



CRUISE REPORT ON RESEARCH ACTIVITY

M.V.SEAFDEC 2 Cruise No. 39-1/2012

14 May – 23 July 2012

**National Research Survey by
Research Institute of Marine Fisheries of Vietnam (RIMF)
Vietnamese Waters**

TD/RP/172

This report is based on preliminary data

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

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Report of Research Activity

1. Cruise Summary

Vessel name: M.V.SEAFDEC 2

Cruise no: M.V.SEAFDEC 2 No.39-1/2012

Period: 14 May – 23 July 2012 (73 days)

Area: Waters of Vietnam

Port of call: Hai Phong, Da Nang, Nha Trang, Vung Tau, and Phu Quoc.

Objective: To carry out fisheries resources survey by using following methods:

1. Hydro-acoustic survey: Simrad EK-60 by using multi acoustic frequency (38, 120, and 200 kHz)
2. Fisheries resources sampling: bottom otter- board trawl and mid-water trawl.
3. Oceanographic survey: ICTD (including chlorophyll-A), Bongo net (Zooplankton and fish larvae), Current Indicator, and other weather information.

Numbers of sampling stations and fishing gear survey:

1. Acoustic survey: distance of the survey approximately 4,228 Nm.
2. Bottom and mid-water trawl: totally 115 stations, including 80 stations for bottom trawl, and 35 stations for mid-water trawl (to be decided by the chief scientist of RIMF during the survey)
3. Oceanographic and plankton survey: approximately 120 stations will be carried out

2. List of personal on board

2.1 Ship personals

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 Ngowlimhuat	Second Engineer
6.	Mr. Kittinai Sukdit	Third Engineer
7.	Mr. Tana Rungjoy	Boatswain
8.	Mr. Pradit Kui-prasert	Steersman
9.	Mr. Charan Intippunya	Steersman
10.	Mr. Chainarong Chopaknam	Fishing assistant
11.	Mr. Somyos Pronprasert	Fishing assistant
12.	Mr. Boontarin Wora-in	Fitter
13.	Mr. Plew Shodok	Oiler
14.	Mr. Teeradet Jantana	Oiler
15.	Mr. Akarapol Chaibanyat	Oiler
16.	Mr. Saichol Kornnoom	Cook
17.	Mr. Marut Sangphuek	Ship's Boy

2.2 Researchers from SEAFDEC/TD

No	Name	Responsibility	Contact address	Period of duty
1	Mr. Isara chanrajkiij	Chief scientist	Isara@seafdec.org	20 May - 20 July
2	Mr. Sayan Promjinda	Fishing gear Technologist	sayan@seafdec.org	20 May - 20 July
3	Mr. Narong Ruangsivakul	Fishing gear Technologist	narong@seafdec.org	20 May – 29 June
5	Dr. Natinee Sukramongkol	Fisheries Oceanographer	nattinee@seafdec.org	20 May – 19 June

2.3 Vietnamese national researchers

No	Name	Responsibility	Contact address	Period of duty
1	Mr. Nguyen Viet Nghia	Coordinator/RIMF	nvnghia@rimf.org.vn	24 May-3 Jun
2	Mr. Vu Viet Ha	Coordinator/RIMF	vvha@rimf.org.vn	4 - 11 Jun
3	Mr. Tran Van Cuong	Chief scientist	tvcuong@rimf.org.vn	24 May-20 Jul
4	Mr. Do Van Nguyen	Fisheries Biologist	dvnguyen@rimf.org.vn	26 May-20 Jul

No	Name	Responsibility	Contact address	Period of duty
5	Mr. Dao Trong Hong	Fisheries Biologist	dthong@rimf.org.vn	26 May-20 Jul
6	Mr. Nguyen Van Giang	Fisheries Biologist	nvgiang@rimf.org.vn	24 May-20Jul
7	Mr. Tran Nhat Anh	Fisheries Biologist	tnanh@rimf.org.vn	24 May-20 Jul
8	Mr. Vo Trong Thang	Fisheries Biologist	vtthang@rimf.org.vn	4 Jun-20Jul
9	Mr. Pham Van Tuyen	Fishing gear Technologist	pvtuyen@rimf.org.vn	24 May-20 Jul
10	Mr. Tran Van Vu	Fisheries Oceanographer	tvvu@rimf.org.vn	24 May-12 Jun
11	Mr. Nguyen Duc Linh	Fisheries Oceanographer	ndlinh@rimf.org.vn	12 Jun-20 Jul
12	Mr. Nguyen Dac Thang	Fisheries Oceanographer	ndthang@rimf.org.vn	26 May-20 Jul
13	Mr. Pham Huy Hung	Observer/RIMF	phhung@rimf.org.vn	24 May-3 Jun
14	Mr. Tran Liem Khiet	Fisheries Oceanographer	tlkhiet@rimf.org.vn	24-25 May
15	Mrs. Nguyen Thuy Duong	Observer/DOF		24-25 May
16	Mr. Phan Van Bac	Observer/DOF		26 May-2 Jun
17	Mr. Nguyen Hoai Nam	Observer/DOF		4 Jun-29 Jun
18	Mr. Vu Van Tam	Observer/DOF		30 Jun-10 Jul

3. Report in General

M.V. SEAFDEC Cruise No.39-1/2012 is a collaborative research survey between Research Institute of Marine Fisheries, Vietnam (RIMF) and Southeast Asian Fisheries Development Center (SEAFDEC), to investigate status and stock of small pelagic fisheries resources in Vietnam Waters. Cruise survey is scheduled from 26 May to 18 July 2012, by dividing into 5 sub-trips.

Respecting to Cruise Order M.V. SEAFDEC2 Cruise No.39-1/2012, forty-five (45) hydroacoustic tracks and a hundred twenty (120) oceanographic survey stations (OS) have been detailed to collect larvae and plankton by using Bongo net and environment parameters are collected by CTD, are conducted during trip. Small pelagic resources sampling by trawls do not position into the plan but be able to conduct in referring to fish school showed by echo trace of hydroacoustic equipments. It is, however, the method found inapplicable for survey operating because rarely fish school found during survey. Small pelagic resources sampling is modified to operate along the hydroacoustic tracks.

Prior the survey is launched, the calibration of hydroacoustic equipment (Simrad EK-60) and pelagic trawl fishing trial, is carried out on 24 and 25 May 2012 in vicinity of Halong Bay. Area of calibration is not so suitable in regarding to current condition however calibration is accomplished without pelagic trawl fishing trial operation.

The first sub-trip is carried out from 26 May to 2 June 2012. Area of survey is around Gulf of Tong Kin. Two (2) ports, Hai Phong and Da Nang are defined as Port of Calls. Total numbers of oceanographic survey stations are thirty two (32) stations and number of bottom trawl fishing is eighteen (18). Few fishing positions are selected to conduct on the hydroacoustic track. Thirteen (13) hydroacoustic tracks are carried out the recording by hydroacoustic survey equipment (Simrad EK-60). Fishing gear is switched from Bottom trawl to mid-water trawl for fishing trial after finishing oceanographic survey station OS26, at Con Co Island. Mid-water trawl fishing trial, however, is cancelled because net drum is trouble by insufficient pulling power. M.V. SEAFDEC2 proceeds to port of Da Nang for repair net drum. Weather and sea condition during the trip is generally slight during sub-trip.

The second sub-trip is carried out from 5 to 10 June 2012. Area of survey is around central part of Vietnam Water. Port of call is Nha Trang. Total numbers Oceanographic survey station area Sixteen (16), and seven (7) mid-water trawl fishing operation and one (1) mid-water trawl trial operation is carried out during sub-trip. At trawl fishing station No.5, mid-water trawl net is damage from accident of over trawling depth layer and net struggled with rough sea bottom. Crews spend a day replacing ground rope and net mending. Six (6) hydroacoustic tracks are carried out the resources abundance information recording by hydroacoustic survey equipment (Simrad EK-60). During the hydroacoustic survey from OS 45 to OS 46, M.V. SEAFDEC2 get the accident of electricity trouble. It causes main supply of 24 voltages electric system is blackout and GPS system includes with GPS data transfer system is collapsed. Gyrocompass was consequently trouble and autopilot system is failure. All research activities are cancelled after finish OS45, among hydroacoustic track No. 20 (Waypoint No.19 to Waypoint No.21). M.V. SEAFDEC2 is preceded to Port of Nha Trang manually. Weather and sea condition during the trip is generally slight however the sea condition turns to moderate in particular afternoon time after the day 7th.

