.99´ N	114° 20.14´E	10.0	000	28.8	1014.5	85	cloudy	slight	29.8	0.7	076	0.5	052	0.1	181
A04	05° 19.90´ N	114° 17.25´E	4.0	270	28.5	1013.0	85	cloudy	slight	30.3	0.1	128	0.4	296	0.4	205
	05° 19.98´ N	114° 17.41´E	10.0	240	28.4	1013.0	85	cloudy	moderate	29.2	0.5	056	0.7	084	-	-
A05	05° 13.91´ N	114° 13.38´E	10.0	250	31.0	1011.0	79	cloudy	slight	30.2	0.3	067	0.3	070	0.4	235
A06	05° 08.90´ N	114° 07.20´E	10.0	260	28.3	1011.5	85	cloudy	slight	28.3	0.1	344	0.4	296	0.2	227
	05° 08.98´ N	114° 07.33´E	4.0	070	31.5	1013	79	partıy cloudy	slight	30.2	0.2	323	0.2	283	0.7	208
	05° 08.99´ N	114° 07.27´E	8.0	200	29.1	1013.0	85	cloudy	slight	28.2	1.5	050	0.4	103	-	-
A07	05° 04.51´ N	114° 01.94´E	4.0	070	31.5	1013.0	79	partıy cloudy	slight	30.2	0.2	323	0.2	283	0.7	208
A08	05° 01.95´ N	113° 53.39´E	10	180	29.1	1013.0	78	cloudy	slight	30.1	0.8	018	0.7	049	0.2	101
	05° 02.09´ N	113° 53.33´E	2.0	230	30.0	1014.0	78	partıy cloudy	slight	29.3	1.6	040	0.8	064	0.1	183
A09	04° 58.02´ N	113° 49.13´E	6.0	180	29.6	1013.0	72	cloudy	slight	30.2	0.3	006	0.3	010	0.1	226
A10	05° 01.95´ N	113° 45.17´E	4.0	220	30.9	1010.5	72	partıy cloudy	slight	31.0	0.0	000	0.1	156	0.5	235
A11	05° 07.05´ N	113° 50.28´E	2.0	270	30.9	1010	63	partıy cloudy	slight	30.7	0.3	358	0.1	355	0.0	330
A12	05° 07.32´ N	113° 57.32´E	14	180	27.8	1012.5	85	cloudy	slight	29.8	0.6	017	0.5	036	0.3	091
	05° 06.99´ N	113° 57.13´E	8.0	040	29.8	1012.0	92	cloudy	slight	30.4	-	-	-	-	-	-
A13	05° 12.9´ N	114° 03.2´E	4.0	040	28.7	1013.5	85	cloudy	slight	30.3	0.1	067	0.3	015	0.1	302
	05° 13.0´ N	114° 03.3´E	10.0	230	28.9	1010.5	85	cloudy	slight	30.1	0.2	021	0.1	359	0.1	305
	05° 13.13´ N	114° 03.35´E	4.0	180	29.4	1015.0	78	partıy cloudy	slight	29.3	1.4	061	0.5	074	0.2	065
A14	05° 19.4´ N	114° 11.4´E	8.0	240	29.2	1010.0	85	cloudy	slight	30.1	0.4	007	0.3	339	0.3	316
A15	05° 22.9´ N	114° 12.1´E	4.0	030	29.6	1014.0	78	cloudy	slight	30.6	0.1	010	0.1	340	0.1	013
A16	05° 29.04´ N	114° 16.11´E	6.0	050	30.2	1011.5	92	cloudy	slight	30.0	0.2	305	0.4	287	0.7	321
A17	05° 36.0´ N	114° 19.1´E	2.0	340	31.1	1012.0	73	partly cloudy	slight	31.0	0.0	000	0.2	037	0.3	252
A18	05° 41.02´ N	114° 24.17´E	4.0	050	30.5	1013.5	73	cloudy	slight	30.2	0.2	057	0.1	079	0.5	346
B01	05° 36.21´ N	114° 14.63´E	4.0	000	29.2	1010.5	92	partıy cloudy	slight	29.9	0.0	339	0.2	236	0.7	195

Table 6. Environmental condition during oceanographic survey (cont.)

Station No	Position		Wind		Air					Sea Surface	Current					
											10 m		50 m		100 m	
	Latitude	Longitude	Spd. (Knt)	Dir.	Temp (°C)	Press. (mbar)	Humidity (%)	Weather	Sea stage	Temp (°C)	Spd.(Knt)	Dir	Spd.(Knt)	Dir	Spd.(Knt)	Dir
B03	06° 05.77′ N	113° 45.51′E	6.0	040	29.9	1011.5	85	cloudy	slight	30.0	0.0	000	0.4	041	0.2	115
B05	06° 33.28′ N	113° 18.25′E	6.0	070	29.5	1011.5	92	cloudy	slight	29.9	0.1	309	1.1	135	0.7	197
B21	06° 15.17′ N	113° 02.71′E	6.0	050	31.5	1012.0	73	cloudy	slight	30.0	0.2	205	0.7	144	0.8	163
B19	05° 45.32′ N	113° 32.99′E	6.0	060	26.7	1011.5	92	cloudy	slight	29.9	0.1	349	0.4	272	0.7	238
B17	05° 18.56′ N	114° 00.06′E	6.0	020	28.4	1011	92	cloudy	slight	30.2	0.1	340	0.2	297	0.4	331

Appendix 1) Research activities of M.V. SEAFDEC2

Date	Time	Activities	Remark
15 Sep 10	0945	Leaved SEAFDEC/TD for Muara Port, Brunei	
19 Sep 10	1010	Arrived Muara fishing station, Alongside Tenggairi	
20 Sep 10	0800	All researcher DOF/Brunei (12 persons) embarked on board	
	0830	Leave Muara fishing port to survey station	
	1306-2345	Topographic survey station A1-A18	
21 Sep 10	0802-0920	Bottom trawl fishing operation 1 At station A2(A2-A3), sea depth 105 m.	
	0957-1114	Oceanographic survey op.1 at station A3 - CTD , sea depth 128 m - Bongo net, sea depth125 m./ depth 75 m. - Neuston net, sea depth 114 m.	
	1117-1224	Bottom trawl fishing operation 2 At station A3(A3-A4), sea depth 110 m.	
	1340-1446	Bottom trawl fishing operation 3 At station A4(A4-A5), sea depth 108 m.	
	1532-1637	Oceanographic survey op.2 at station A5 - CTD , sea depth 101 m - Bongo net, sea depth101 m./depth 75 m. - Neuston net, sea depth 101 m.	
	1654-1802	Bottom trawl fishing operation 4 At station A5(A5-A6), sea depth 109 m.	
22 Sep 10	0630-0735	Bottom trawl fishing operation 5. At station A6(A6-A7), sea depth 103 m.	
	0753-0858	Oceanographic survey op.3 at station A7 - Bongo net, sea depth99 m/ depth 75 m. - Neuston net, sea depth 100 m. - CTD , sea depth 102 m	
	0909-1018	Bottom trawl fishing operation 6. At station A7(A7-A8), sea depth 103 m.	
	1135-1229	Bottom trawl fishing operation 7. At station A8(A8-A9), sea depth 121 m.	
	1258-1400	Oceanographic survey op.4 at station A9 - CTD , sea depth 103 m - Bongo net, sea depth 102 m/ depth 75 m. - Neuston net, sea depth 110 m.	
	1429-1553	Oceanographic survey op.5 at station A 10 - Neuston net, sea depth 409 m - Bongo net, sea depth 416 m/ depth 75 m. - CTD , sea depth 330 m	
	1635-1753	Oceanographic survey op.6 at station A 11 - CTD , sea depth 336 m - Bongo net, sea depth 360 m/ depth 125 m. - Neuston net, sea depth 360 m	
	1855-2025	CTD wire arrangement sea depth 1,111 m.	
23 Sep 10	0614-0747	Bottom trawl fishing operation 8 At station A 12(A12-A13), sea depth 190 m.	

Date	Time	Activities	Remark
23 Sep 10	0855-0943	Oceanographic survey op.7 at station A 13 Bongo net, sea depth 320 m./ depth 125 m. Neuston net, sea depth 322 m.	
	1055-1142	Oceanographic survey op.8 at station A 15 Neuston net, sea depth 413 m. Bongo net, sea depth 417 m./ depth 133 m.	
	1305-1335	Oceanographic survey op.9 at station A 17 Bongo net, sea depth 543 m./ depth 118 m. Neuston net, sea depth 540 m.	
	1447-1535	Oceanographic survey op.10at station A 1 Neuston net, sea depth 110 m. Bongo net, sea depth 110 m./ depth 80 m.	
	1611-1718	Bottom trawl fishing operation 9 At station A1(A1-A2), sea depth 115 m.	
		Proceeded to Muara fishing port	
	2200	Alongside Tenggiri, Muara fishing port	
	2230	All researchers DOF/Brunei disembarked on board	
26 Sep 10	0630	All researcher DOF/Brunei (9 persons) embarked on board	
27 Sep 10	1730-1825	Load the fuel 34 Tons	
	1830	Leaved BSM's pier for survey area station A2	
28 Sep 10	0617-0734	Oceanographic survey op.11 at station A 2 - CTD/ water sampling , sea depth 108 m - Bongo net, sea depth 108 m/ depth 73 m Neuston net, sea depth 106 m	
	0758-0912	Beam trawl fishing operation 1. At station A1(A1-A2), sea depth 108 m.	
	0938-	Beam trawl fishing operation 2. At station A2(A2-A3), sea depth 110 m.	
	1108-1223	Beam trawl fishing operation 3. At station A3(A3-A4), sea depth 108 m.	
	1233-1400	Oceanographic survey op.12 at station A 4 - Bongo net, sea depth 112 m/ depth 92 m Neuston net, sea depth 106 m - CTD/ water sampling , sea depth 108 m	
	1415-1542	Beam trawl fishing operation 4. At station A4(A4-A5), sea depth 115 m.	
	1626-1750	Beam trawl fishing operation 5. At station A5(A5-A6), sea depth 120 m.	
	1840-1910	Oceanographic survey op.13 at station A 6 - CTD/ water sampling , sea depth 102 m	
29 Sep 10	0558-0716	Beam trawl fishing operation 6. At station A6(A6-A7), sea depth 100 m.	
	0725-0756	Oceanographic survey op.13 at station A6 - Bongo net, sea depth 101 m/ depth 80 m Neuston net, sea depth 100 m.	
	0931-1058	Beam trawl fishing operation 7. At station A7(A7-A8), sea depth 97 m.	

Date	Time	Activities	Remark
29 Sep 10	1144-1324	Oceanographic survey op.14 at station A8 - Bongo net, sea depth 118 m/ depth 82 m Neuston net, sea depth 97 m. - CTD / water sampling , sea depth 119 m	
	1349-1505	Beam trawl fishing operation 8. At station A8(A8-A9), sea depth 116 m.	
	1527-1700	Beam trawl fishing operation 9. At station A9(A9-A10), sea depth 169 m.	
30 Sep 10	0602-0735	Beam trawl fishing operation 10. At station A 11(A11-A12), sea depth 264 m.	
	0806-1015	Oceanographic survey op.15 at station A12 - Bongo net, sea depth 201 m./ depth 115 m. - Neuston net, sea depth 216 m. - CTD/ water sampling , sea depth 210 m	
	1018-1145	Beam trawl fishing operation 11. At station A 12(A12-A13), sea depth 350 - 264 m.	
	1210-1313	Oceanographic survey at station A13 - CTD/ water sampling , sea depth 309 m	
	1350-1527	Oceanographic survey op.16 at station A 14 - CTD / water sampling , sea depth 258 m Bongo net, sea depth 240 m/ depth 78 m Neuston net, sea depth 196 m.	
	1545-1733	Beam trawl fishing operation 12. At station A 14(A14-A15), sea depth 350 - 260 m.	
	1755-1855	Oceanographic survey at station A15 - CTD/ water sampling , sea depth 309 m	
		Proceed to Muara fishing port	
1 Oct 10	0015	Alongside M.V.TENGGIRI , Muara fishing port	
3 Oct 10	1300	All researcher DOF/Brunei (10 persons) embarked on board	
	1500	Leave Muara fishing port to survey station	
	1600-1720	To calibrated FQ-80 for acoustic survey	
	2230	Arrived at station B1 and drifting	
4 Oct 10	0545-0748	Oceanographic survey op.17 at station B 1 - CTD / water sampling , sea depth 843 m Bongo net, sea depth 850 m/ depth 118 m Neuston net, sea depth 837 m.	
	0915-1308	Acoustic survey from station B1 to station B3	
	1315-1519	Oceanographic survey op.18 at station B 3 - CTD / water sampling , sea depth 2,044 m Bongo net, sea depth 2,499 m/ depth 90 m Neuston net,	
	1522-1618	IKMT operation 2 at station B 3, sea depth 2,699 And depth of IKMT at 182 m.	
	1622-1720	IKMT operation 3 at station B 3, sea depth 2,044 And depth of IKMT at 400 m.	
	1746-2147	Acoustic survey from station B3 to station B5	
	1619-1736	Bottom beam trawl fishing operation 5 At station A5(A5-A6), sea depth 118 m.	