The third sub-trip is carried out from 20 to 28 June 2012. Due to the electricity and navigation instruments malfunctioning, M.V. SEAFDEC2 spends 10 days to partly repair. Area of survey

is around central part of Vietnam Water. Port of call is Vung Tao. Total numbers Oceanographic survey station area Twenty four (24), and five (5) mid-water trawl fishing operations, are carried out during sub-trip. Eleven (11) hydroacoustic tracks are carried out abundance of fisheries resources information recording by using hydroacoustic survey equipment (Simrad EK-60). Regarding that rough sea and bad weather condition causes mid-water trawl fishing is not able to fully operate and echo signals of hydroacoustic equipment (Simrad EK-60) show very rare fish school as well as signal is very poor quality and during the track southwestward while ship is navigated against wind direction. Result of catch is unsatisfied.

The forth sub-trip is carried out from 2 to 9 July 2012. Port of call is Phu Quoc Island. Area of survey is around southern part of Vietnam Water, Eastern of Gulf of Thailand. Total numbers oceanographic survey station area twenty three (23) and sixteen (16) bottom trawl fishing operations are carried out during sub-trip. Bottom trawl fishing operations are designed to conduct few operations along the hydroacoustic track. Fishing operation No.22 on hydroacoustic track No.31 is trouble during shooting net. Otter board is struggled with sea bottom and trawl net is broken. Crews spend 5 hours to repair and fishing operation is able to conduct in the following days. Weather and sea condition during the trip is generally moderate but found the slight condition during morning period.

The fifth trip sub-trip is carried out from 11 to 18 July 2012. Port of call is Vung Tau. Area of survey is around southwestern part of Vietnam Water, Eastern of Gulf of Thailand. Total numbers oceanographic survey station area twenty four (24) and twenty one (21) bottom trawl fishing operations are carried out during sub-trip. Eleven(11) acoustic tracks of resources abundance information recorded by hydroacoustic equipment (Simrad EK-60) are conducted during this sub-trip. During hydroacoustic waypoint No.37-38, two petroleum platforms are obstructed the route so that M.V.SEAFFDEC2 must adjust the course for safety navigation and fishing operation on this track is adjusted to 10 nautical mile away from original acoustic track. Observation that many stationary gears i.e. fyke net, stake trap was found along the coastal in shallow water. It is dangerous for navigation in the nighttime and oceanographic survey operations. The area of fifth sub-trip found many type of stationary fishing gears in particular bottom gillnet, longline-trap, longline-hook what also obstructed the trawl fishing operation Many trawlers both pair trawls and single trawls are observed around the deeper area.

Overall result from five survey trips are one hundred and twenty one (121) oceanographic survey operations by CTD, Bongo net, and Neuston net. Fifty seven (57) fishing operations are conducted the demersal resources survey by otter-board trawl. Twelve (12) mid-water trawl fishing operations are conducted and forty four (44) hydroacoustic tracks, approximately 4,200 nm is recorded of fisheries resource abundance by hydroacoustic equipment (Simrad EK-60). The map of survey station was show in (Fig.1)

The general observation from cruise survey is concluded that;

1) Trawl net should be modified for more research performance. Bottom trawl net is 3-5 m. net height that is not sufficient to catch small pelagic fish sometime observe at depth 10 m above sea bottom. New high opening design is need to investigate and installed with M.V.SEAFFDEC2 for the next survey

2) Mid-water trawl installed onboard M.V.SEAFFDEC2 is commercial scale design. It is too large to operate by less experience crews. The original net opening is record as 20-30 m. but the operation is found inconvenient with heavy weight. Operator remove the weight and found opening is 10-15 m what suitable to operated in shallow area. The minimum sea depth is 40 m. Modification of mid-water trawl net for more convenient for operation e.g. reduce scale of net, change some lighter weight material should be priority carried out.

3) Otter board for using both bottom trawl and mid water trawl net should replace conventional otter board. Nowadays fishers in Northern Europe and Alaska, USA has introduced the hybrid otter board what be able to operate both bottom trawl and mid-water trawl. Only otter board allows M.V.SEAFFDEC2 switch of the net during operated and reduce dangerous during changing otter board.

4) Net Sonde is the depth sensor used for this cruise. The accuracy is found error at the depth less than 20 m. As well as trawl eyes sensor and wing net sensor found malfunction. It is very important to prepare the new more accuracy net recorder and sending trawl eye sensor and wing net sensor to maintenance and check at the factory.

5) Weather condition is one of the major hindrances affected to fishing operations during the cruise survey. Wind force level 5 makes trouble the vessel maneuvering and get harm to deck crew. It is found that ship drifting more than 2 nm/hr while wind force 5. That is

impossible for setting the net because speed of vessel during shooting net cannot be controlled. If shooting operation is success, strong wind directly affects to towing speed both follow wind and against wind direction.

6) Local fishing boats and activities always make trouble to research survey. It is not only fishing operation but also hydroacoustic Survey. Area Gulf of Tong kin southerly, surface gillnet target on flying fish always obstructs to hydroacoustic tracks. There are many fishers conducted gillnet trap and longline at the central part of Vietnam Water. They always obstructs to trawling track and make fishing operation towing time is shorter that standard operation.

7) Oceanographic survey is collected by instrument of RIMF Vietnam. Obviously that it is not priority of SEAFDEC oceanographer to participate with cruise survey.

8) Some petroleum platforms obstructed the hydroacoustic tracks of sub-trip 3 and 5. It is very important for safety operation to inform these platforms to acknowledge task of M.V.SEAFDEC2.

Results of catches, however, are not report as a part of fishing log. Data is available under the approval by RIMF, Vietnam. Anyone who requires and interested in the result of catch, contact to the survey project coordinator, Mr. Nguyen Viet Nghia, Research Institute for Marine Fisheries-Vietnam (RIMF). Address: 224 Le Lai street, Hai Phong city, Vietnam. [Tel:+84 313836656](tel:+84313836656) , Fax:+84 313-836812; www.rimf.org.vn

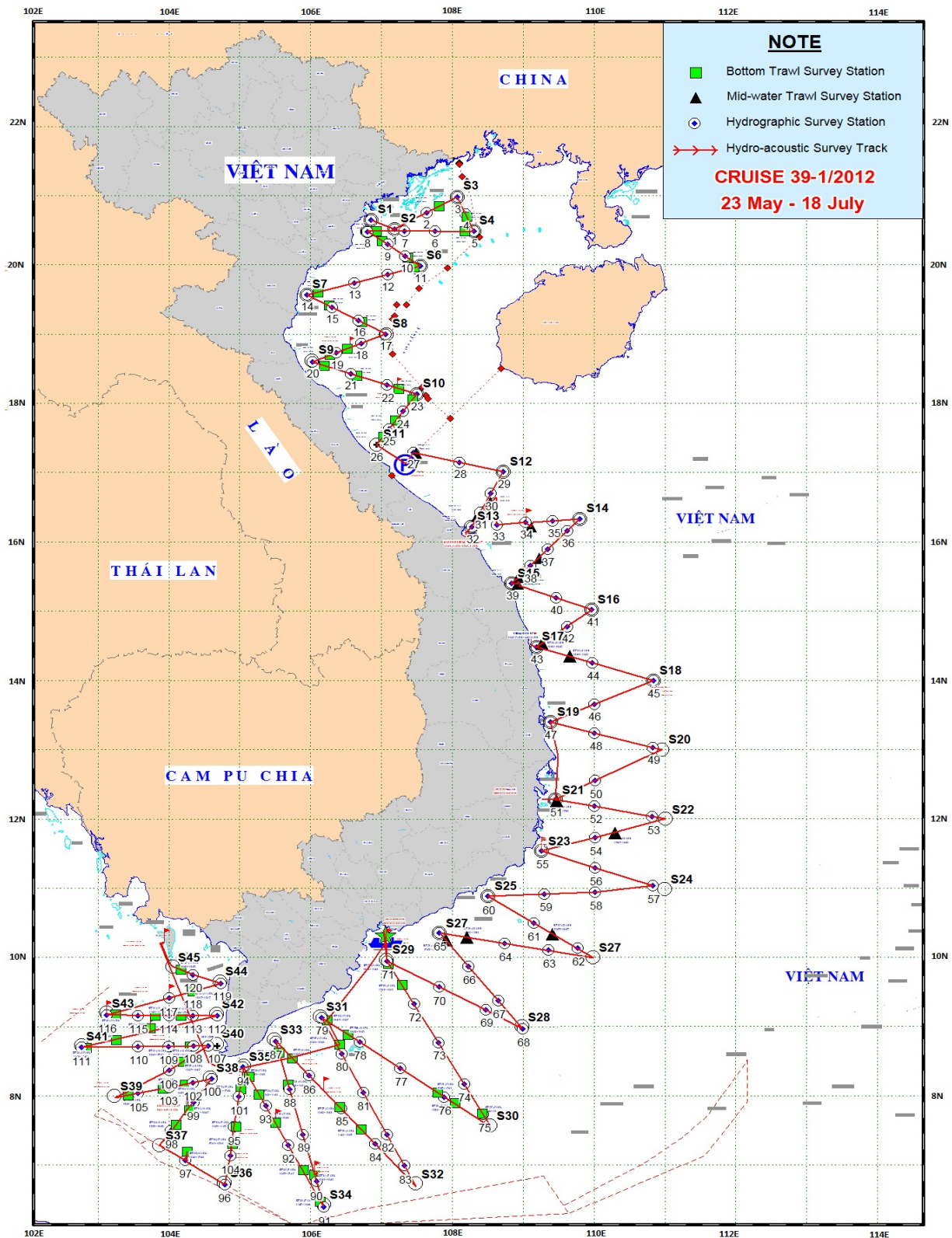


Fig. 1 Map showing the survey stations

6. Oceanographic survey

6.1 Physical and biological oceanography

There were 121 oceanographic stations completed during 26 May to 18 July 2012 (Figure 1). Physical and chemical characteristics of water were collected using compact CTD data logger (ASTD-151), compact-EM (current meter), and Thermo-Salino Graph. The compact CTD were deployed the same time with current meter from the sea surface to the maximum depth of approximately 250 meter (Figure 2). The general information during the cruise tracks such as; ship position, weather and sea condition were record every hour through the navigation deck unit.

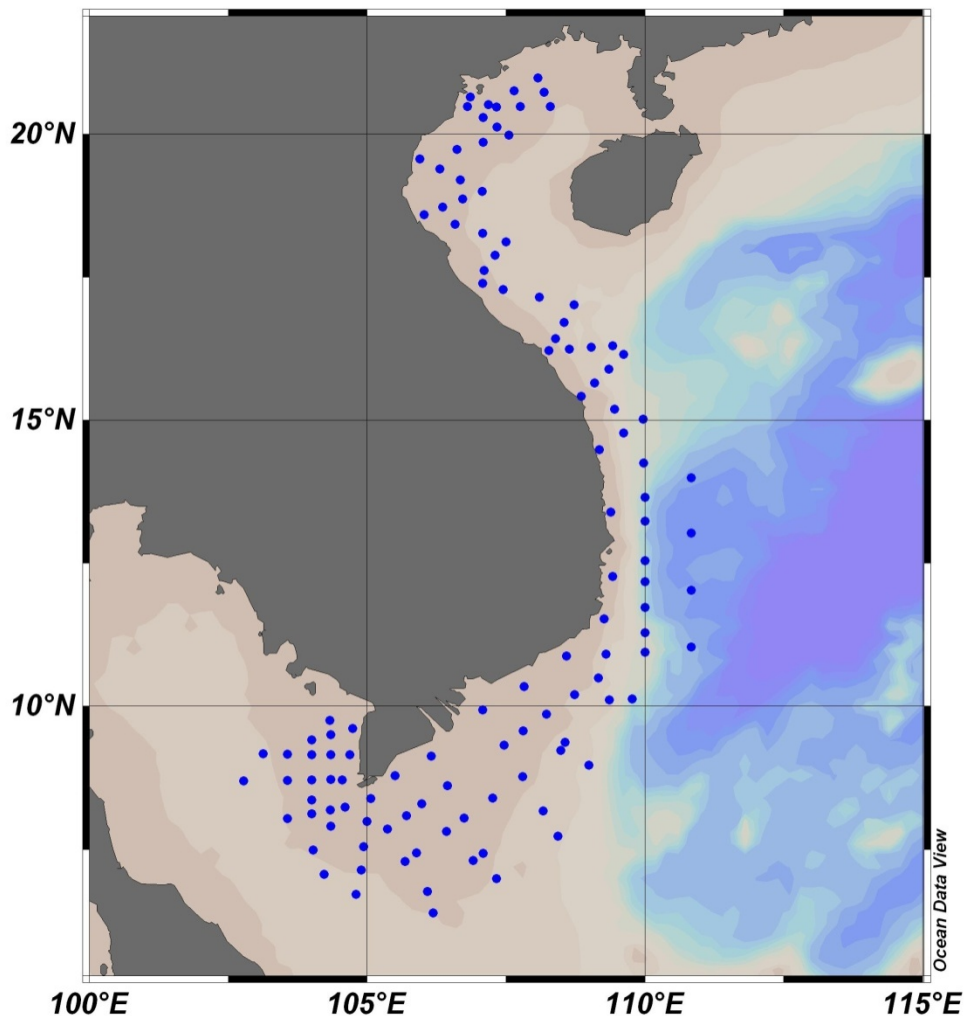


Figure 1 Map showing the survey stations.

The Neuston net was towed behind the ship for seven (7) minutes at the sea surface for collecting the juvenile fish samples (Figure 3). Vertical tow of zooplankton net (mesh size 330 μ m), phytoplankton net (mesh size 80 μ m), and larvae and egg net (mesh size 450 μ m) were

respectively operated with slow speed from the maximum depth of 100 meter to the sea surface (Figure 4). The volume of water filtered through the plankton net was measure through the flowmeter.

Thermosalinograph with Fluorometer (TSG-Fluorometer) which equips onboard M.V. SEAFDEC2 were operated along the cruise track 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. Unfortunately, during M.V. SEAFDEC2 was en route to the survey station OS46 (June 9, 2012), the ship's gyrocompass system was failure and affected to the NMEA navigation device of the thermosalinograph system. Therefore, the data acquired from the thermosalinograph system were 44 tracks from the station OS01 to OS46 only.



Figure 2. Compact CTD data logger and current meter deployment.



Figure 3. Neuston net towing at the sea surface.



Figure 4. Vertical tow of zoo-phytoplankton net, and larvae and egg net.

6.2 Preliminary analysis of oceanographic parameters

All 121 oceanographic stations parted into five (5) legs conducted both day and night time with the sea depth varies between 10 m (OS107) and >2,000 m (OS45, OS52, OS53, OS57). However, the physical characteristics of Vietnamese waters of the present survey could not be described in the details in this report as the oceanographic data sharing and collaboration has become sensitive and unshared policy. Therefore, the only contour charts of sea surface temperature ($^{\circ}\text{C}$), salinity (PSU), and fluorescence (mcg/L) were retrieved from the Thermosalinograph with Fluorometer and navigation logsheet. The contour chart along the survey tracks of salinity (PSU) and fluorescence (mcg/L) from the station OS01 to OS46 were shown in figure 5. The salinity varied between 21.9 to 33.3 PSU and low salinity was observed at the coastal area of station OS01, OS08, OS14 and OS20. The fluorescence intensity (mcg/L) found fluctuated between 0.0875 and 1.9 mcg/L at the inner Gulf of Tonkin (OS01 to OS11, OS14, OS20) while the outer area varied in the narrow range with the average at 0.0167 mcg/L.

The sea surface temperature retrieved from the Thermosalinograph (OS01 to OS46) varied between 27.5 and 31.9 °C parallel with the sea surface temperature recorded from navigation deck were varied between 24.0 and 33.3°C while the air temperature recorded between 26 and 37°C (Figure 6). The horizontal plot of sea surface temperature retrieved from the navigation logsheet show a cold water zone at offshore of Nha Trang area (OS53, OS54, OS57) and the southward region at the coastal area of station OS60 (Figure 6). The low sea surface temperature is fluctuated between 24.0°C and 25.6°C which is 2-4°C colder than the surrounding water (Figure 6). The survey result is evident of the upwelling over the southeast shelf of Vietnamese waters which may induce by the southwest monsoon forcing.

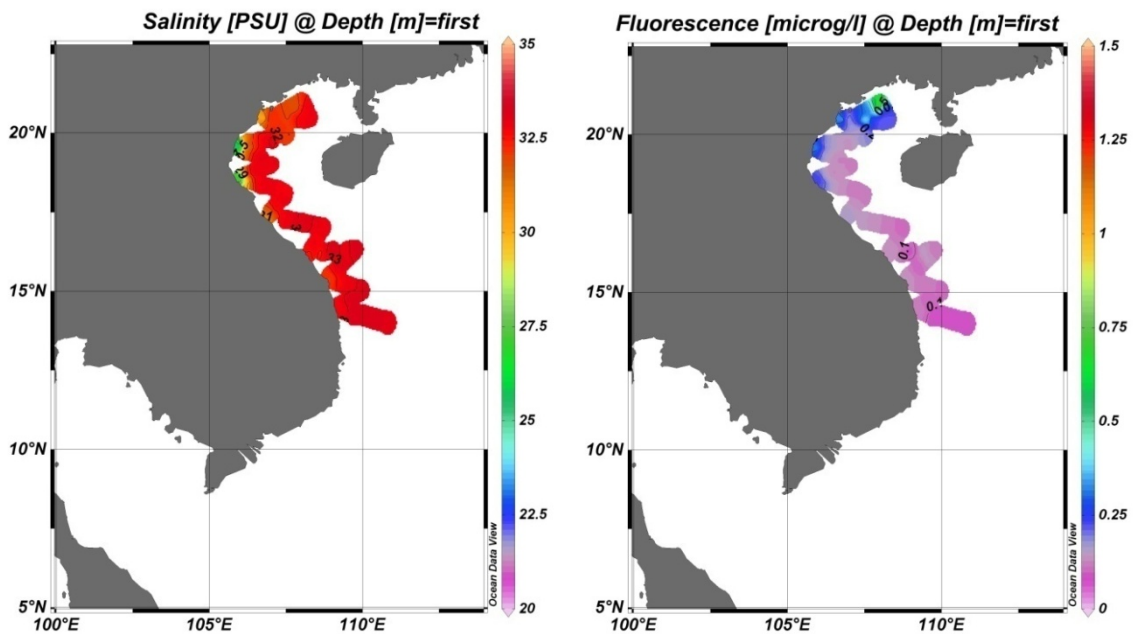


Figure 5. Horizontal plot along the survey track of salinity (PSU), and fluorescence (mcg/L).