Date	Time	Activities	Remark
5 Oct 10	0556-0749	Oceanographic survey op.19 at station B 5 - CTD / water sampling , sea depth 1,364 m Bongo net, sea depth 1,296 m/ depth 113 m Neuston net, sea depth 1,318 m	
	0757-0853	IKMT operation 4 at station B5, sea depth 1,280 And depth of IKMT at 98 m.	
	0922-1147	Acoustic survey from station B5 to station B 21	
	1150-1352	Oceanographic survey op.20 at station B 21 CTD / water sampling , sea depth 1,390 m Bongo net, sea depth 1,319 m/ depth 100 m Neuston net,	
	1355-1452	IKMT operation 5 at station B 21, sea depth 1,390 And depth of IKMT at 200-292 m.	
	1514-1931	Acoustic survey from station B21 to station B 19	
	1937-2020	IKMT operation 6 at station B19, sea depth 2,300 And depth of IKMT at 120-175 m.	
6 Oct 10	0635-0828	Oceanographic survey op.21 at station B 19 - CTD / water sampling , sea depth 2,368 m Bongo net, sea depth 2,358 m/ depth 102 m Neuston net, sea depth 2,368 m	
	0832-0934	IKMT operation 7 at station B19, sea depth 2,368 And depth of IKMT at 350-560 m.	
	0958-1350	Acoustic survey from station B19 to station B 17	
	1354-1540	Oceanographic survey op.22 at station B 17 - CTD / water sampling , sea depth 800 m Bongo net, sea depth 807 m/ depth 136 m Neuston net, sea depth 2,368 m	
	1545-1640	IKMT operation 8 at station B17, sea depth 855 And depth of IKMT at 300-380 m.	
6 Oct 10	1900-1940	IKMT operation 9 at station A12, sea depth 227 And depth of IKMT at 65-75 m.	
	1950-2020	Oceanographic survey op.22 at station B 17 - CTD / water sampling , sea depth 197 m	
7 Oct 10	0530-0609	IKMT operation 10 at station A16, sea depth 413 And depth of IKMT at 67-70 m.	
	0622-0800	Oceanographic survey op.23 at station A16 - CTD / water sampling , sea depth 442 m Bongo net, sea depth 492 m/ depth 140 m Neuston net, sea depth 2,368 m	
	0927-1055	Oceanographic survey op.24 at station A18 - CTD / water sampling , sea depth 314 m Bongo net, sea depth 355 m/ depth 148 m Neuston net, sea depth 355 m	
	1057-1150	IKMT operation 11 at station A18, sea depth 420 And depth of IKMT at 230-265 m.	
		Proceeded to Muara fishing port	
	1730	Port alongside M.V.TENGGIRI	
	1800	All researchers DOF/Brunei disembarked on board	
9 Oct 10	0800	All researcher DOF/Brunei (8 persons) embarked onboard	
	0840	Leave Muara fishing port to survey station	

Date	Time	Activities	Remark
9 Oct 10	1020	Proceeded back to Muara fishing port due to rough sea condition	
	1145	Port alongside M.V.TENGGIRI , Muara fishing port	
	1400	All researchers disembarked	
11 Oct 10	0800	All researcher DOF/Brunei (8 persons) embarked on board	
	0845	Leave Muara fishing port to survey station	
	1458-1506	Oceanographic survey at station A4 - CTD / water sampling , sea depth 112 m	
	1657-1705	Oceanographic survey at station A6 - CTD / water sampling , sea depth 100 m	
	1808-1840	Start shooting Deep sea trap operation 1 Sea depth 258 -320 m.	
	1900-2035	Beam trawl fishing operation 13. At station A13, sea depth 108 m.	
12 Oct 10	0846-1018	Start hauling Deep sea trap operation 1	
	1047-1113	CTD addition for station A13	
	1307-1315	CTD addition for station A 8	
	1617-1645	Start shooting Deep sea trap operation 2 Sea depth 339 -266 m.	
	1832-2005	Beam trawl fishing operation 14. At station A11, sea depth 420-350 m.	
13 Oct 10	0638-0835	Start hauling Deep sea trap operation 2	
		Proceeded to the area for setting Video camera	
	1445-1550	Setting underwater Video camera	
	1555-1650	Shooting underwater Video camera	
		Proceeded to Muara fishing port	
	1750	Port alongside M.V.TENGGIRI ,muara fishing port	
	1815	All researchers disembarked	
14-16 Oct 10		Prepare for training and workshop	
17 Oct 10	0800	All participants and instructor embarked on board	
	0830	Leave Muara fishing port to survey station	
	1418-1448	Shooting Deep sea trap operation 3. At station A17 Sea depth 388 m	
	1502-1603	Topographic survey by participant group 1	
	1616-1750	Beam trawl fishing operation 15. sea depth 305 - 290 m.	
	1400	All researchers disembarked on board	
18 Oct 10	0755-0900	Topographic survey by participant group 2	
	0940-1100	Agazzi trawl operation 1 , sea depth 113m	
	1118-1217	Topographic survey by participant group 3	
	1458-1506	Oceanographic survey at station A4 - CTD / water sampling , sea depth 112 m	
	1440-1600	Agazzi trawl operation 2 , sea depth 163-157m	
	1620-1815	Hauling Deep sea trap op. 3	
19 Oct 10	0600-0700	Topographic survey by participant group 4	
	0717-0847	Agazzi trawl operation 3 , sea depth 360m	
	1250-1325	Seabed observation by towing Under water VDO	

Date	Time	Activities	Remark
19 Oct 10		camera op. 1 , sea depth 52 m	
	1340-1420	Seabed observation by towing Under water VDO camera op. 2 , sea depth 50 m	
		Proceed to Muara fishing station	
	1630	Port alongside M.V.TENGGIRIi	
	1700	All participants and Instructor disembarked on board	

Appendix 2) Fishing log
Appendix 2.1 Otter board trawl fishing log

TRAWL FISHING LOGSHEET
Operation No.1

Cruise no: 36-4/2010		**Name of Vessel**				**Air**		
Survey station No.A2(A2-A3)		M.V. SEAFDEC 2				Air Temp.	28	(°C)
Date: 21-Sep-10						Pressure	1014	hpa
Moon age: 13 phase: 97		**Start shooting**		**Finish shooting**		Humidity	92	%
Wind		Time	0802	Time	0830	**Water**		
Speed (Kt)	Direction	Latitude	05_30.90 N	Latitude	05_29.10 N	Surface temp.	29.7	(°C)
22	000	Longitude	114_25.30 E	Longitude	114_25.40 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	0900	Time	0920	**Current**		
Sea condition : Slight		Latitude	05_27.50 N	Latitude	05_26.90 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_25.40 E	Longitude	114_25.40 E	10	0.4	074°
Eng. Mode: trawl mode		**Fishing gear**				25	0.2	355°
Speed (kt): 3.4		Type of trawl: Bottom trawl				50	0.1	310°
RPM: 900		Towing time: 30 minute		Towing distance(nm): 1.6		Depth of capture (m)		105
Pitch: 12		Warp angle: Stb 68 / Port 69		Warp length (m): 350 m		Type of bottom		Muddy
Towing direction: 180°		Net spread (m): -		Net openning (m): -		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.2

Cruise no: 36-4/2010		**Name of Vessel**				**Air**		
Survey station No.A3(A3-A4)		M.V. SEAFDEC 2				Air Temp.	29.5	(°C)
Date: 21-Sep-10						Pressure	1014.5	hpa
Moon age: 13 phase:97		**Start shooting**		**Finish shooting**		Humidity	85	%
Wind		Time	1117	Time	1133	**Water**		
Speed (Kt)	Direction	Latitude	05_25.60 N	Latitude	05_24.50 N	Surface temp.	30.6	(°C)
10	000	Longitude	114_21.50 E	Longitude	114_21.70 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1203	Time	1224	**Current**		
Sea condition : Slight		Latitude	05_22.90 N	Latitude	05_22.70 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_22.00 E	Longitude	114_22.50 E	10	0.5	087°
Eng. Mode: trawl mode		**Fishing gear**				25	0.3	081°
Speed (kt): 3.2		Type of trawl: Bottom trawl				50	0.2	162°
RPM: 900		Towing time: 30 minute		Towing distance(nm): 1.6		Depth of capture (m)		110
Pitch: 11		Warp angle: Stb 71 / Port 70		Warp length (m): 500 m		Type of bottom		Muddy
Towing direction: 180°		Net spread (m): 17.2		Net openning (m):-		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.3

Cruise no: 36-4/2010		**Name of Vessel**				**Air**		
Survey station No.A4(A4-A5)		M.V. SEAFDEC 2				Air Temp.	30.5	(°C)
Date: 21-Sep-10						Pressure	1013.5	hpa
Moon age: 13 phase:97		**Start shooting**		**Finish shooting**		Humidity	82	%
Wind		Time	1340	Time	1355	**Water**		
Speed (Kt)	Direction	Latitude	05_18.20 N	Latitude	05_17.20 N	Surface temp.	30.3	(°C)
8	330	Longitude	114_16.70 E	Longitude	114_17.10 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1425	Time	1446	**Current**		
Sea condition : Slight		Latitude	05_15.90 N	Latitude	05_15.60 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_17.80 E	Longitude	114_18.30 E	10	0.4	046°
Eng. Mode: trawl mode		**Fishing gear**				25	0.3	008°
Speed (kt): 3.1		Type of trawl: Bottom trawl				50	0.1	255°
RPM: 900		Towing time: 30 minute		Towing distance(nm): 1.5		Depth of capture (m)		108
Pitch: 10		Warp angle: Stb 74.5 / Port 73		Warp length (m): 500 m		Type of bottom		Muddy
Towing direction: 160°		Net spread (m): 17.0		Net openning (m):-		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.4

Cruise no: 36-4/2010		**Name of Vessel**				**Air**		
Survey station No.A5 (A5-A6)		M.V. SEAFDEC 2				Air Temp.	29.9	(°C)
Date: 21-Sep-10						Pressure	1011	hpa
Moon age: 13 phase:97		**Start shooting**		**Finish shooting**		Humidity	78	%
Wind		Time	1654	Time	1710	**Water**		
Speed (Kt)	Direction	Latitude	05_12.60 N	Latitude	05_12.00 N	Surface temp.	30.6	(°C)
8	030	Longitude	114_11.60 E	Longitude	114_10.80 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1740	Time	1802	**Current**		
Sea condition : Slight		Latitude	05_11.00 N	Latitude	05_10.70 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_09.60 E	Longitude	114_09.40 E	10	0.4	014°
Eng. Mode: trawl mode		**Fishing gear**				25	0.2	023°
Speed (kt): 3.1		Type of trawl: Bottom trawl				50	0.3	186°
RPM: 900		Towing time: 30 minute		Towing distance(nm): 1.5		Depth of capture (m)		109
Pitch: 12		Warp angle: Stb 69 / Port 70		Warp length (m): 500 m		Type of bottom		Muddy
Towing direction: 230°		Net spread (m): 17.1		Net openning (m):-		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.5

Cruise no: 36-4/2010		**Name of Vessel**				**Air**		
Survey station No.A6 (A6-A7)		M.V. SEAFDEC 2				Air Temp.	29.4	(°C)
Date: 22-Sep-10						Pressure	1012	hpa
Moon age: 14 phase:99		**Start shooting**		**Finish shooting**		Humidity	85	%
Wind		Time	0630	Time	0646	**Water**		
Speed (Kt)	Direction	Latitude	05_07.20 N	Latitude	05_07.00 N	Surface temp.	30.2	(°C)
4	070	Longitude	114_05.30 E	Longitude	114_04.20 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	0716	Time	0735	**Current**		
Sea condition : Slight		Latitude	05_06.20 N	Latitude	05_06.20 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_02.80 E	Longitude	114_02.30 E	10	0.2	316°
Eng. Mode: trawl mode		**Fishing gear**				25	0.3	299°
Speed (kt): 3.1		Type of trawl: Bottom trawl				50	0.5	220°
RPM: 900		Towing time: 30 minute		Towing distance(nm): 1.6		Depth of capture (m)		103
Pitch: 11		Warp angle: Stb 72 / Port 73		Warp length (m): 450 m		Type of bottom		Muddy
Towing direction: 235°		Net spread (m): 17.3		Net openning (m):-		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.6