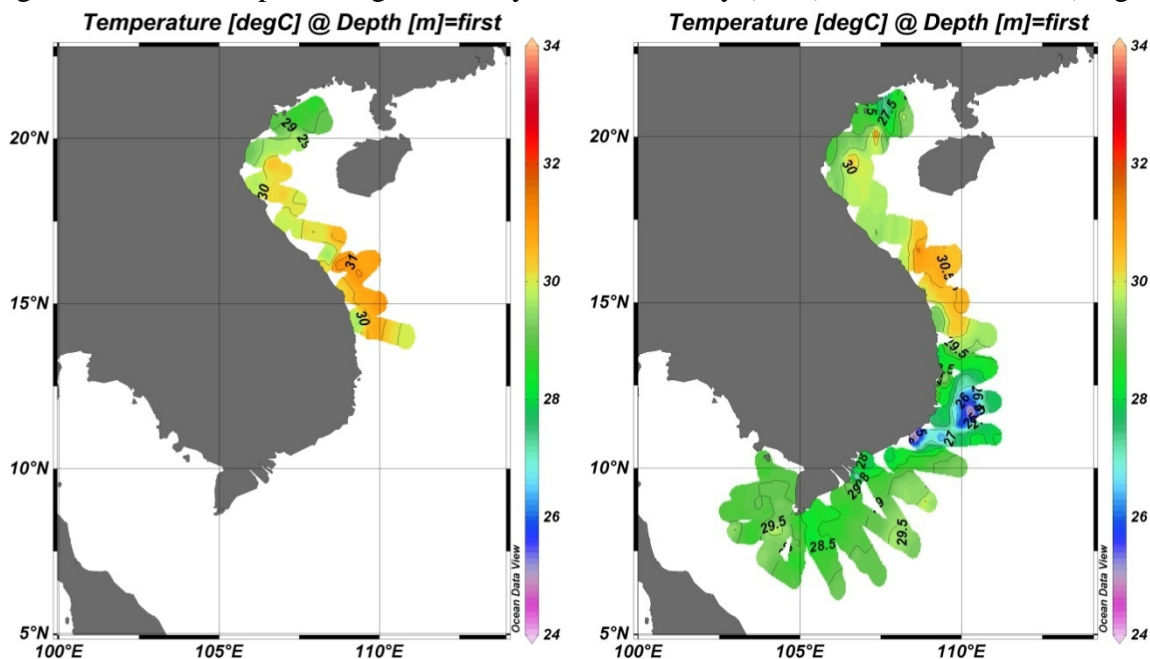


Figure 6. Horizontal plot along the survey track of sea temperature ($^{\circ}\text{C}$) retrieved from the Thermosalonograph (left), and navigation logsheet (right) at the surf

7. Summarization of the activities conducted in the previous survey of M.V. SEAFDEC 2 in Vietnam water.

The 1st survey of M.V. SEAFDEC2 in Vietnam water was conducted from 16 May to 24 July 2012. The activities and results of the survey can be summarized as the following.

a. Survey activities

- *Acoustic survey*

Based on the initial design for the assessment of fishery status, it was concluded that the total number of acoustic survey stations during the 1st cruise were sufficient. It was recommended for the 2nd survey cruise that the total number of the acoustic track will be the same with the 1st cruise.

However, it was found that in the water depth over 1,000m, the acoustic signal included the noise, especially in some area where there was no detection. In the coastal area (<10m), the noise was also recorded.

In terms of the quality, the record of acoustic data quality was generally good. However, the noise was included during bad weather condition and when the current indicator of the vessel was switched on. Therefore, it is recommended to change the cruising speed, and switch off the Current Indicator.

- *Oceanographic survey*

The number of oceanographic survey station was covered the whole station as planned. It is recommended that the oceanographic survey of the 2nd cruise will be the same as 1st cruise. However, oceanographic survey should not be in coastal area where the water depth is less than 10m. In addition, the oceanographic winch meter should be fixed before the next cruise.

- *Fishing gear operation*

Out of 120 total survey stations planned, it was only 57 and 12 stations of demersal and mid-water trawl samplings were conducted. The main reason was that sea condition was not suitable and safe enough for the trawl sampling. In addition, a number of problems had occurred during the survey cruise including net broken, DC system trouble, winches trouble. However, during the LEG-1, LEG-4, and LEG-5, the samples were sufficient for data analysis, whereas there were only few sampling stations for the LEG-2 and LEG-3.

It is strongly recommended that the station for trawl sampling should follow the original/agreed plan (at least 2 stations on each track). However, the trawl net should be already set during the acoustic track, and to be ready for sampling based on the signal of the fish school.

It was recognized during the 1st cruise that the height of the net mouth was quite low. This caused a limited amount of the samples for the acoustic survey analysis. To resolve this limitation for the next cruise, there are two (2) options recommended as follows:

Option 1: Using a new set of otter-board and trawl net

It is recommended that the high-mouth-opening trawl sampling net (similar to that of using in research study of SEAFDEC/MFRDMD, so-called crocodile net in Malaysia) and a set of 2-in-1 otterboard (which can be used for demersal and mid-water fishery resource survey) should be used.

It was recognized that it was too dangerous to change of the otter-board at sea from/to demersal and midwater trawl sampling. For future smooth operation of the survey, it is therefore RIMF has requested TD to provide 2-in-1 otterboard which both demersal and midwater trawl could be used. In this regard, TD informed RIMF that the cost for a set of the requested otterboard is approximately USD 20,000. In addition, RIMF also requested TD to provide high-mouth-opening trawl sampling net (similar to so-called crocodile net in Malaysia which SEAFDEC/MFRDMD is now conducting a research on) for obtaining better performance in fish sampling. In this connection, TD informed RIMF that the high-mouth-opening trawl sampling net will cost about USD 12,000. In response to this request, TD could borrow the 2-in-1 otterboard from MFRDMD whereas the net has to be provided by RIMF's budget. The Meeting noted that time required for constructing the new net would be about 1 month.

Option 2: Using the trawl net of Vietnam

RIMF informed SEAFDEC that RIMF has a set of high-mouth-opening trawl sampling net, which has been used onboard R/V Bien Dong (2 nets and one pair of door). Therefore, this set can be used for the next survey by M.V. SEAFDEC2. However, this matter should be carefully considered by experts from RIMF and SEAFDEC/TD about the possibility to use the net. If it is applicable, it is required to have a trial before the survey.

The Meeting also noted that in case that these 2 options could not be finalized, the same trawl sampling nets used during the 1st cruise will also be used in the 2nd cruise.

b. Period of time.

Period of time was suitable for the 1st cruise, which can represent the data of stock status during southwest monsoon.

c. Weather condition.

It was noted that weather during the 1st cruise was too tough to carry out the research survey.

d. Port of call

At Hai Phong, it was originally planned to bring the vessel mooring at Hai Phong main port. But, the location of mooring had to change due to urgent security reason, which requested by port authorities.

In Phu Quoc, there is only domestic port available at An Thoi, and it has never used by foreign vessel.

e. Corporation between SEAFDEC/TD staff and RIMF staff onboard.

The number of problems that occurred during the 1st cruise was discussed and clarified for future smooth working among the both parties onboard the vessel.

Research activities of M.V. SEAFDEC2
Cruise 39-1/2012: Pelagic Fisheries resources survey in Vietnam Waters

Date	Time	Activities	Remark
14 May 12	0845	Leaved SEAFDEC/TD for Hai Phong, Vietnam	
11 May	1155	Arrived Hai Phong Pilot station	
	1700	Alongside at port of Hai Phong	

Sea trial: 24- 25 May 2012

24 May 12	0700	All researcher RIMF (9 persons) embarked on board	
	0815	Leave Port of Hai Phong for cruise trial	
	1200	Let go anchor	L20°38'.00N λ106°52'.40E
	1430-2230	Calebration Hydro acoustic equipment EK 60	Sea depth 25 m
25 May 12	0615-0930	Calebration Hydro acoustic equipment EK 60	
	0940	Heave up anchor and then proceeded to Hai Phong	L04°47'.20N λ114°18'.20E
	1430	Alongside port of Hai Phong	L04°47'.30N λ114°18'.20E
	1540-1730	Preparation the fishing gear	

Leg I: 26 May to 2 June 2012

26 May 12	1810	Leave port of Hai Phong for research survey St. 1	
	2000 2004-2017 2020-2025 2027-2030	Oceanographic survey op.1 at station no.1 - Neuston net, sea depth 12.5 m - CTD , sea depth 13.5 m - Plankton net , sea depth 13.5 m And then proceeded to St. OS1.	L20°39'.10N λ106°51'.50E L20°39'.00N λ106°51'.50E L20°38'.70N λ106°51'.90E L20°38'.70N λ106°51'.90E
	2030-2252	Acoustic survey from station no.1 to station OS1	
	2252 2257-2310 2312-2322 2324-2330	Oceanographic survey op.2 at station OS1. - Neuston net, sea depth 28.5 m - Plankton net , sea depth 28.5 m - CTD , sea depth 28.5 m And then proceeded to St. OS2.	L20°31'.00N λ107°11'.20E L20°30'.90N λ107°11'.20E L20°31'.20N λ107°10'.70E L20°31'.00N λ107°10'.40E
	2330-0445	Acoustic survey from station OS1 to station OS2	
	27 May 12	0445 0449-0500	Oceanographic survey op.3 at station OS2. - Neuston net, sea depth 30.2 m

	0505-0515 0520-0525	- Plankton net , sea depth 30.2 m - CTD , sea depth 30 m And then proceeded to St. OS3.	L20°45'.50N λ107°28'.60E L20°45'.50N λ107°38'.80E L20°45'.40N λ107°38'.40E
	0918-0930	Shooting Bottom trawl Op.1, Sea depth 34 m.	L20°54'.80N λ107°57'.60E - L20°55'.30N λ107°56'.60E
	1015-1035	Hauling Bottom trawl Op.1	L20°56'.60N λ107°59'.80E - L20°56'.00N λ108°00'.20E
	1110 1112-1122 1125-1130 1135-1138	Oceanographic survey op.4 at station OS3. - Neuston net, sea depth 34.5 m - Plankton net , sea depth 34.5 m - CTD , sea depth 30 m And then proceeded to St. OS3b.	L20°59'.00N λ108°04'.50E L20°59'.00N λ108°04'.50E L20°59'.10N λ108°04'.70E L20°59'.00N λ108°04'.60E
27 May 12	1325 1328-1340 1342-1350 1350-1400	Oceanographic survey op.5 at station OS3b. - Neuston net, sea depth 43 m - Plankton net , sea depth 43 m - CTD , sea depth 43 m	L20°44'.10N λ108°11'.10E L20°44'.10N λ108°11'.10E L20°44'.50N λ108°11'.10E L20°44'.40N λ108°11'.00E
	1405-1425	Shooting Bottom trawl Op.2 Sea depth 43 m.	L20°44'.30N λ108°10'.80E - L20°43'.20N λ108°49'.90E
	1510-1525	Hauling Bottom trawl Op.2	L20°41'.30N λ108°08'.20E - L20°41'.00N λ108°08'.10E
	1700 1702-1715 1717-1725 1727-1738	Oceanographic survey op.6 at station OS4. - Neuston net, sea depth 42.5 m - CTD , sea depth 42.5 m - Plankton net , sea depth 42.5 m And then proceeded to St. OS6	L20°29'.10N λ108°18'.10E L20°29'.10N λ108°18'.10E L20°29'.50N λ108°18'.30E L20°29'.50N λ108°18'.30E
	1835-1850	Shooting Bottom trawl Op.3 Sea depth 52 m.	L20°29'.20N λ108°08'.70E - L20°28'.70N λ108°08'.20E

	1935-1952	Hauling Bottom trawl Op.3	L20°26'.60N λ108°06'.70E - L20°26'.10N λ108°06'.40E
	2150 2152-2202 2203-2214 2215-2230	Oceanographic survey op.7 at station OS6. - Neuston net, sea depth 41.5 m - Plankton net , sea depth 41.5 m - CTD , sea depth 41.5 m And then proceeded to St. OS7	L20°28'.90N λ107°45'.30E L20°28'.90N λ107°45'.40E L20°29'.20N λ107°45'.50E L20°29'.10N λ107°45'.40E
28 May 12	2230-0048	Acoustic survey from station OS6 to station OS7	
	0048 0054-0100 0105-0110 0112-0117	Oceanographic survey op.8 at station OS7. - Neuston net, sea depth 30 m - CTD , sea depth 30 m - Plankton net , sea depth 30 m And then proceeded to St. OS7	L20°28'.70N λ107°19'.50E L20°28'.70N λ107°19'.30E L20°28'.70N λ107°19'.30E L20°28'.60N λ107°19'.20E
	0500-0515	Shooting Bottom trawl Op.4 Sea depth 52 m.	L20°28'.70N λ106°58'.70E - L20°28'.10N λ106°57'.90E
	0600-0613	Hauling Bottom trawl Op.4	L20°26'.40N λ106°55'.40E - L20°26'.00N λ106°55'.00E
	0701 0706-0718 0720-0725 0726-0733	Oceanographic survey op.9 at station OS8. - Neuston net, sea depth 23 m - CTD , sea depth 23 m - Plankton net , sea depth 23 m And then proceeded to St. OS9	L20°28'.80N λ106°48'.40E L20°28'.70N λ106°48'.30E L20°28'.10N λ106°48'.10E L20°28'.00N λ106°48'.00E
	0837-0850	Shooting Bottom trawl Op.5 Sea depth 28.5 m.	L20°22'.80N λ106°56'.70E - L20°23'.60N λ106°57'.10E
	0925-0937	Hauling Bottom trawl Op.5	L20°25'.50N λ106°58'.20E - L20°25'.90N λ106°58'.30E
	1050 1053-1105 1107-1112	Oceanographic survey op.10 at station OS9. - Neuston net, sea depth 30 m - Plankton net , sea depth 30 m	L20°17'.40N λ107°05'.30E L20°17'.40N

	1113-1125	- CTD , sea depth 30 m And then proceeded to St. OS10	λ107°05'.30E L20°17'.30N λ107°05'.10E L20°17'.20N λ107°05'.00E
	1125-1310	Acoustic survey from station OS9 to station OS10	
28 May 12	1310 1313-1322 1325-1332 1333-1337	Oceanographic survey op.11 at station OS10. - Neuston net, sea depth 30 m - Plankton net , sea depth 30 m - CTD , sea depth 30 m	L20°07'.40N λ107°20'.30E L20°07'.30N λ107°20'.30E L20°07'.40N λ107°19'.80E L20°07'.40N λ107°19'.70E
	1340-1355	Shooting Bottom trawl Op.6 Sea depth 30 m.	L20°07'.50N λ107°19'.70E - L20°07'.30N λ107°20'.50E
	1500-1520	Hauling Bottom trawl Op.6	L20°04'.30N λ107°22'.60E - L20°04'.00N λ107°22'.80E
	1520-1632	Acoustic survey from station OS10 to station OS11	
	1632 1635-1646 1648-1652 1653-1658 1659-1702	Oceanographic survey op.12 at station OS11. - Neuston net, sea depth 34 m - Plankton net , sea depth 34 m - CTD , sea depth 34 m - Plankton net , sea depth 34 m	L19°58'.90N λ107°33'.10E L19°59'.00N λ107°33'.20E L19°58'.80N λ107°33'.20E L19°58'.90N λ107°32'.20E L19°59'.00N λ107°33'.20E
	1736-1747	Shooting Bottom trawl Op.7 Sea depth 32 m.	L19°57'.70N λ107°28'.10E - L19°57'.10N λ107°28'.10E
	1832-1844	Hauling Bottom trawl Op.7	L19°54'.80N λ107°28'.00E - L19°54'.50N λ107°28'.00E
	1645-1735	Acoustic survey to station OS12	
	2203 2205-2217 2219-2227 2228-2238	Oceanographic survey op.13 at station OS12. - Neuston net, sea depth 47.5 m - Plankton net , sea depth 47.5 m - CTD , sea depth 47 m	L19°51'.60N λ107°05'.20E L19°51'.60N λ107°05'.20E L19°51'.90N λ107°05'.20E