Cruise no: 36-4/2010		**Name of Vessel**				**Air**		
Survey station No.A7 (A7-A8)		M.V. SEAFDEC 2				Air Temp.	30.7	(°C)
Date: 22-Sep-10						Pressure	1013	hpa
Moon age: 14 phase:99		**Start shooting**		**Finish shooting**		Humidity	61	%
Wind		Time	0909	Time	0927	**Water**		
Speed (Kt)	Direction	Latitude	05_04.50 N	Latitude	05_04.10 N	Surface temp.	30.3	(°C)
4	050	Longitude	114_01.30 E	Longitude	114_00.40 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Party Cloudy		Time	0957	Time	1018	**Current**		
Sea condition : Slight		Latitude	05_03.40 N	Latitude	05_03.60 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	113_58.90 E	Longitude	113_58.30 E	10	0.2	315°
Eng. Mode: trawl mode		**Fishing gear**				25	0.3	297°
Speed (kt): 3.1		Type of trawl: Bottom trawl				50	0.3	226°
RPM: 900		Towing time: 30 minute		Towing distance(nm): 1.6		Depth of capture (m)		103
Pitch: 10		Warp angle: Stb 68 / Port 70		Warp length (m): 450 m		Type of bottom		Muddy
Towing direction: 230°		Net spread (m): 17.4		Net openning (m):-		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.7

Cruise no: 36-4/2010		**Name of Vessel**				**Air**		
Survey station No.A8 (A8-A9)		M.V. SEAFDEC 2				Air Temp.	30.4	(°C)
Date: 22-Sep-10						Pressure	1013.5	hpa
Moon age: 14 phase:99		**Start shooting**		**Finish shooting**		Humidity	67	%
Wind		Time	1135	Time	1150	**Water**		
Speed (Kt)	Direction	Latitude	05_01.00 N	Latitude	05_00.00 N	Surface temp.	30.5	(°C)
6	180	Longitude	113_51.70 E	Longitude	113_51.40 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1210	Time	1229	**Current**		
Sea condition : Slight		Latitude	04_59.00 N	Latitude	04_58.90 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	113_51.10 E	Longitude	113_50.80 E	10	0.2	328°
Eng. Mode: trawl mode		**Fishing gear**				25	0.0	256°
Speed (kt): 3.0		Type of trawl: Bottom trawl				50	0.6	208°
RPM: 900		Towing time: 20 minute		Towing distance(nm): 1.0		Depth of capture (m)		121
Pitch: 11		Warp angle: Stb 71 / Port 69		Warp length (m): 500 m		Type of bottom		Muddy
Towing direction: 190°		Net spread (m): 17.6		Net openning (m):-		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.8

Cruise no: 36-4/2010		**Name of Vessel**				**Air**		
Survey station No.A12		M.V. SEAFDEC 2				Air Temp.	28.4	(°C)
Date: 23-Sep-10						Pressure	1011	hpa
Moon age: 15 phase:100		**Start shooting**		**Finish shooting**		Humidity	92	%
Wind		Time	0614	Time	0632	**Water**		
Speed (Kt)	Direction	Latitude	05_08.30 N	Latitude	05_07.60 N	Surface temp.	30.2	(°C)
4	000	Longitude	114_00.40 E	Longitude	113_59.40 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	0710	Time	0747	**Current**		
Sea condition : Slight		Latitude	05_06.50 N	Latitude	05_06.20 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	113_57.90 E	Longitude	113_57.50 E	10	0.1	012°
Eng. Mode: trawl mode		**Fishing gear**				25	0.2	001°
Speed (kt): 3.1		Type of trawl: Bottom trawl				50	0.2	232°
RPM: 900		Towing time: 38 minute		Towing distance(nm): 1.9		Depth of capture (m)		190
Pitch: 13		Warp angle: Stb 35 / Port 67		Warp length (m): 800 m		Type of bottom		Muddy
Towing direction: 130°		Net spread (m): 17.4		Net openning (m):-		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.9

Cruise no: 36-4/2010		**Name of Vessel**				**Air**		
Survey station No.A1		M.V. SEAFDEC 2				Air Temp.	30.8	(°C)
Date: 23-Sep-10						Pressure	1011	hpa
Moon age: 15 phase:100		**Start shooting**		**Finish shooting**		Humidity	79	%
Wind		Time	1611	Time	1625	**Water**		
Speed (Kt)	Direction	Latitude	05_32.20 N	Latitude	05_32.10 N	Surface temp.	30.7	(°C)
8	270	Longitude	114_25.10 E	Longitude	114_26.20 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1655	Time	1718	**Current**		
Sea condition : Slight		Latitude	05_32.20 N	Latitude	05_32.40 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_27.60 E	Longitude	114_28.50 E	10	0.3	103°
Eng. Mode: trawl mode		**Fishing gear**				25	0.3	118°
Speed (kt): 3.0		Type of trawl: Bottom trawl				50	0.3	303°
RPM: 900		Towing time: 30 minute		Towing distance(nm): 1.6		Depth of capture (m)		115
Pitch: 11		Warp angle: Stb 71 / Port 73		Warp length (m): 800 m		Type of bottom		Muddy
Towing direction: 090°		Net spread (m): 19-20		Net openning (m):-		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

Appendix 2.2 Beam trawl fishing log

TRAWL FISHING LOGSHEET
Operation No.1

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A1(A1-A2)		M.V. SEAFDEC 2				Air Temp.	26	(°C)
Date: 28-Sep-10						Pressure	1014	hpa
Moon age: 20 phase: 77		**Start shooting**		**Finish shooting**		Humidity	92	%
Wind		Time	0758	Time	0805	**Water**		
Speed (Kt)	Direction	Latitude	05_33.10 N	Latitude	05_32.70 N	Surface temp.	29.5	(°C)
4	310	Longitude	114_27.00 E	Longitude	114_26.80 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	0905	Time	0912	**Current**		
Sea condition : Slight		Latitude	05_30.40 N	Latitude	05_30.20 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_25.70 E	Longitude	114_25.60 E	5	0.3	047°
Eng. Mode: Trawl		**Fishing gear**				25	0.4	112°
Speed (kt): 2.5		Type of trawl: Bottom Beamtrawl				50	0.4	242°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 3.8		Depth of capture (m)		108
Pitch: 3		Warp angle: P/60		Warp length (m): 250 m		Type of bottom		Muddy
Towing direction: 210°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.2

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A2(A2-A3)		M.V. SEAFDEC 2				Air Temp.	26.9	(°C)
Date: 28-Sep-10						Pressure	1015	hpa
Moon age: 20 phase: 77		**Start shooting**		**Finish shooting**		Humidity	92	%
Wind		Time	0938	Time	0943	**Water**		
Speed (Kt)	Direction	Latitude	05_27.90 N	Latitude	05_27.60 N	Surface temp.	30.2	(°C)
4	330	Longitude	114_22.20 E	Longitude	114_21.90 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1043	Time	1049	**Current**		
Sea condition : Slight		Latitude	05_25.90 N	Latitude	05_25.70 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_20.70 E	Longitude	114_20.60 E	5	0.1	061°
Eng. Mode: Trawl		**Fishing gear**				25	0.2	228°
Speed (kt): 2.0		Type of trawl: Bottom Beamtrawl				50	0.4	209°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.1		Depth of capture (m)		110
Pitch: 4		Warp angle: P/62		Warp length (m): 300 m		Type of bottom		Muddy
Towing direction: 210°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.3

Cruise no: 36-4 /2010		Name of Vessel				Air		
Survey station No.A3(A3-A4)		M.V. SEAFDEC 2				Air Temp.	27.9	(°C)
Date: 28-Sep-10						Pressure	1014	hpa
Moon age: 20 phase: 77		Start shooting		Finish shooting		Humidity	92	%
Wind		Time	1108	Time	1115	Water		
Speed (Kt)	Direction	Latitude	05_24.00 N	Latitude	05_23.50 N	Surface temp.	30	(°C)
4	270	Longitude	114_18.70 E	Longitude	114_18.40 E	Bottom temp.	N/R	(°C)
Weather condition		Start hauling		Finish hauling		Transparency	N/R	(m)
Cloudy		Time	1215	Time	1223	Current		
Sea condition : Slight		Latitude	05_21.60 N	Latitude	05_21.30 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_17.60 E	Longitude	114_17.70 E	5	0.2	111°
Eng. Mode: Trawl		Fishing gear				25	0.2	301°
Speed (kt): 2.1		Type of trawl: Bottom Beamtrawl				50	0.3	243°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.0		Depth of capture (m)		130
Pitch: 3		Warp angle: P/63		Warp length (m): 450 m		Type of bottom		Muddy
Towing direction: 207°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.4

Cruise no: 36-4 /2010		Name of Vessel				Air		
Survey station No.A4(A4-A5)		M.V. SEAFDEC 2				Air Temp.	28.7	(°C)
Date: 28-Sep-10						Pressure	1011.5	hpa
Moon age: 20 phase: 77		Start shooting		Finish shooting		Humidity	85	%
Wind		Time	1415	Time	1420	Water		
Speed (Kt)	Direction	Latitude	05_18.60 N	Latitude	05_18.30 N	Surface temp.	30.2	(°C)
8	250	Longitude	114_15.70 E	Longitude	114_15.60 E	Bottom temp.	N/R	(°C)
Weather condition		Start hauling		Finish hauling		Transparency	N/R	(m)
Cloudy		Time	1520	Time	1542	Current		
Sea condition : Slight		Latitude	05_16.30 N	Latitude	05_16.20 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_14.80 E	Longitude	114_15.80 E	5	0.2	192°
Eng. Mode: Trawl		Fishing gear				25	0.6	317°
Speed (kt): 2.1		Type of trawl: Bottom Beamtrawl				50	0.4	222°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.1		Depth of capture (m)		115
Pitch: 3.5		Warp angle: P/62		Warp length (m): 400 m		Type of bottom		Muddy
Towing direction: 215°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.5

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A5(A5-A6)		M.V. SEAFDEC 2				Air Temp.	27.9	(°C)
Date: 28-Sep-10						Pressure	1011	hpa
Moon age: 20 phase: 77		**Start shooting**		**Finish shooting**		Humidity	92	%
Wind		Time	1626	Time	1633	**Water**		
Speed (Kt)	Direction	Latitude	05_11.50 N	Latitude	05_11.50 N	Surface temp.	30.4	(°C)
6	250	Longitude	114_10.30 E	Longitude	114_10.80 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1733	Time	1750	**Current**		
Sea condition : Slight		Latitude	05_11.70 N	Latitude	05_12.10 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_13.00 E	Longitude	114_13.50 E	5	0.2	109°
Eng. Mode: Trawl		**Fishing gear**				25	0.3	313°
Speed (kt): 2.5		Type of trawl: Bottom Beamtrawl				50	0.2	242°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.2		Depth of capture (m)		120
Pitch: 3.0		Warp angle: P/64		Warp length (m): 450 m		Type of bottom		Muddy
Towing direction: 090°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.6

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A6(A6-A7)		M.V. SEAFDEC 2				Air Temp.	27.1	(°C)
Date: 29-Sep-10						Pressure	1012.5	hpa
Moon age: 21 phase: 67		**Start shooting**		**Finish shooting**		Humidity	92	%
Wind		Time	0558	Time	0605	**Water**		
Speed (Kt)	Direction	Latitude	05_05.70 N	Latitude	05_06.10 N	Surface temp.	29.8	(°C)
4	180	Longitude	114_03.90 E	Longitude	114_04.30 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	0705	Time	0716	**Current**		
Sea condition : Slight		Latitude	05_07.50 N	Latitude	05_07.90 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_05.80 E	Longitude	114_06.20 E	5	0.4	355°
Eng. Mode: Trawl		**Fishing gear**				25	0.5	034°
Speed (kt): 2.1		Type of trawl: Bottom Beamtrawl				50	0.5	065°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.0		Depth of capture (m)		100
Pitch: 2.5		Warp angle: P/64		Warp length (m): 350 m		Type of bottom		Muddy
Towing direction: 045°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.7

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A7(A7-A8)		M.V. SEAFDEC 2				Air Temp.	28.6	(°C)
Date: 29-Sep-10						Pressure	1014	hpa
Moon age: 21 phase: 67		**Start shooting**		**Finish shooting**		Humidity	79	%
Wind		Time	0931	Time	0937	**Water**		
Speed (Kt)	Direction	Latitude	05_03.70 N	Latitude	05_03.60 N	Surface temp.	30	(°C)
10	180	Longitude	114_02.00 E	Longitude	114_01.90 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1037	Time	1058	**Current**		
Sea condition : Slight		Latitude	05_01.90 N	Latitude	05_02.60 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_00.90 E	Longitude	114_00.40 E	5	0.3	044°
Eng. Mode: Trawl		**Fishing gear**				25	0.3	010°
Speed (kt): 2.0		Type of trawl: Bottom Beamtrawl				50	0.5	060°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.0		Depth of capture (m)		97
Pitch: 6		Warp angle: P/60		Warp length (m): 300 m		Type of bottom		Muddy
Towing direction: 210°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.8