			L19°52'.00N λ107°05'.20E
	2238-0155	Acoustic survey from OS12 to station OS13	
29 May 12	0155 0158-0208 0210-0215 0218-0223	Oceanographic survey op.14 at station OS13. - Neuston net, sea depth 30 m - Plankton net , sea depth 30 m - CTD , sea depth 30 m	L19°43'.90N λ106°37'.20E L19°43'.90N λ106°37'.20E L19°43'.70N λ106°37'.50E L19°43'.70N λ106°37'.50E
	0518-0530	Shooting Bottom trawl Op.8 Sea depth 29 m.	L19°38'.30N λ106°16'.70E - L19°38'.90N λ106°16'.20E
	0615-0626	Hauling Bottom trawl Op.8	L19°40'.80N λ106°14'.30E - L19°40'.20N λ106°14'.60E
	0626-0815	Acoustic survey to station OS14	
	0815 0820-0830 0832-0837 0838-0848	Oceanographic survey op.15 station OS14. - Neuston net, sea depth 19.5 m - Plankton net , sea depth 19.5 m - CTD , sea depth 19.5 m	L19°34'.20N λ105°57'.00E L19°33'.90N λ105°57'.10E L19°33'.60N λ105°56'.80E L19°33'.60N λ105°56'.80E
	0848-1025	Acoustic survey to station OS15	
	1025-1035	Shooting Bottom trawl Op.9 Sea depth 28 m.	L19°26'.00N λ106°12'.30E - L19°25'.30N λ106°12'.30E
	1120-1133	Hauling Bottom trawl Op.9	L19°22'.40N λ106°12'.40E - L19°22'.20N λ106°12'.70E
	1212 1216-1225 1226-1238 1238-1243	Oceanographic survey op.16 station OS15, depth 30 - Neuston net - Plankton net - CTD	L19°23'.40N λ106°18'.30E L19°23'.40N λ106°18'.30E L19°23'.60N λ106°18'.60E L19°23'.70N λ106°18'.60E
	1243-1508	Acoustic survey from OS15 to station OS16	

Date	Time	Activities	Remark
29 May 12	1508	Oceanographic survey op.17 station	L19°11'.90N λ106°40'.70E
	1510-1519	OS16, depth 46	L19°11'.90N λ106°41'.00E
	1522-1528	- Neuston net	L19°12'.00N λ106°41'.00E
	1530-1541	- Plankton net	L19°12'.90N λ106°41'.00E
		- CTD	
	1755-1800	Shooting Bottom trawl Op.10 Sea depth 48 m.	L19°10'.00N λ106°43'.70E - L19°09'.80N λ106°43'.90E
	1845-1905	Hauling Bottom trawl Op.10 And then proceeded to St. OS17	L19°08'.10N λ106°46'.00E - L19°07'.70N λ106°46'.60E
	2055	Oceanographic survey op.18 station	L18°59'.90N λ107°04'.30E
2100-2112	OS17, depth 61	L18°59'.90N λ107°04'.30E	
2114-2124	- Neuston net	L19°00'.00N λ107°03'.90E	
2125-2132	- Plankton net	L19°00'.10N λ107°03'.80E	
	- CTD		
2132-2337	Acoustic survey from station OS170 to station OS18		
2337	Oceanographic survey op.19 station	L18°52'.10N λ106°43'.00E	
2340-2352	OS18, depth 53	L18°52'.10N λ106°43'.00E	
2354-0004	- Neuston net	L18°52'.20N λ106°43'.40E	
0005-0012	- Plankton net	L18°52'.30N λ106°43'.40E	
	- CTD		
30 May 12	0012-0130	Acoustic survey from station OS18 to station OS19	
	0505-0515	Shooting Bottom trawl Op.11 Sea depth 46 m.	L18°47'.40N λ106°31'.60E - L18°46'.30N λ106°31'.50E
	0600-0615	Hauling Bottom trawl Op.11 And then proceeded to St. OS19	L18°45'.00N λ106°33'.00E - L18°44'.70N λ106°33'.40E
	0732	Oceanographic survey op.20 station	L18°43'.40N λ106°21'.60E
	0735-0745	OS19, depth 41	L18°43'.30N λ106°21'.40E
	0747-0754	- Neuston net	L18°43'.20N λ106°21'.10E
	0755-0805	- Plankton net	L18°43'.30N λ106°21'.10E
		- CTD	
	0805-0900	Acoustic survey from station OS19 to station OS20	
	0900-0910	Shooting Bottom trawl Op.12 Sea depth 31 m.	L18°40'.20N λ106°13'.10E - L18°40'.50N λ106°13'.80E
	0955-1012	Hauling Bottom trawl Op.12 And then proceeded to St. OS20	L18°41'.40N λ106°17'.20E - L18°41'.40N λ106°17'.20E
	1150	Oceanographic survey op.21 station	L18°35'.60N λ106°01'.60E
	1152-1201	OS20, depth 23	L18°35'.60N λ106°01'.60E
1204-1209	- Neuston net	L18°35'.70N λ106°01'.70E	
1210-1214	- Plankton net	L18°35'.80N λ106°01'.70E	
	- CTD		
1310-1320	Shooting Bottom trawl Op.13 Sea depth 26 m.	L18°32'.10N λ106°11'.80E - L18°31'.10N λ106°11'.90E	
1400-1412	Hauling Bottom trawl Op.13 And then proceeded to St. OS21	L18°28'.80N λ106°12'.40E - L18°28'.30N λ106°12'.70E	
1624	Oceanographic survey op.22 station	L18°25'.50N λ106°35'.00E	
1626-1635	OS21, depth 44	L18°25'.60N λ106°35'.00E	
1637-1644	- Neuston net	L18°25'.80N λ106°35'.10E	
1645-1651	- Plankton net	L18°25'.80N λ106°35'.00E	
	- CTD		

	1742-1755	Shooting Bottom trawl Op.14 Sea depth 55 m.	L18°23'.00N λ106°42'.80E - L18°22'.60N λ106°41'.90E
	1840-1900	Hauling Bottom trawl Op.14 And then proceeded to St. OS22	L18°21'.40N λ106°39'.40E - L18°20'.70N λ106°38'.70E
30 May 12	2135 2142-2150 2152-2203 2205-2215	Oceanographic survey op.23 station OS22, depth 68 - Neuston net - Plankton net - CTD	L18°15'.80N λ107°04'.60E L18°15'.60N λ107°05'.10E L18°15'.30N λ107°05'.20E L18°15'.20N λ107°05'.10E
	2215-2320	Acoustic survey from station OS22 to station OS23	
31 May 12	0506-0533	Shooting Bottom trawl Op.15 Sea depth 72 m.	L18°11'.70N λ107°15'.10E - L18°10'.70N λ107°16'.50E
	0618-0645	Hauling Bottom trawl Op.15 And then proceeded to St. OS23	L18°09'.10N λ107°18'.80E - L18°08'.50N λ107°19'.80E
	0747 0749-0800 0802-0815 0816-0826	Oceanographic survey op.24 station OS23, depth 80 - Neuston net - Plankton net - CTD	L18°07'.00N λ107°30'.00E L18°06'.70N λ107°30'.30E L18°06'.40N λ107°29'.90E L18°06'.30N λ107°30'.00E
	0826-0912	Acoustic survey from station OS23 to station OS24	
	0912-0925	Shooting Bottom trawl Op.16 Sea depth 76 m.	L18°00'.50N λ107°25'.20E - L17°59'.60N λ107°25'.60E
	1010-1032	Hauling Bottom trawl Op.16 And then proceeded to St. OS24	L17°57'.00N λ107°26'.90E - L17°56'.20N λ107°27'.40E
	1032-1140	Acoustic survey to station OS24	
	1140 1143-1154 1155-1207 1208-1220	Oceanographic survey op.25 station OS24, depth 72 - Neuston net - Plankton net - CTD	L17°53'.00N λ107°18'.30E L17°52'.90N λ107°18'.30E L17°53'.00N λ107°18'.20E L17°52'.80N λ107°18'.40E
	1220-1319	Acoustic survey from station OS23 to station OS24	
	1319-1330	Shooting Bottom trawl Op.17 Sea depth 66 m.	L17°45'.20N λ107°21'.10E - L17°45'.60N λ107°11'.50E
	1415-1435	Hauling Bottom trawl Op.17 And then proceeded to St. OS25	L17°46'.20N λ107°09'.70E - L17°46'.20N λ107°09'.70E
	1538 1544-1554 1556-1606 1607-1614	Oceanographic survey op.26 station OS25, depth 55 - Neuston net - Plankton net - CTD	L17°37'.10N λ107°06'.40E L17°37'.10N λ107°06'.30E L17°36'.90N λ107°06'.20E L17°36'.80N λ107°06'.20E
	1614-1700	Acoustic survey from station OS24 to station OS25	
	1700-1710	Shooting Bottom trawl Op.18 Sea depth 52 m.	L17°30'.30N λ107°01'.20E - L17°30'.80N λ107°01'.10E
	1755-1819	Hauling Bottom trawl Op.18 And then proceeded to St. OS26	L17°33'.10N λ107°01'.10E - L17°33'.30N λ106°59'.80E
1920 1923-1935 1936-1945	Oceanographic survey op.27 station OS26, depth 55 - Neuston net	L17°23'.70N λ106°56'.20E L17°23'.60N λ106°56'.50E L17°23'.00N λ106°56'.50E	

	1946-1951	- Plankton net - CTD	L17°22'.80N λ106°56'.60E	
	2230	Let go anchor	L17°08'.70N λ107°19'.80E	
1 June 12	0730-1000	Preparation for fishing gear , to change the net and otter board from bottom trawl to Mid-water trawl		
	1050	Heave up anchor and then proceed to OS.27		
1 June 12	1213	Oceanographic survey op.28 station	L17°17'.20N λ107°27'.10E	
	1216-1225	OS27, depth 64	L17°17'.30N λ107°27'.10E	
	1227-1237	- Neuston net	L17°17'.50N λ107°27'.10E	
	1238-1245	- Plankton net - CTD	L17°17'.40N λ107°27'.10E	
	1254-1344	Fishing trial for Mid-water trawl		
	1352-1752	Acoustic survey from station OS27 to station OS28		
	1752	Oceanographic survey op.29 station	L17°08'.90N λ108°06'.10E	
	1754-1805	OS28, depth 89	L17°08'.90N λ108°06'.10E	
	1806-1819	- Neuston net	L17°09'.10N λ108°06'.30E	
	1820-1830	- Plankton net - CTD	L17°09'.00N λ108°06'.30E	
	1830-2202	Acoustic survey from station OS28 to station OS29		
	2202	Oceanographic survey op.30 station	L17°01'.00N λ108°43'.40E	
	2203-2217	OS29, depth 98	L17°01'.00N λ108°43'.40E	
	2218-2233	- Neuston net	L17°01'.00N λ108°43'.70E	
	2234-2249	- Plankton net - CTD	L17°00'.90N λ108°43'.70E	
	2249-0055	Acoustic survey from station OS29 to station OS30		
2 June 12	0055	Oceanographic survey op.31 station	L16°42'.40N λ108°32'.60E	
	0056-0106	OS30, depth 94	L16°42'.30N λ108°32'.60E	
	0107-0125	- Neuston net	L16°42'.10N λ108°32'.30E	
	0127-0140	- Plankton net - CTD	L16°42'.10N λ108°32'.30E	
		2249-0055	Acoustic survey from station OS30 to station OS31	
		0327	Oceanographic survey op.32 station	L16°25'.50N λ108°23'.40E
		0330-0340	OS31, depth 83	L16°25'.50N λ108°23'.40E
		0343-0406	- Neuston net	L16°25'.50N λ108°23'.40E
		0407-0417	- Plankton net - CTD	L16°25'.40N λ108°23'.50E
		0417-0538	Acoustic survey from station OS31 to station OS32	
	0538	Oceanographic survey op.33 station	L16°13'.20N λ108°16'.50E	
	0540-0550	OS32, depth 38	L16°13'.20N λ108°16'.70E	
	0552-0538	- Neuston net	L16°13'.20N λ108°16'.70E	
	0600-0604	- Plankton net - CTD	L16°13'.00N λ108°16'.80E	
		Proceeded to Danang port		
	0900	Alongside at Port of Danang		

Leg II: 5 to 10 June 2012

Date	Time	Activities	Remark
5 June 12	0810	Leave Danang port for research survey	
	1000-1100	Fishing trail Op.1 for Mid-water trawl , depth 64 m.	L16°20'.00N λ108°20'.10E - L16°21'.90N λ108°20'.40E
	1231-1347	Fishing trail Op.2 for Mid-water trawl , depth 84 m.	L16°26'.00N λ108°24'.00E - L16°27'.10N λ108°28'.20E
	1430-1516	Shooting Mid-water trawl Op.1 Sea depth 94 m.	L16°33'.30N λ108°31'.10E - L16°34'.00N λ108°32'.00E
	1710-1731	Hauling Mid-water trawl Op.1	L16°39'.50N λ108°38'.70E - L16°40'.30N λ108°38'.80E
	1731-2000	Acoustic survey to station OS33	
5 June 12	2000	Oceanographic survey op.34 station	L16°14'.50N λ108°38'.20E
	2005-2015	OS33, depth 95	L16°14'.40N λ108°38'.30E
	2017-2030	- Neuston net	L16°13'.90N λ108°38'.60E
	2031-2045	- Plankton net	L16°13'.70N λ108°38'.70E
		- CTD	
	2045-2252	Acoustic survey to station OS34	
5 June 12	2252	Oceanographic survey op.35 station	L16°16'.40N λ109°02'.20E
	2253-2305	OS34,depth 111	L16°16'.40N λ109°02'.20E
	2307-2321	- Neuston net	L16°16'.30N λ109°02'.70E
	2323-2337	- Plankton net	L16°16'.20N λ109°02'.80E
		- CTD	
6 June 12	0505-0520	Shooting Mid-water trawl Op.2 Sea depth 116 m.	L16°14'.20N λ109°09'.60E - L16°14'.70N λ109°09'.60E
	0620-0635	Hauling Mid-water trawl Op.2	L16°18'.30N λ109°09'.40E - L16°18'.60N λ109°09'.10E
	0635-0808	Acoustic survey to station OS35	
	0808	Oceanographic survey op.36 station	L16°18'.10N λ109°25'.20E
	0815-0825	OS35,depth 258	L16°18'.00N λ109°25'.50E
	0826-0839	- Neuston net	L16°17'.40N λ109°25'.80E
	0841-0900	- Plankton net	L16°17'.20N λ109°25'.30E
		- CTD	
	0900-1246	Acoustic survey to station OS35b and then proceed to station OS 36	
	1246	Oceanographic survey op.37 station	L16°09'.20N λ109°37'.30E
	1248-1300	OS36,depth 800	L16°09'.20N λ109°37'.30E
	1302-1317	- Neuston net	L16°08'.80N λ109°37'.40E
	1318-1344	- Plankton net	L16°08'.60N λ109°37'.30E
		- CTD	
	1344-1552	Acoustic survey to station OS37	
1552	Oceanographic survey op.38 station	L15°53'.50N λ109°20'.90E	
1554-1605	OS37,depth 150	L15°53'.50N λ109°20'.90E	
1607-1618	- Neuston net	L15°53'.20N λ109°21'.00E	
1620-1635	- Plankton net	L15°53'.30N λ109°20'.80E	
	- CTD		
1732-1735	Shooting Mid-water trawl Op.3 Sea depth 127 m.	L15°46'.80N λ109°13'.90E - L15°45'.80N λ109°14'.40E	
1855-1917	Hauling Mid-water trawl Op.3	L15°42'.30N λ109°15'.80E - L15°41'.70N λ109°16'.10E	
1917-2033	Acoustic survey to station OS38		
2033	Oceanographic survey op.39 station	L15°39'.00N λ109°05'.80E	

	2035-2045 2047-2100 2103-2116	OS38,depth 106 - Neuston net - Plankton net - CTD	L15°39'.00N λ109°05'.80E L15°39'.20N λ109°05'.40E L15°39'.40N λ109°05'.00E	
7 June 12	0548-0612	Shooting Mid-water trawl Op.4 Sea depth 70-80 m.	L15°29'.70N λ109°56'.40E - L15°30'.60N λ108°57'.00E	
	0638-0654	Hauling Mid-water trawl Op.4	L15°31'.90N λ108°58'.10E - L15°32'.00N λ108°58'.80E	
	0654-0755	Acoustic survey to station OS39		
	0755 0758-0811 0813-0819 0820-0827	Oceanographic survey op.40 station OS39,depth 52 - Neuston net - Plankton net - CTD	L15°25'.20N λ108°51'.50E L15°24'.90N λ108°51'.50E L15°24'.50N λ108°51'.50E L15°24'.50N λ108°51'.60E	
7 June 12	0858-0914	Shooting Mid-water trawl Op.5 Sea depth 72 m.	L15°22'.70N λ108°56'.60E - L15°23'.30N λ108°56'.80E	
	1010-1030	Hauling Mid-water trawl Op.5	L15°26'.60N λ108°57'.60E - L15°26'.90N λ108°58'.10E	
	1030-1348	Acoustic survey to station OS40		
	1348 1353-1403 1405-1416 1417-1434	Oceanographic survey op.41 station OS40,depth 162 - Neuston net - Plankton net - CTD	L15°11'.40N λ109°27'.50E L15°11'.40N λ109°27'.50E L15°11'.50N λ109°27'.90E L15°11'.70N λ109°27'.90E	
	1502-1753	Acoustic survey to station OS41		
	1753 1755-1805 1807-1820 1823-1850	Oceanographic survey op.42 station OS41,depth 469 - Neuston net - Plankton net - CTD	L15°01'.10N λ109°58'.30E L15°01'.10N λ109°58'.60E L15°01'.10N λ109°58'.70E L15°01'.10N λ109°58'.90E	
	1850-2135	Acoustic survey to station OS42		
	2135 2137-2149 2150-2205 2207-2240	Oceanographic survey op.43 station OS42,depth 268 - Neuston net - Plankton net - CTD And then acoustic survey to station OS.43	L14°46'.60N λ109°37'.00E L14°46'.60N λ109°37'.10E L14°47'.00N λ109°37'.00E L14°47'.50N λ109°37'.20E	
	8 June 12	0205 0208-0220 0222-0229 0230-0236	Oceanographic survey op.44 station OS43,depth 60 - Neuston net - Plankton net - CTD	L14°28'.90N λ109°11'.00E L14°28'.90N λ109°11'.10E L14°29'.10N λ109°10'.80E L14°29'.20N λ109°10'.80E
		0600	Let go anchor , depth 25.5	
0620-1700		Repaired for Mid –water trawl, changed the new wire for ground rope		
9 June 12	0505-0527	Shooting Mid-water trawl Op.6 Sea depth 83 m.	L14°30'.90N λ109°14'.50E - L14°30'.10N λ109°15'.20E	
	0638-0654	Hauling Mid-water trawl Op.6 And proceeded to station OS.44	L14°26'.60N λ109°17'.60E - L14°26'.40N λ109°18'.30E	
	0847-0905	Shooting Mid-water trawl Op.7 Sea depth 277 m.	L14°20'.20N λ109°40'.10E - L14°19'.60N λ109°40'.10E	
	1025-1050	Hauling Mid-water trawl Op.7	L14°15'.00N λ109°41'.60E -	