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A8(A8-A9)		M.V. SEAFDEC 2				Air Temp.	28.3	(°C)
Date: 29-Sep-10						Pressure	1011.5	hpa
Moon age: 21 phase: 67		**Start shooting**		**Finish shooting**		Humidity	92	%
Wind		Time	1349	Time	1355	**Water**		
Speed (Kt)	Direction	Latitude	05_01.10 N	Latitude	05_00.80 N	Surface temp.	30.1	(°C)
8	180	Longitude	113_52.00 E	Longitude	113_51.60 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1450	Time	1505	**Current**		
Sea condition : Slight		Latitude	04_59.80 N	Latitude	05_00.10 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	113_49.30 E	Longitude	113_49.10 E	5	0.8	350°
Eng. Mode: Trawl		**Fishing gear**				25	0.9	061°
Speed (kt): 2.5		Type of trawl: Bottom Beamtrawl				50	0.5	063°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.5		Depth of capture (m)		116
Pitch: 7		Warp angle: P/58		Warp length (m): 400 m		Type of bottom		Muddy
Towing direction: 230°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.9

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A9(A9-A10)		M.V. SEAFDEC 2				Air Temp.	28.5	(°C)
Date: 29-Sep-10						Pressure	1010	hpa
Moon age: 21 phase: 67		**Start shooting**		**Finish shooting**		Humidity	85	%
Wind		Time	1527	Time	1540	**Water**		
Speed (Kt)	Direction	Latitude	05_00.50 N	Latitude	05_00.40 N	Surface temp.	29.7	(°C)
8	180	Longitude	113_47.60 E	Longitude	113_47.10 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1640	Time	1700	**Current**		
Sea condition : Slight		Latitude	04_59.30 N	Latitude	04_59.20 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	113_44.90 E	Longitude	113_44.60 E	5	0.9	029°
Eng. Mode: Trawl		**Fishing gear**				25	0.5	075°
Speed (kt): 2.7		Type of trawl: Bottom Beamtrawl				50	0.1	086°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.4		Depth of capture (m)		169
Pitch: 8		Warp angle: P/ 62		Warp length (m): 650 m		Type of bottom		Muddy
Towing direction: 250°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.10

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A11		M.V. SEAFDEC 2				Air Temp.	28.1	(°C)
Date: 30-Sep-10						Pressure	1011	hpa
Moon age: 22 phase: 57		**Start shooting**		**Finish shooting**		Humidity	92	%
Wind		Time	0602	Time	0612	**Water**		
Speed (Kt)	Direction	Latitude	05_07.10 N	Latitude	05_07.30 N	Surface temp.	29.7	(°C)
8	180	Longitude	113_52.60 E	Longitude	113_53.40 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	0712	Time	0735	**Current**		
Sea condition : Slight		Latitude	05_09.70 N	Latitude	05_10.50 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	113_54.60 E	Longitude	113_54.80 E	5	0.9	050°
Eng. Mode: Trawl		**Fishing gear**				25	0.8	053°
Speed (kt): 2.7		Type of trawl: Bottom Beamtrawl				50	0.3	121°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.7		Depth of capture (m)		264-361
Pitch: 8		Warp angle: P/ 63		Warp length (m): 1,000 m		Type of bottom		Muddy
Towing direction: 075°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.11

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A12		M.V. SEAFDEC 2				Air Temp.	28	(°C)
Date: 30-Sep-10						Pressure	1012.5	hpa
Moon age: 22 phase: 57		**Start shooting**		**Finish shooting**		Humidity	85	%
Wind		Time	1018	Time	1028	**Water**		
Speed (Kt)	Direction	Latitude	05_11.20 N	Latitude	05_10.80 N	Surface temp.	29.8	(°C)
14	180	Longitude	114_00.60 E	Longitude	114_00.60 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1128	Time	1145	**Current**		
Sea condition : Slight		Latitude	05_08.40 N	Latitude	05_09.30 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_00.20 E	Longitude	114_01.00 E	5	0.4	034°
Eng. Mode: Trawl		**Fishing gear**				25	0.5	021°
Speed (kt): 2.8		Type of trawl: Bottom Beamtrawl				50	0.1	096°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.4		Depth of capture (m)		264
Pitch: 8		Warp angle: P/ 60		Warp length (m): 800 m		Type of bottom		Muddy
Towing direction: 180°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.12

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A14		M.V. SEAFDEC 2				Air Temp.	30.7	(°C)
Date: 30-Sep-10						Pressure	1008.5	hpa
Moon age: 22 phase: 57		**Start shooting**		**Finish shooting**		Humidity	79	%
Wind		Time	1545	Time	1557	**Water**		
Speed (Kt)	Direction	Latitude	05_22.20 N	Latitude	05_21.80 N	Surface temp.	30.2	(°C)
10	210	Longitude	114_11.90 E	Longitude	114_11.70 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1657	Time	1738	**Current**		
Sea condition : Slight		Latitude	05_19.50 N	Latitude	05_20.60 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_10.90 E	Longitude	114_12.00 E	5	0.4	324°
Eng. Mode: Trawl		**Fishing gear**				25	0.4	296°
Speed (kt): 2.2		Type of trawl: Bottom Beamtrawl				50	0.5	327°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.4		Depth of capture (m)		379
Pitch: 6		Warp angle: P/ 60		Warp length (m): 1,000 m		Type of bottom		Muddy
Towing direction: 215°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.13

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A13-A12		M.V. SEAFDEC 2				Air Temp.	28.3	(°C)
Date: 11-Oct-10						Pressure	1013.5	hpa
Moon age: 04 phase: 18		**Start shooting**		**Finish shooting**		Humidity	84	%
Wind		Time	1900	Time	1913	**Water**		
Speed (Kt)	Direction	Latitude	05_12.30 N	Latitude	05_11.98 N	Surface temp.	29.1	(°C)
8	200	Longitude	114_02.44 E	Longitude	114_02.14 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	2013	Time	2035	**Current**		
Sea condition : Moderate		Latitude	05_10.30 N	Latitude	05_10.30 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_00.50 E	Longitude	114_00.30 E	5	1.5	053°
Eng. Mode: Trawl		**Fishing gear**				50	0.9	080°
Speed (kt): 2.5		Type of trawl: Bottom Beamtrawl				100	0.5	108°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.3		Depth of capture (m)		264-235
Pitch: 8		Warp angle: St.b/ 62		Warp length (m): 850 m		Type of bottom		Muddy
Towing direction: 220°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

TRAWL FISHING LOGSHEET
Operation No.14

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No.A11-A12		M.V. SEAFDEC 2				Air Temp.	28.3	(°C)
Date: 12-Oct-10						Pressure	1018	hpa
Moon age: 05 phase: 27		**Start shooting**		**Finish shooting**		Humidity	92	%
Wind		Time	1832	Time	1845	**Water**		
Speed (Kt)	Direction	Latitude	05_11.10 N	Latitude	05_10.80 N	Surface temp.	29.3	(°C)
8	270	Longitude	113_55.50 E	Longitude	113_55.30 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
Cloudy		Time	1945	Time	2005	**Current**		
Sea condition : Moderate		Latitude	05_09.10 N	Latitude	05_08.90 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	113_54.10 E	Longitude	113_53.90 E	5	1.0	061°
Eng. Mode: Trawl		**Fishing gear**				50	0.6	075°
Speed (kt): 2.5		Type of trawl: Bottom Beamtrawl				100	0.2	142°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.1		Depth of capture (m)		420-350
Pitch: 7		Warp angle: St.b/ 63		Warp length (m): 1,050 m		Type of bottom		Muddy
Towing direction: 215°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

TRAWL FISHING LOGSHEET
Operation No.15

Cruise no: 36-4 /2010		**Name of Vessel**				**Air**		
Survey station No. A18		M.V. SEAFDEC 2				Air Temp.	32.1	(°C)
Date: 17-Oct-10						Pressure	1010.5	hpa
Moon age: 10 phase: 74		**Start shooting**		**Finish shooting**		Humidity	67	%
Wind		Time	1616	Time	1630	**Water**		
Speed (Kt)	Direction	Latitude	05_40.90 N	Latitude	05_40.10 N	Surface temp.	30.2	(°C)
2	070	Longitude	114_24.10 E	Longitude	114_23.80 E	Bottom temp.	N/R	(°C)
Weather condition		**Start hauling**		**Finish hauling**		Transparency	N/R	(m)
bc		Time	1730	Time	1750	**Current**		
Sea condition : Slight		Latitude	05_38.20 N	Latitude	05_38.20 N	Depth (m)	Spd (kt)	Direction
Vessel		Longitude	114_22.80 E	Longitude	114_20.50 E	5	0.2	008°
Eng. Mode: Trawl		**Fishing gear**				50	0.2	223°
Speed (kt): 2.5		Type of trawl: Bottom Beamtrawl				100	0.3	037°
RPM: 900		Towing time: 60 minute		Towing distance(nm): 2.1		Depth of capture (m)		305-243
Pitch: 5		Warp angle: St.b/ 63		Warp length (m): 1,000 m		Type of bottom		Muddy
Towing direction: 205°		Net spread (m): 4		Net openning (m): 0.8		Total catch (kg)		

NR: Not recorded

Correspondence person on catch report:

Appendix 2.3 Deep-sea Trap fishing log

TRAP FISHING LOGSHEET
Operation No.1

Cruise No:36-4/2010		Name of Vessel				Air temp:	28.3	°C
Survey station No: A13		M.V.SEAFDEC 2				Air pressure:	1013	mbar
Date: 11-12/Oct/2010						Humidity :	84	%
Moon age: 4 phase 18%		Start shooting 11/10/10		Finish shooting 11/10/10		Water		
Wind		Time	1808	Time	1840	Surface	29.2	°C
Spd (kt)	Direction	Latitude	05°12'.50 N	Latitude	05°13'.50 N	Bottom temp:	NR	°C
8	200	Longitud	114°02.50 E	Longitude	114°03'.90 E	Transparency	NR	m
Weather cond: Cloudy		Start hauling 12/10/10		Finish hauling 12/10/10				
Sea condition: Moderate		Time	0846	Time	1018	Depth	Spd (kt)	Direction
Gear		Latitude	05°13'.50 N	Latitude	05°13'.90 N	5	1.6	051°
Type of trap: Deep sea trap		Longitud	114°03'.90 E	Longitude	114°04'.00 E	50	0.9	077°
Total No. of trap: 45		Depth of capture:53 m		Bottom type:Rock/Sand		100	0.3	099°
Type of bait: Trash fishes		Memorandum:				Total catch in number:		
Immersion time:		Shooting speed 4.5 knot				579 samples		
14 hrs 36 min		Sea depth : 258 -320 m				Total catch in weight:		
		Total distance 1.7 nm Setting course 045°				22.61 kg		

NR: Not recorded

TRAP FISHING LOGSHEET
Operation No.2

Cruise No:36-4/2010		Name of Vessel				Air temp:	28.2	°C
Survey station No: A11		M.V.SEAFDEC 2				Air pressure:	1012.5	mbar
Date: 12-13/Oct/2010						Humidity :	92	%
Moon age: 5 phase 27%		Start shooting 12/10/10		Finish shooting 12/10/10		Water		
Wind		Time	1617	Time	1645	Surface	29.3	°C
Spd (kt)	Direction	Latitude	05°07'.00 N	Latitude	05°07'.00 N	Bottom temp:	NR	°C
4	220	Longitud	113°50.70 E	Longitude	113°51'.80 E	Transparency	NR	m
Weather cond: Cloudy		Start hauling 12/10/10		Finish hauling 12/10/10				
Sea condition: Moderate		Time	0638	Time	0835	Depth	Spd (kt)	Direction
Gear		Latitude	05°07'.20 N	Latitude	05°07'.50 N	5	1.2	058°
Type of trap: Deep sea trap		Longitud	113°57'.70 E	Longitude	113°51'.40 E	50	0.9	060°
Total No. of trap: 45		Depth of capture:53 m		Bottom type:Rock/Sand		100	0.5	109°
Type of bait: Trash fishes		Memorandum:				Total catch in number:		
Immersion time:		Shooting speed 4.0 knot				330 pcs.		
15 hrs 05 min		Sea depth : 339 -266 m				Total catch in weight:		
		Total distance 1.1 nm Setting course 090°				18.91 kg		

NR: Not recorded

Correspondence person on catch report:

TRAP FISHING LOGSHEET
Operation No.3

Cruise No:36-4/2010		Name of Vessel				Air temp:	31	°C
Survey station No: A17		M.V.SEAFDEC 2				Air pressure:	1011.5	mbar
Date: 17-18/Oct/2010						Humidity :	72	%
Moon age: 10 phase 74		Start shooting 17/10/10		Finish shooting 17/10/10		Water		
Wind		Time	1418	Time	1448	Surface	30.2	°C
Spd (kt)	Direction	Latitude	05°36'.90 N	Latitude	05°37'.20 N	Bottom temp:	NR	°C
2	070	Longitud	114°21.20 E	Longitude	114°22'.10 E	Transparency	NR	m
Weather cond: bc		Start hauling 18/10/10		Finish hauling 18/10/10				
Sea condition: Smooth		Time	1620	Time	1815	Depth	Spd (kt)	Direction
Gear		Latitude	05°37'.20 N	Latitude	05°37'.10 N	5	0.1	258°
Type of trap: Deep sea trap		Longitud	114°22'.10 E	Longitude	114°21'.50 E	50	0.1	292°
Total No. of trap: 42		Depth of capture:53 m		Bottom type:Rock/Sand		100	0.2	056°
Type of bait: Lizard fish		Memorandum:				Total catch in number:		
Immersion time:		Shooting speed 3.0 knot				379 pcs.		
26 hr 44 min		Sea depth : 388 -290 m				Total catch in weight:		
		Total distance 0.9 nm Setting course 072°				15.13 kg		

NR: Not recorded

Correspondence person on catch report:

Appendix 2.4 Isaacs-Kidd Mid-Water Trawl (IKMT) fishing log

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.1

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: B1		MV SEAFDEC2				Air temp:	30.4	°C
Date: 04 October 2010						Air pressure:	1012	hpa
Moon age: 26/15		Start shooting		Finish shooting		Humidity :	85	%
Wind		Time	0754	Time	0810	Water		
Spd (kt)	Direction	Latitude	05°-36'.6 N	Latitude	05°-35'.7 N	Surface temp:	29.8	°C
4	030	Longitude	114°-14'.7 E	Longitude	114°-14'.7 E	Bottom temp:		°C
Weather cond: partly cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	0840	Time	0852	Current		
Vessel		Latitude	05°-33'.7 N	Latitude	05°-33'.0 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	114°-15'.0 E	Longitude	114°-15'.1 E	10	0.0	000
Speed (kt): 4		Fishing Gear				50	0.2	094
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	0.1	32
Pitch: 7		Towing time: 30 min		Distance (nmi): 2.0'		Depth of IKMT (m): 335		
Towing direction: 170		Warp angle: St.b.63		Warp length (m): 1,000		Sea depth (m): 850		
		Scattering layer: 270-400						

NR: Not recorded

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.2

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: B3		MV SEAFDEC2				Air temp:	30.2	°C
Date: 04 October 2010						Air pressure:	1010	hpa
Moon age: 26/15		Start shooting		Finish shooting		Humidity :		%
Wind		Time	1522	Time	1537	Water		
Spd (kt)	Direction	Latitude	06°-06'.3 N	Latitude	06°-07'.1 N	Surface temp:	29.9	°C
4	030	Longitude	113°-43'.8 E	Longitude	113°-44'.4 E	Bottom temp:		°C
Weather cond: Cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	1607	Time	1618	Current		
Vessel		Latitude	06°-08'.5 N	Latitude	06°-08'.8 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	113°-45'.2 E	Longitude	113°-45'.2 E	10	0.0	155
Speed (kt): 3.2		Fishing Gear				50	0.4	082
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	0.5	163
Pitch: 5		Towing time: 30 min		Distance (nmi): 1.6'		Depth of IKMT (m): 182		
Towing direction: 045		Warp angle: 62		Warp length (m): 410		Sea depth (m): 2,044		
		Scattering layer: 130-160						

NR: Not recorded

Correspondence person on catch report:

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.3

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: B3		MV SEAFDEC2				Air temp:	30.0	°C
Date: 04 October 2010						Air pressure:	1010	hpa
Moon age: 26/15		Start shooting		Finish shooting		Humidity :	73	%
Wind		Time	1622	Time	1635	Water		
Spd (kt)	Direction	Latitude	06°-08'.8 N	Latitude	06°-08'.7 N	Surface temp:	30.0	°C
4	030	Longitude	113°-45'.1 E	Longitude	113°-44'.5 E	Bottom temp:		°C
Weather cond: Cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	1705	Time	1720	Current		
Vessel		Latitude	06°-08'.0 N	Latitude	06°-07'.7 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	113°-43'.0 E	Longitude	113°-42'.3 E	10	0.0	000
Speed (kt): 3		Fishing Gear				50	0.2	100
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	0.5	175
Pitch: 4		Towing time: 30 min		Distance (nmi): 1.6'		Depth of IKMT (m): -		
Towing direction: 225		Warp angle: 58		Warp length (m): 1,110		Sea depth (m): 2,044		
		Scattering layer: 310-450						

NR: Not recorded

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.4

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: B5		MV SEAFDEC2				Air temp:	30.4	°C
Date: 05 October 2010						Air pressure:	1012	hpa
Moon age: 27/8		Start shooting		Finish shooting		Humidity :	79	%
Wind		Time	0757	Time	0810	Water		
Spd (kt)	Direction	Latitude	06°-35'.3 N	Latitude	06°-35'.1 N	Surface temp:	29.9	°C
6	060	Longitude	113°-17'.5 E	Longitude	113°-16'.9 E	Bottom temp:		°C
Weather cond: Cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	0840	Time	0853	Current		
Vessel		Latitude	06°-34'.8 N	Latitude	06°-34'.7 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	113°-15'.2 E	Longitude	113°-14'.7 E	5	0.2	225
Speed (kt): 3.5		Fishing Gear				50	0.7	149
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	0.8	160
Pitch: 5		Towing time: 30 min		Distance (nmi): 2.2'		Depth of IKMT (m): -		
Towing direction: 240		Warp angle: 62		Warp length (m): 1,000		Sea depth (m): 1,280		
		Scattering layer:						

NR: Not recorded

Correspondence person on catch report:

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.5

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: B21		MV SEAFDEC2				Air temp:	30.1	°C
Date: 05 October 2010						Air pressure:	1010.5	hpa
Moon age: 27/8		Start shooting		Finish shooting		Humidity :	85	%
Wind		Time	1355	Time	1412	Water		
Spd (kt)	Direction	Latitude	06°-16'.8 N	Latitude	06°-16'.2 N	Surface temp:	30	°C
6	060	Longitude	113°-01'.7 E	Longitude	113°-00'.9 E	Bottom temp:		°C
Weather cond: partly cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	1442	Time	1452	Current		
Vessel		Latitude	06°-15'.3 N	Latitude	06°-15'.1 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	112°-59'.4 E	Longitude	112°-59'.1 E	5	0.1	053
Speed (kt): 3.5		Fishing Gear				50	1.1	156
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	1.3	150
Pitch: 5-6		Towing time: 30 min		Distance (nmi): 1.7'		Depth of IKMT (m): 200		
Towing direction: 220		Warp angle: 63		Warp length (m): 700		Sea depth (m): 1,310		
		Scattering layer:						

NR: Not recorded

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.6

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: B19		MV SEAFDEC2				Air temp:	31.4	°C
Date: 05 October 2010						Air pressure:	1010.5	hpa
Moon age: 27/8		Start shooting		Finish shooting		Humidity :	92	%
Wind		Time	1937	Time	1942	Water		
Spd (kt)	Direction	Latitude	05°-45'.2 N	Latitude	05°-45'.0 N	Surface temp:	30.2	°C
6	060	Longitude	113°-32'.7 E	Longitude	113°-32'.4 E	Bottom temp:		°C
Weather cond: partly cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	2012	Time	2020	Current		
Vessel		Latitude	05°-43'.7 N	Latitude	05°-43'.5 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	113°-30'.9 E	Longitude	113°-30'.6 E	5	0.1	081
Speed (kt): 4		Fishing Gear				50	0.3	187
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	1.0	188
Pitch: 6		Towing time: 30 min		Distance (nmi):		Depth of IKMT (m): 120-130		
Towing direction: 215		Warp angle: 65		Warp length (m): 400		Sea depth (m): 2,300		
		Scattering layer: 60-120				(Max.depth of IKMT=176m)		

NR: Not recorded

Correspondence person on catch report:

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.7

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: B19		MV SEAFDEC2				Air temp:	27.4	°C
Date: 05 October 2010						Air pressure:	1012.5	hpa
Moon age: 28/3		Start shooting		Finish shooting		Humidity :	92	%
Wind		Time	0832	Time	0846	29.8		
Spd (kt)	Direction	Latitude	05°-47'.2 N	Latitude	05°-46'.9 N	Surface temp:	30	°C
6	050	Longitude	113°-32'.0 E	Longitude	113°-31'.3 E	Bottom temp:		°C
Weather cond: cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	0916	Time	0934	Current		
Vessel		Latitude	05°-46'.0 N	Latitude	05°-45'.7 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	113°-29'.6 E	Longitude	113°-28'.8 E	5	0.1	061
Speed (kt): 4		Fishing Gear				50	0.5	235
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	0.7	217
Pitch: 7		Towing time: 30 min		Distance (nmi): 1.9		Depth of IKMT (m): 350-450		
Towing direction: 240		Warp angle: 63		Warp length (m): 1200		Sea depth (m): 2,368		
		Scattering layer: 300-400						

NR: Not recorded

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.8

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: B17		MV SEAFDEC2				Air temp:	29.1	°C
Date: 05 October 2010						Air pressure:	1009.5	hpa
Moon age: 28/3		Start shooting		Finish shooting		Humidity :	85	%
Wind		Time	1545	Time	1557	Water		
Spd (kt)	Direction	Latitude	05°-19'.3 N	Latitude	05°-18'.5 N	Surface temp:	30.2	°C
10	000	Longitude	113°-59'.1 E	Longitude	113°-59'.0 E	Bottom temp:		°C
Weather cond: cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: moderate		Time	1627	Time	1640	Current		
Vessel		Latitude	05°-16'.8 N	Latitude	05°-16'.1 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	113°-58'.7 E	Longitude	113°-58'.6 E	5	0.1	059
Speed (kt): 3.3		Fishing Gear				50	0.4	286
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	0.2	322
Pitch: 500		Towing time: 30 min		Distance (nmi): 1.7'		Depth of IKMT (m):		
Towing direction: 180		Warp angle: 65		Warp length (m): 1000		Sea depth (m): 855		
		Scattering layer: 270-400						

NR: Not recorded

Correspondence person on catch report:

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.9

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: A12		MV SEAFDEC2				Air temp:	29.5	°C
Date: 06 October 2010						Air pressure:	1010.5	hpa
Moon age: 28/3		Start shooting		Finish shooting		Humidity :	92	%
Wind		Time	1900	Time	1905	Water		
Spd (kt)	Direction	Latitude	05°-09'.5 N	Latitude	05°-09'.3 N	Surface temp:	30.4	°C
8	010	Longitude	114°-00'.0 E	Longitude	113°-59'.8 E	Bottom temp:		°C
Weather cond: cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	1935	Time	1940	Current		
Vessel		Latitude	05°-07'.9 N	Latitude	05°-07'.7 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	113°-58'.2 E	Longitude	113°-58'.0 E	5	0.4	075
Speed (kt): 4		Fishing Gear				50	0.3	083
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	0.4	21
Pitch: 5		Towing time: 30 min		Distance (nmi): 2.1		Depth of IKMT (m):		
Towing direction: 227		Warp angle: 63		Warp length (m): 200		Sea depth (m): 227		
		Scattering layer: 60						

NR: Not recorded

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.10

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: A16		MV SEAFDEC2				Air temp:	28.9	°C
Date: 07 October 2010						Air pressure:	1011.5	hpa
Moon age: 29/0		Start shooting		Finish shooting		Humidity :	85	%
Wind		Time	0530	Time	0535	Water		
Spd (kt)	Direction	Latitude	05°-30'.5 N	Latitude	05°-30'.3 N	Surface temp:	30	°C
6	050	Longitude	114°-16'.8 E	Longitude	114°-16'.7 E	Bottom temp:		°C
Weather cond: partly cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	0605	Time	0609	Current		
Vessel		Latitude	05°-28'.4 N	Latitude	05°-28'.2 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	114°-15'.9 E	Longitude	114°-15'.8 E	5	0.5	066
Speed (kt): 4		Fishing Gear				50	0.3	013
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	0.6	22
Pitch: 6		Towing time: 30 min		Distance (nmi): 2.0		Depth of IKMT (m):		
Towing direction: 190		Warp angle: 63		Warp length (m): 200		Sea depth (m): 413		
		Scattering layer: 45-85						

NR: Not recorded

Correspondence person on catch report:

Isaacs-Kidd MID-WATER TRAWL LOGSHEET
Operation No.11

Cruise No: 36-4/2010		Name of Vessel				Air		
Survey station No: A18		MV SEAFDEC2				Air temp:	30.5	°C
Date: 05 October 2010						Air pressure:	1013.5	hpa
Moon age: 29/0		Start shooting		Finish shooting		Humidity :	73	%
Wind		Time	1057	Time	1107	Water		
Spd (kt)	Direction	Latitude	05°-41'.3 N	Latitude	05°-40'.9 N	Surface temp:	30.4	°C
2	050	Longitude	114°-23'.2 E	Longitude	114°-22'.8 E	Bottom temp:		°C
Weather cond: partly cloudy		Start hauling		Finish hauling		Surface temp:		°C
Sea condition: slight		Time	1137	Time	1150	Current		
Vessel		Latitude	05°-39'.6 N	Latitude	05°-39'.3 N	Depth	Spd (kt)	Direction
Eng Mode: Separate		Longitude	114°-21'.7 E	Longitude	114°-21'.3 E	5	0.2	080
Speed (kt): 3.5		Fishing Gear				50	0.1	187
RPM: 900		Type of trawl: Isaccs Kid Mid Water Trawl				100	0.5	43
Pitch: 5		Towing time: 30 min		Distance (nmi): 1.7		Depth of IKMT (m):		
Towing direction: 220		Warp angle: 65		Warp length (m): 750		Sea depth (m): 420		
		Scattering layer: 180-230						

NR: Not recorded

Correspondence person on catch report:

Appendix 3 Partial detail of hydro-acoustic survey

Doc ID.	0000001120	Station		Trawl op. 1	Ship Course	202	Remark Trawl route station 1-2. Error on main screen while start recording, then restart. It caused the derived file namely, 000000112001 and 000000112002.Some interfere on screen because echo sounder is not switched off.
Date	28/09/2010	From	Lat.	05°32.20 N	Ship Speed	2.6 kt.	
Start Time	0808		Long.	114°26.82 E	Sea State	Smooth	
Finish Time	0903	To	Lat.	05°30.50 N	Bottom Depth	101-107 m.	
			Long.	114°25.75 E			
Doc ID.	0000001121	Station		Trawl op. 2	Ship Course	220	Remark Trawl route station 2-3. Some interfere on screen because echo sounder and current indicator is switched off 20 minutes after starting.
Date	28/09/2010	From	Lat.	05°27.65 N	Ship Speed	1.8-2.7 kt.	
Start Time	0944		Long.	114°21.97 E	Sea State	Smooth	
Finish Time	1040	To	Lat.	05°26.05 N	Bottom Depth	108 m.	
			Long.	114°29.81 E			
Doc ID.	0000001122	Station		Trawl op. 3	Ship Course	205	Remark Trawl route station 3-4. Analyzer screen show wizard USB but not any errors. Echo sounder and current indicator is switched off 5 seconds after starting.
Date	28/09/2010	From	Lat.	05°23.45 N	Ship Speed	1.9 kt.	
Start Time	1118		Long.	114°18.43 E	Sea State	Slight	
Finish Time	1210	To	Lat.	05°21.90 N	Bottom Depth	127-133 m.	
			Long.	114°17.77 E			
Doc ID.	0000001123	Station		Trawl op. 4	Ship Course	262-238	Remark Trawl route station 4-5. DSL 45- 60 m depth
Date	28/09/2010	From	Lat.	05°18.19 N	Ship Speed	1.7 kt.	
Start Time	1424		Long.	114°15.59 E	Sea State	Slight	
Finish Time	1515	To	Lat.	05°16.49 N	Bottom Depth	110-114 m.	
			Long.	114°14.87 E			
Doc ID.	0000001124	Station		Trawl op. 5	Ship Course	090	Remark Trawl route station 5-6. Echo sounder and current indicator is switched off 6 minutes after starting. DSL intensity lighter than op.5 with 50- 60 m depth
Date	28/09/2010	From	Lat.	05°11.55 N	Ship Speed	3 kt.	
Start Time	1642		Long.	114°11.24 E	Sea State	Slight	
Finish Time	1728	To	Lat.	05°07.39 N	Bottom Depth	96-102 m.	
			Long.	114°05.75 E			

Doc ID.	0000001125	Station		Trawl op. 6	Ship Course	047	Remark
Date	29/09/2010	From	Lat.	05°06.25 N	Ship Speed	2.0 kt.	Trawl route station 6-7. Error on main screen, GPS is not transferred while start recording, then restart. It caused the derived file namely,000000112501 and 000000112002.
Start Time	0611		Long.	114°04.51 E	Sea State	Slight	
Finish Time	0659	To	Lat.	05°07.39 N	Bottom Depth	99 m.	
			Long.	114°05.75 E			
Doc ID.	0000001126	Station		Trawl op. 7	Ship Course	213	Remark
Date	29/09/2010	From	Lat.	05°03.53N	Ship Speed	2.2 kt.	Trawl route station 7-8. Weather condition is moderated, there are interference (gap) on echo trace.
Start Time	0940		Long.	114°01.84 E	Sea State	Slight	Three DSL appeared at 30- 45, 50-70 and 78 - 82 m depth
Finish Time	1032	To	Lat.	05°02.02 N	Bottom Depth	93 m.	
			Long.	107°30.28 E			
Doc ID.	0000001127	Station		Trawl op. 8	Ship Course	262 – 238	Remark
Date	29/09/2010	From	Lat.	05°00.84N	Ship Speed	2.1-2.6 kt.	Trawl route station 8-9. Weather condition is moderate condition, there are interference (gap) on echo trace. Towing direction is turn from 238 to 262°. DSL 40-70 m depth
Start Time	1359		Long.	113°51.44 E	Sea State	Moderate	
Finish Time	1445	To	Lat.	04°59.99 N	Bottom Depth	121 m.	
			Long.	113°49.67 E			
Doc ID.	0000001128	Station		Trawl op. 9	Ship Course	248	Remark
Date	29/09/2010	From	Lat.	05°00.31 N	Ship Speed	2.1-3 kt.	Trawl route station 9-10. DSL 35-75 m.
Start Time	1546		Long.	113°46.93 E	Sea State	Slight	
Finish Time	1635	To	Lat.	04°59.43 N	Bottom Depth	166-169 m.	
			Long.	113°45.13 E			
Doc ID.	0000001130	Station		Trawl op. 10	Ship Course	016	Remark
Date	30/09/2010	From	Lat.	05°07.77 N	Ship Speed	2.1 kt.	Route from station 11-12. Weather condition is moderate condition, there are interference (gap) on echo trace. Echo sounder is not switched off for checking depth. DSL 30-90 m and 240 – 260 m depth.
Start Time	0625		Long.	113°53.76 E	Sea State	Moderate	Ping No.1342
Finish Time	0707	To	Lat.	05°09.50 N	Bottom Depth	277-345 m.	
			Long.	113°54.53 E			
Doc ID.	0000001131	Station		Trawl op. 11	Ship Course	190	Remark
Date	30/09/2010	From	Lat.	05°10.65 N	Ship Speed	2.4-2.8 kt.	Route from station 12-13. Weather condition is moderate condition, there are interference (gap) on echo trace. Echo sounder is switched off. DSL 15-85 m.
Start Time	1032		Long.	114°00.60 E	Sea State	Moderate	Ping No.1647
Finish Time	1125	To	Lat.	05°08.51 N	Bottom Depth	200-269 m.	
			Long.	114°00.29 E			

Doc ID.	0000001132	Station		Trawl op. 12	Ship Course	210	Remark Route from station 14-15. Weather condition is moderate, there are interference (gap) on echo trace. Echo sounder is not switched off because carefully check on bottom topography.
Date	30/09/2010	From	Lat.	05°21.70 N	Ship Speed	2.5 kt.	
Start Time	1600		Long.	114°11.73 E	Sea State	Moderate	
Finish Time	1644	To	Lat.	05°20.50 N	Bottom Depth	200-340 m.	
			Long.	114°11.11 E			
Doc ID.	0000001136	Station			Ship Course	Drop anchor	Remark Calibration Low Frequency: ~200 pings Temp: 30.5 °C Salinity: 23.51 psu.
Date	03/10/2010	From	Lat.	3°29.93 N	Ship Speed		
Start Time			Long.	108°30.23 E	Sea State	Slight	
Finish Time		To	Lat.	3°29.95 N	Bottom Depth	41.5 m.	
			Long.	108°00.21 E			
Doc ID.	0000001137	Station		17-18	Ship Course	Drop anchor	Remark Calibration High Frequency: ~300 pings Temp: 30.5 °C Salinity: 23.51 psu.
Date	03/10/2010	From	Lat.	3°29.97 N	Ship Speed		
Start Time			Long.	108°00.21 E	Sea State	Slight	
Finish Time		To	Lat.	3°29.97 N	Bottom Depth	41.5 m.	
			Long.	107°30.19 E			
Doc ID.	0000001138	Station		18-19	Ship Course	Drop anchor	Remark Calibration Low Frequency: ~327 pings Temp: 30.5 °C Salinity: 23.51 psu.
Date	03/10/2010	From	Lat.	3°29.96 N	Ship Speed		
Start Time			Long.	107°30.25 E	Sea State	Slight	
Finish Time		To	Lat.	3°29.96 N	Bottom Depth	41.5 m.	
			Long.	107°00.25 E			
Doc ID.	0000001139	Station		19-20	Ship Course	Drop anchor	Remark Calibration High Frequency: ~538 pings Temp: 30.5 °C Salinity: 23.51 psu.
Date	03/10/2010	From	Lat.	3°29.99 N	Ship Speed		
Start Time			Long.	107°00.10 E	Sea State	Slight	
Finish Time		To	Lat.	3°29.95 N	Bottom Depth	41.5 m.	
			Long.	106°30.21 E			
Doc ID.	0000001141	Station		B 01	Ship Course	170	Remark IKMT op1. DSL is appeared from 310 to 450 m depth Strong interference from SONAR frequency.
Date	04/10/2010	From	Lat.	05°35.70 N	Ship Speed	4.2 kt.	
Start Time	0740		Long.	114°14.70 E	Sea State	Slight	
Finish Time	0850	To	Lat.	05°33.15 N	Bottom Depth	850 m.	
			Long.	114°15.11 E			

Doc ID.	0000001142	Station		B 01-B 03	Ship Course	316	Remark Sailing from B 01 to B 03 part 1 (10 nm) Slight interference (gap) from rough sea condition DSL layer at 30-40 m, 50-70 m, 90-105 m and 285-500 m.
Date	04/10/2010	From	Lat.	05°36.29 N	Ship Speed	10.3 kt.	
Start Time	0913		Long.	114°14.59 E	Sea State	Slight	
Finish Time	1013	To	Lat.	05°43.85 N	Bottom Depth	>850 m.	
			Long.	114°07.17 E			
Doc ID.	0000001143	Station		B 01-B 03	Ship Course	315	Remark Sailing from B 01 to B 03 part 2 (10 nm) Slight interference (gap) from rough sea condition. DSL layer at 50-80 m, 145-170 m and 310-500 m.
Date	04/10/2010	From	Lat.	05°43.85 N	Ship Speed	10.0 kt.	
Start Time	1013		Long.	114°07.17 E	Sea State	Moderate	
Finish Time	1115	To	Lat.	05°51.42 N	Bottom Depth	>850 m.	
			Long.	113°59.68 E			
Doc ID.	0000001144	Station		B 01-B 03	Ship Course	315	Remark Sailing from B 01 to B 03 part 3 (10 nm) Slight interference (gap) from rough sea condition. DSL layer at 30-90 m, 230-270 m and 310-500 m.
Date	04/10/2010	From	Lat.	05°51.42 N	Ship Speed	10.4 kt.	
Start Time	1013		Long.	113°59.68 E	Sea State	Moderate	
Finish Time	1115	To	Lat.	05°59.28 N	Bottom Depth	>850 m.	
			Long.	113°52.13 E			
Doc ID.	0000001145	Station		B 01-B 03	Ship Course	315	Remark Sailing from B 01 to B 03 part 4 (10 nm) Slight interference (gap) from rough sea condition. DSL layer at 25-65 m, 70-85 m 140-170 m and 300-500 m.
Date	04/10/2010	From	Lat.	05°59.21 N	Ship Speed	10.5 kt.	
Start Time	1216		Long.	113°52.05 E	Sea State	Moderate	
Finish Time	1308	To	Lat.	06°05.70 N	Bottom Depth	>850 m.	
			Long.	113°45.64 E			
Doc ID.	0000001146	Station		B 03	Ship Course	045	Remark IKMT op2. Towing direction against wind direction so interference (gap) from rough sea condition and echo sounder very strong and frequently. Towing at DSL layer; 50-115, 130-150
Date	04/10/2010	From	Lat.	06°06.38 N	Ship Speed	3.0 kt.	
Start Time	1523		Long.	113°49.93 E	Sea State	Moderate	
Finish Time	1605	To	Lat.	06°08.47 N	Bottom Depth	>2000 m.	
			Long.	113°45.24 E			
Doc ID.	0000001147	Station		B 03	Ship Course	246	Remark IKMT op3. Slight interference (gap) from rough sea condition. DSL layer at 48-115, 290-450 Towing at DSL layer; 350 m.
Date	04/10/2010	From	Lat.	06°08.88 N	Ship Speed	3.0 kt.	
Start Time	1624		Long.	113°45.04 E	Sea State	Moderate	
Finish Time	1704	To	Lat.	06°08.04 N	Bottom Depth	>2000 m.	
			Long.	113°43.16 E			

Doc ID.	0000001148	Station		B 03-B05	Ship Course	315	Remark Sailing from B 03 to B 05 part 1 (10 nm) Slight interference (gap) from rough sea condition. DSL layer at 10-60 m, 70-120 m 200-300 m and 350-500 m.
Date	04/10/2010	From	Lat.	06°05.78 N	Ship Speed	9.3 kt.	
Start Time	1746		Long.	113°45.58 E	Sea State	Moderate	
Finish Time	1846	To	Lat.	06°12.61 N	Bottom Depth	>2000 m.	
			Long.	113°38.82 E			
Doc ID.	0000001149	Station		B 03-B05	Ship Course	313	Remark Sailing from B 03 to B 05 part 2 (10 nm) Slight interference (gap) from rough sea condition. DSL layer at 15-50 m, 200-220 m and 330-500 m.
Date	04/10/2010	From	Lat.	06°12.68 N	Ship Speed	9.5 kt.	
Start Time	1846		Long.	113°38.73 E	Sea State	Moderate	
Finish Time	1946	To	Lat.	06°19.20 N	Bottom Depth	>2000 m.	
			Long.	113°31.27 E			
Doc ID.	0000001150	Station		B 03-B05	Ship Course	315	Remark Sailing from B 03 to B 05 part 3 (10 nm) Slight interference (gap) from rough sea condition. DSL layer at 10-110 m, 210-220 m 300-315 m, and 320-500 m. At 2020 hrs, DSL downward to 350-500 m
Date	04/10/2010	From	Lat.	06°19.25 N	Ship Speed	9.4 kt.	
Start Time	1946		Long.	113°32.11 E	Sea State	Slight	
Finish Time	2046	To	Lat.	06°25.98 N	Bottom Depth	>2000 m.	
			Long.	113°25.45 E			
Doc ID.	0000001151	Station		B 03-B05	Ship Course	316	Remark Sailing from B 03 to B 05 part 4 (10 nm) Slight interference (gap) from rough sea condition. DSL layer at 15-75 m (thick), 75-90 m (weak), 200-250 m, 300-330 m (weak), and 350-500 m (thick).
Date	04/10/2010	From	Lat.	06°26.08 N	Ship Speed	9.6 kt.	
Start Time	2046		Long.	113°25.34 E	Sea State	Slight	
Finish Time	2147	To	Lat.	06°32.91 N	Bottom Depth	>2000 m.	
			Long.	113°18.46 E			
Doc ID.	0000001152	Station		B05	Ship Course	258	Remark IKMT op 4. Towing at DSL layer; 350 m. Moderate interference (gap) from rough sea condition. DSL layer at 25-80, 100-150, and 260-500 m.
Date	05/10/2010	From	Lat.	06°35.23 N	Ship Speed	3.5 kt.	
Start Time	0800		Long.	113°17.53 E	Sea State	Moderate	
Finish Time	0836	To	Lat.	06°34.83 N	Bottom Depth	1280 m.	
			Long.	113°15.48 E			
Doc ID.	0000001153	Station		B 05-B21	Ship Course	223	Remark Sailing from B 03 to B 05 part 1 (10 nm). Track follow swell so that slight interference (gap). DSL layer at 40-60 m (thick), 140-200 m, 240-300 m (weak), and 340-500 m (thick). Scatter echo-gram (fish??) 200-290 m
Date	05/10/2010	From	Lat.	06°32.87 N	Ship Speed	9.6 kt.	
Start Time	0922		Long.	113°18.32 E	Sea State	Moderate	
Finish Time	1023	To	Lat.	06°25.54 N	Bottom Depth	>1300 m.	
			Long.	113°11.82 E			

Doc ID.	0000001154	Station		B 05-B 21	Ship Course	219	Remark Sailing from B 03 to B 05 part 2 (10 nm). Track follow swell so that slight interference (gap). DSL layer at 30-70 m (thick), 90-100 m, 130-200 m, 277-310 m (weak), and 340-500 m (thick).
Date	05/10/2010	From	Lat.	06°25.45 N	Ship Speed	9.9 kt.	
Start Time	1024		Long.	113°11.75 E	Sea State	Moderate	
Finish Time	1147	To	Lat.	06°15.17 N	Bottom Depth	>1300 m.	
			Long.	113°02.85 E			
Doc ID.	0000001155	Station		B 21	Ship Course	238	Remark IKMT op 5 Towing at DSL layer; 250 m but reach 200 m. Slight Interference (gap) from rough sea condition. DSL layer at 40-45, 230-260 m and 330-500 m. Fish school at depth 164-200 m, 205-215 m, 250-270 m and 260-280 m.
Date	05/10/2010	From	Lat.	06°16.67 N	Ship Speed	3.5 kt.	
Start Time	1358		Long.	113°01.55 E	Sea State	Moderate	
Finish Time	1441	To	Lat.	06°15.33 N	Bottom Depth	1360 m.	
			Long.	112°59.47 E			
Doc ID.	0000001156	Station		B 21-B 19	Ship Course	135	Remark Sailing from B 21 to B 19 part 1 (8 nm). Track rolling but slight interference (gap) from rough sea condition. DSL layer at 15-70 m (thick), 70-80 m, 90-176 m, 200-210 m (weak), and 340-500 m (thick). Fish school: 174-190 m.
Date	05/10/2010	From	Lat.	06°15.43 N	Ship Speed	9.3 kt.	
Start Time	1513		Long.	113°02.82 E	Sea State	Moderate	
Finish Time	1600	To	Lat.	06°09.83 N	Bottom Depth	>1300 m.	
			Long.	113°08.22 E			
Doc ID.	0000001157	Station		B 21-B 19	Ship Course	135	Remark Sailing from B 21 to B 19 part 2 (10 nm). Track rolling but slight interference (gap) from rough sea condition. DSL layer at 35 - 90 m (thick), 130-155 m, 225-260 m (weak), and 350-500 m (thick). Fish school: 175 m.
Date	05/10/2010	From	Lat.	06°09.66 N	Ship Speed	9.8 kt.	
Start Time	1601		Long.	113°08.44 E	Sea State	Moderate	
Finish Time	1700	To	Lat.	06°02.93 N	Bottom Depth	>1300 m.	
			Long.	113°15.11 E			
Doc ID.	0000001158	Station		B 21-B 19	Ship Course	133	Remark Sailing from B 21 to B 19 part 3 (12 nm). Track rolling but slight interference (gap) from rough sea condition. DSL layer at 40 - 135 m (thick), 200-220 m, 270-350 m (weak), and 370-500 m (thick). Scatted fish school: 32-60 m.
Date	05/10/2010	From	Lat.	06°02.73 N	Ship Speed	9.9 kt.	
Start Time	1700		Long.	113°15.34 E	Sea State	Moderate	
Finish Time	1815	To	Lat.	05°54.15 N	Bottom Depth	>1300 m.	
			Long.	113°24.07 E			
Doc ID.	0000001159	Station		B 21-B 19	Ship Course	134	Remark Sailing from B 21 to B 19 part 4 (12 nm). Track rolling but slight interference (gap) from rough sea condition. DSL layer at 15 - 115 m and thickness at 45-70m. DSL shift from 265 to 200 m (twilight) and 350-500 m (thick).
Date	05/10/2010	From	Lat.	05°54.11 N	Ship Speed	10.0 kt.	
Start Time	1815		Long.	113°24.12 E	Sea State	Slight	
Finish Time	1930	To	Lat.	05°45.46 N	Bottom Depth	>2000 m.	
			Long.	113°32.91 E			

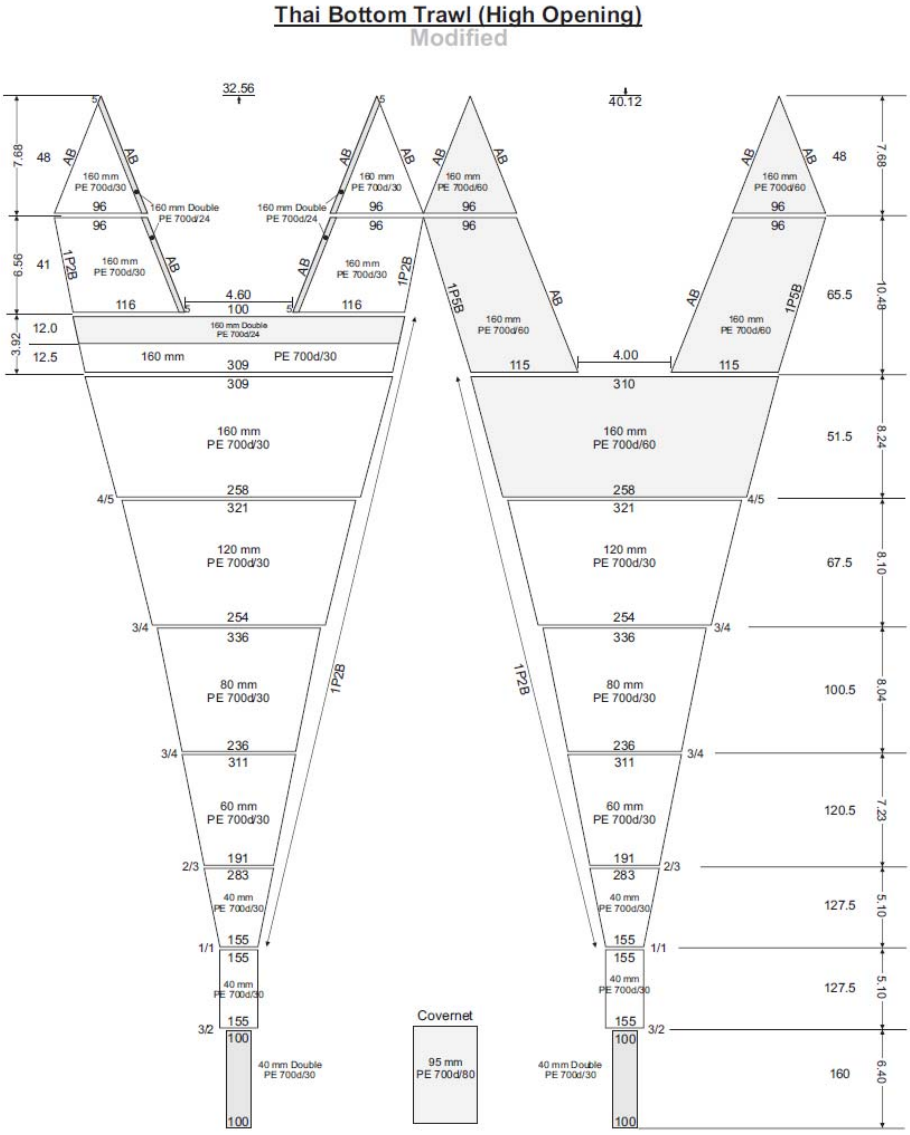
Doc ID.	0000001160	Station		B 19	Ship Course	234	Remark IKMT op 6 Towing at DSL layer; 120-175 m. Slight interference (gap) from rough sea condition. DSL layer cover at 10-114 m but thick at 40-80 m, 162-210 and 215-250 m and 330-500 m is dense.
Date	05/10/2010	From	Lat.	05°45.06 N	Ship Speed	3.5-4.7 kt.	
Start Time	1940		Long.	113°32.53 E	Sea State	Slight	
Finish Time	2010	To	Lat.	05°43.82 N	Bottom Depth	>2000 m.	
			Long.	113°31.02 E			
Doc ID.	0000001161	Station		B 21	Ship Course	240	Remark Error file while start recording, then restart recording. Data is at file 000000116101. IKMT op 7 Towing at DSL layer; 400 m but reach 380 m. moderate interference (gap) from rough sea condition. DSL layer at 20-90 m, 290-350 m (weak) and 350-500 m. Fish school at depth 160-180 m.
Date	06/10/2010	From	Lat.	05°47.28 N	Ship Speed	3.9 kt.	
Start Time	0836		Long.	113°31.77 E	Sea State	Moderate	
Finish Time	0915	To	Lat.	05°46.03 N	Bottom Depth	>2000 m.	
			Long.	113°29.69 E			
Doc ID.	0000001163	Station		B 19-B 17	Ship Course	140	Remark Sailing from B 19 to B 17 part 1 (12 nm). Track rolling so that slight interference (gap) from rough sea condition. DSL layer at 30-80 m (Dense), 320-370 m. (weak), and 380-500 m (Dense). Fish school: 235-245 m.
Date	06/10/2010	From	Lat.	05°45.38 N	Ship Speed	9.9 kt.	
Start Time	0958		Long.	113°39.97 E	Sea State	Moderate	
Finish Time	1115	To	Lat.	05°36.53 N	Bottom Depth	>2000 m.	
			Long.	113°41.89 E			
Doc ID.	0000001164	Station		B 19-B 17	Ship Course	136	Remark Sailing from B 19 to B 17 part 2 (13 nm). Track rolling so that slight interference (gap) from rough sea condition. DSL layer at 30-60 m (thick), 0-180 m (weak), 320-340 m (weak), and 340-500 m (thick). Fish school: 235-310 m.
Date	06/10/2010	From	Lat.	05°36.49 N	Ship Speed	9.8 kt.	
Start Time	1115		Long.	113°41.97 E	Sea State	Moderate	
Finish Time	1230	To	Lat.	05°27.87 N	Bottom Depth	>2000 m.	
			Long.	113°50.83 E			
Doc ID.	0000001165	Station		B 19-B 17	Ship Course	135	Remark Sailing from B 19 to B 17 part 3 (15 nm). Track rolling so that slight interference (gap) from rough sea condition. DSL layer at 10-65 m (Fair), 40-55 m (Dense) Layer at 65-70 m (weak), 115-145 m and Lower DSL start at 265 m, 320-500 m (thick). Fish school: 170-180 m.
Date	06/10/2010	From	Lat.	05°27.77 N	Ship Speed	9.6 kt.	
Start Time	1230		Long.	113°50.80 E	Sea State	Moderate	
Finish Time	1349	To	Lat.	05°18.57 N	Bottom Depth	<1000 m.	
			Long.	114°00.03 E			
Doc ID.	0000001166	Station		B 17	Ship Course	180	Remark IKMT op 8 (St B17) Towing at DSL layer; 277-310 m. Moderately interference (gap) appeared. DSL layer at surface to 60 m and 40-60m (dense), 120-160 m and 240-260 m (weak), 260-290 m (dense), 300-340 m (weak) and 350-500 m (dense).
Date	06/10/2010	From	Lat.	05°19.41 N	Ship Speed	3.5 kt.	
Start Time	1542		Long.	11359.14 E	Sea State	Moderate	
Finish Time	1625	To	Lat.	05°16.88 N	Bottom Depth	700-800 m.	
			Long.	113°58.80 E			

Doc ID. 0000001167 Date 06/10/2010 Start Time 1858 Finish Time 1934	Station A 12 From Lat. 05°09.56 N Long. 114°00.08 E To Lat. 05°08.01 N Long. 113°58.33 E	Ship Course 230 Ship Speed 4.3 kt. Sea State moderate Bottom Depth 215 m.	Remark IKMT op 9 Towing at DSL layer; 60 m. Moderately interference (gap) appeared. DSL layer cover at 5-80 within layer apart 5-40 m, 50-60 m, 71-80 m, narrow bands layer at 90 m, 122-125 m, 155 m 170-175 m, and 180-190 m.
Doc ID. 0000001168 Date 07/10/2010 Start Time 0531 Finish Time 0603	Station A 16 From Lat. 05°30.30 N Long. 114°16.73 E To Lat. 05°28.49 N Long. 113°15.95 E	Ship Course 199 Ship Speed 4.5 kt. Sea State Moderate Bottom Depth 485 m.	Remark IKMT op 10 Towing at DSL layer; 60 m. Moderately interference (gap) appeared. DSL layer cover at 12-85 within layer apart: 10-40 m, 45-80 m, l40-160 m (dense), narrow bands layer at 190 m, 222-240 m, 250-260 m 300-360 m, and 360-450 m (dense).
Doc ID. 0000001170 Date 07/10/2010 Start Time 1100 Finish Time 1135	Station A 18 From Lat. 05°41.23 N Long. 114°23.08 E To Lat. 05°39.75 N Long. 113°21.79 E	Ship Course 223 Ship Speed 3.2 kt. Sea State Slight Bottom Depth 400 m.	Remark IKMT op 11 Towing at DSL layer; 60 m. Moderately interference (gap) appeared. DSL layer cover at 12-85 within layer apart: 10-40 m, 45-80 m, l40-160 m (dense), narrow bands layer at 190 m, 222-240 m, 250-260 m 300-360 m, and 360-450 m (dense).
Doc ID. Date Start Time Finish Time	Station From Lat. Long. To Lat. Long.	Ship Course Ship Speed Sea State Bottom Depth	Remark
Doc ID. Date Start Time Finish Time	Station From Lat. Long. To Lat. Long.	Ship Course Ship Speed Sea State Bottom Depth	Remark
Doc ID. Date Start Time Finish Time	Station From Lat. Long. To Lat. Long.	Ship Course Ship Speed Sea State Bottom Depth	Remark

Appendix 4) Diagram of Fishing gear

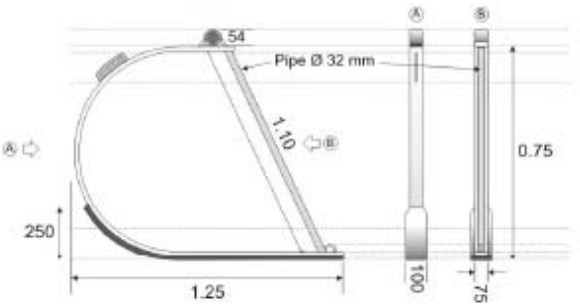
Appendix 4.1 Systematic diagram of otter board trawl

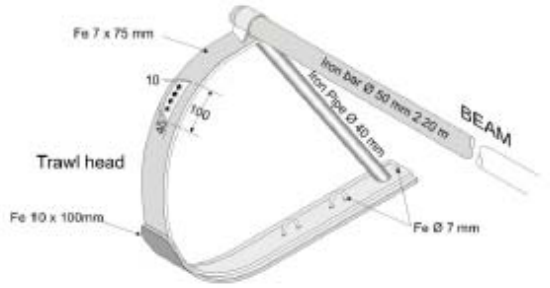
The bottom trawl of M/V SEAFDEC 2 is 2 seams trawl. Ground rope is 40.12 m with length and head rope of 32.56 m length. Net body is 66.37 m length. Ground rope is suitable for soft bottom. Cod end part is 40 mm double mesh size made by polyethylene PE twine size 700d/30. Net opening is about 4-10 m height and 10-20 m wing spread. Net is spread by iron rectangular cambered otter board, high aspect ratio size 1,400 mm length and 2,200 mm height. Sweep line is 30 m length with upper and lower net pendant 50 m. Trawling speed is 3.0-3.5 knot with the trawling time of 30 minute per operation.

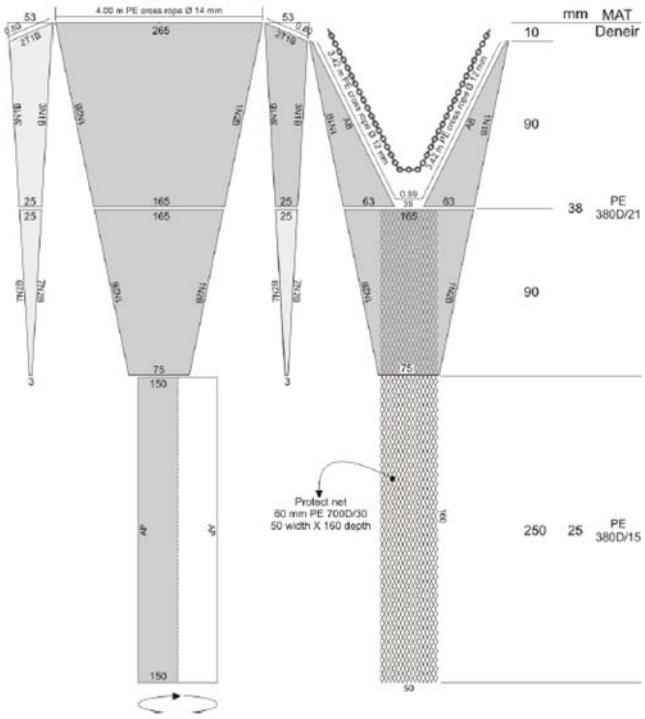


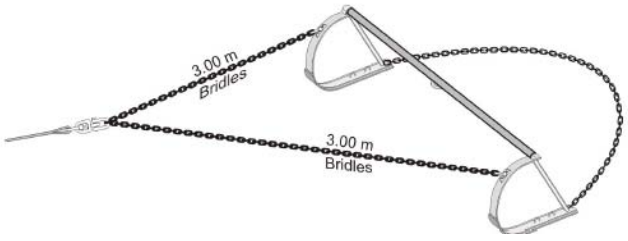
Appendix 4.2 Systematic diagram of beam trawl

SEAFDEC design of deep sea beam trawl gear and its net were developed andmodified from the fisherman in the Northern part and Northeast of the European water. The design is suitable for M.V.SEAFDEC 2 and other research vessels for deep sea fauna samplings in particularly deep sea shrimps and bottom fishes. (Reference: SEAFDEC Publication TD/RES113, downloaded at http://www.map.seafdec.org)





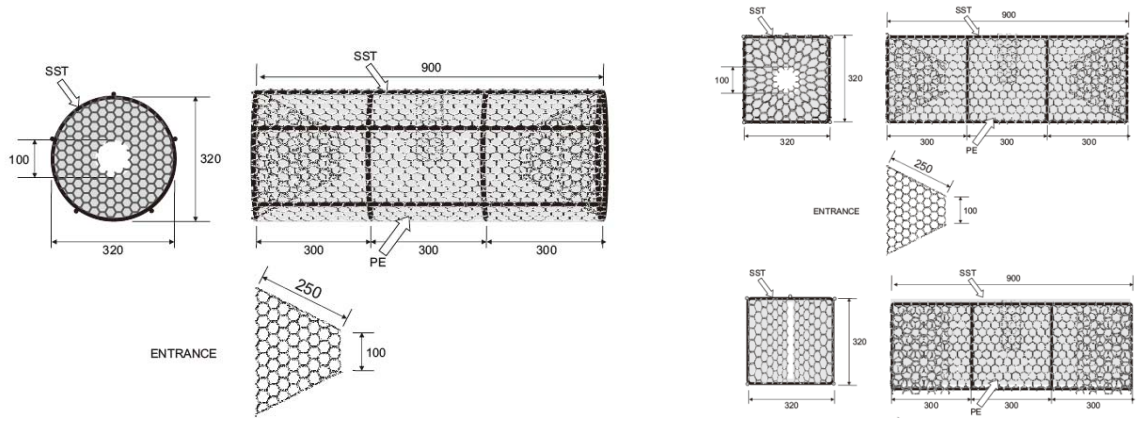




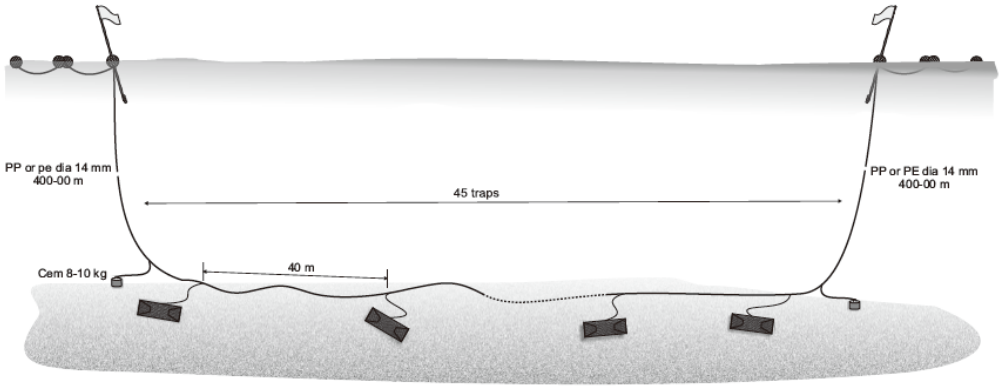
Appendix 4.3 Systematic diagram of deep sea trap

Crustacean, e.g. crab, shrimp and etc is target for deep sea trap fishing. There are 2 deep sea trap designs operated during resource research survey. The first is cubic shape with dimension 30 cm × 90 cm × 30 cm (wide× length × depth). Frame is made by stainless steel with plastic panel, mesh size 2 cm pentagon shape. There are 2 types of entrance, i.e. oval shape with 8 to 10 cm opening diameter and slit shape. Performance of both entrance designs are under investigating. The other design is cylinder design with 35 cm diameter 90 cm in length. Frame is made by stainless steel with plastic panel, mesh size 2 cm pentagon shape. Entrance is oval shape with 8 to 10 cm opening diameter. Round scad and small crab is used for bait. The design is modified from French shrimp trap what operated by BFAR (Bureau of Fisheries and Aquatic Resources, Philippines) in Philippine Waters.

Traps are deployed same system with longline. There is main line and branch line attached with each trap. Main line is made by polypropylene diameter 16 mm and branch line is made by polypropylene diameter 8 mm. The durability of main line is enough to operate within 400 m. If fishing ground is deeper than 400 m, recommended to use polypropylene rope (Dan line) diameter 18 mm and hauling device must be capstan winch, capacity 5 ton, with special side roller on port side. Pelagic longline side roller is not strong enough to operate in very deep sea.



Deep seaTtrap Deployment Diagram



Appendix 4.4 Systematic diagram of Isaacs-Kidd mid-water trawl (IKMT)

The IKMT is a long, round net approximately 6.50 m long, with a series of hoops decreasing in size extending from the mouth of the net to the rear (cod) end, which measures an additional 2 m in length. The hoops maintain the shape of the net during towing. The mouth of the net is 1.75 m wide by 1.30 m high, and is attached to a depressor.

Design of IKMT net is duplicated from the IKMT of Research vessel namely T/S TENYO-MARU that belongs to National Fisheries University (NFU), Japan. But the local materials were used instead. The outer net is PA multifilament diameter 1 mm, mesh side 75 mm and the inner net is PA multifilament (knotless) diameter 0.5 mm, mesh size 16 mm. Codend part used the plankton net mesh size 1 mm and cover with PA multifilament diameter 1 mm, mesh side 19 mm net. All bridles are SST wire diameter 8 mm. The net spreader is iron diameter 35 mm, with approximately 1.50 m in length. (More Detail: SEAFDEC Publication TD/RES113)