		L14°14'.80N λ109°42'.50E
1050-1235	Acoustic survey to station OS44	
1235	Oceanographic survey op.45 station	L14°15'.00N λ109°58'.80E
1240-1248	OS44,depth 750	L14°15'.00N λ109°58'.80E
1250-1302	Neuston net	L14°15'.10N λ109°59'.10E
1303-1325	- Plankton net - CTD	L14°15'.40N λ109°59'.20E
1325-1843	Acoustic survey to station OS45	
1843	Oceanographic survey op.46 station	L13°59'.80N λ110°50'.30E
1855-1920	OS45,depth >2,000 m - CTD	L14°00'.20N λ110°50'.30E
1923-1943	- Plankton net	L14°00'.90N λ110°50'.50E
2100	Gyrocompass was burning and main Gyro out of order	
10 June 12	0434	Oceanographic survey op.47 station
		OS46,depth 1,768 m
	0517-0540	- CTD
	0540-0600	- Plankton net
	1005	Oceanographic survey op.48 station
	1008-1019	OS47,depth 46
	1020-1026	- Neuston net
	1027-1035	- Plankton net - CTD
		Proceed to Nha trang port
	1800	Arrived Nha trang pilot station , let go anchor
11 June 12	0740	Pilot on board
	0815	Alongside Nha trang port
12 -19June	Alongside Nha trang port and Hands employed in routine work	

Leg III: 20 to 28 June 2012

Date	Time	Activities	Remark
20June 12	0810	Pilot onboard and then heaved up anchor, and then proceed to station OS.21	
	0812	Oceanographic survey op.49 station	L12°16'.30N λ109°25'.30E
	0815-0827	OS51,depth 113	L12°16'.70N λ109°27'.20E
	0828-0850	- Neuston net	L12°16'.20N λ109°27'.20E
	0852-0907	- Plankton net - CTD	L12°16'.10N λ109°26'.90E
	0907-1400	Acoustic survey to station OS50	
	1400	Oceanographic survey op.50 station	L12°32'.80N λ110°00'.00E
		OS50, sea depth 1,800 m	
	1402-1412	- Neuston net	L12°32'.80N λ110°00'.00E
	1414-1430	- Plankton net	L12°32'.50N λ109°59'.09E
	1431-1455	- CTD	L12°32'.80N λ109°59'.90E
	1455-2150	Acoustic survey to station OS 49	
	2150	Oceanographic survey op.51 station	L13°01'.70N λ110°50'.20E
		OS49, sea depth 1,807 m	
	2151-2200	- Neuston net	L13°01'.70N λ110°50'.20E
	2202-2221	- Plankton net	L13°01'.50N λ110°50'.29E

	2222-2253	- CTD	L13°01'.80N λ110°50'.10E	
	2253-0445	Acoustic survey to station OS 48		
21 June 12	0445	Oceanographic survey op.52 station OS48, sea depth 1,920 m	L13°14'.40N λ110°00'.00E	
	0448-0458	- Neuston net	L13°14'.40N λ110°00'.00E	
	0501-0518	- Plankton net	L13°14'.50N λ109°59'.50E	
	0520-0545	- CTD	L13°14'.80N λ109°59'.40E	
	0545-0955	Acoustic survey to station OS 47 and then proceed to station OS.51		
	1655-1718	Shooting Mid-water trawl Op.8 Sea depth 117 m.	L12°16'.40N λ109°28'.20E - L12°15'.20N λ109°28'.20E	
	1848-1902	Hauling Mid-water trawl Op.2	L12°08'.30N λ109°28'.20E - L12°08'.30N λ109°29'.00E	
	1902-2335	Acoustic survey to station OS 52		
21 June 12	2335	Oceanographic survey op.53 station OS 52, sea depth 2,000 m	L12°10'.50N λ110°00'.00E	
	2337-2347	- Neuston net	L12°10'.70N λ110°00'.20E	
	2348-0002	- Plankton net	L12°10'.70N λ110°00'.00E	
	0003-0033	- CTD	L12°10'.90N λ109°59'.90E	
22 June 12	0033-0605	Acoustic survey to station OS 53		
	0603	Oceanographic survey op.54 station OS 53, sea depth > 2,000 m	L12°01'.90N λ110°50'.20E	
	0606-0617	- Neuston net	L12°01'.90N λ110°50'.20E	
	0619-0636	- Plankton net	L12°01'.60N λ110°50'.10E	
	0638-0708	- CTD	L12°01'.90N λ110°50'.10E	
	1332-1347	Shooting Mid-water trawl Op.9 Sea depth 1,500 m.	L11°48'.20N λ110°17'.30E - L11°47'.50N λ110°17'.30E	
	1447-1500	Hauling Mid-water trawl Op.9	L11°43'.80N λ110°17'.00E - L11°43'.60N λ110°17'.60E	
	1531-1723	Acoustic survey to station OS. 54		
	1723	Oceanographic survey op. 55 station OS54, sea depth 1,818 m	L11°43'.70N λ110°00'.20E	
	1725-1735	- Neuston net	L11°43'.70N λ110°00'.20E	
	1736-1755	- Plankton net	L11°43'.50N λ110°00'.10E	
1756-1820	- CTD	L11°43'.90N λ110°00'.50E		
	1820-2355	Acoustic survey to station OS 55		
23 June 12	0405	Oceanographic survey op.56 station OS55,depth 81	L11°31'.70N λ109°15'.80E	
	0409-0420		L11°31'.70N λ109°15'.80E	
	0421-0431	- Neuston net	L11°31'.70N λ109°16'.00E	
	0434-0440	- Plankton net	L11°31'.60N λ109°16'.00E	
	0440-0935	Acoustic survey to station OS 56		
	0935	Oceanographic survey op.57 station OS56,depth 648	L11°17'.30N λ110°00'.00E	
	0936-0945		L11°17'.20N λ110°00'.00E	
	0947-0958	- Neuston net	L11°17'.50N λ110°00'.00E	
	1000-1025	- Plankton net	L11°17'.70N λ110°00'.30E	
	1025-1529	Acoustic survey to station OS 57		
	1529	Oceanographic survey op.58 station OS57,depth 2,000 m	L11°02'.00N λ110°50'.40E	
	1530-1543	- Neuston net	L11°02'.00N λ110°50'.40E	
	1545-1600	- Plankton net	L11°01'.80N λ110°51'.50E	

	1602-1624	- CTD	L11°02'.10N λ110°51'.90E
	1645-0448	Acoustic survey to station OS 58	
24 June 12	0448	Oceanographic survey op.59 station OS58,depth 493	L10°56'.50N λ110°00'.20E
	0455-0509		L10°56'.60N λ110°00'.40E
	0510-0525	- Neuston net	L10°56'.90N λ110°01'.20E
	0527-0530	- Plankton net - CTD	L10°57'.20N λ110°02'.00E
	0630-1320	Acoustic survey to station OS 59	
	1320	Oceanographic survey op.60 station OS59,depth 119	L10°54'.70N λ109°18'.20E
	1324-1333		L10°54'.60N λ109°18'.20E
	1335-1345	- Neuston net	L10°54'.50N λ109°18'.70E
	1347-1358	- Plankton net - CTD	L10°54'.60N λ109°18'.20E
	1554-1620	Shooting Mid-water trawl Op.10, was cancel during fishing operation due to sea condition was moderated and strong wind. Then proceed to station OS.60	L10°54'.40N λ109°11'.50E - L10°53'.70N λ109°12'.90E
24 June 12	2130	Oceanographic survey op.61 station OS 60,depth 24	L10°52'.90N λ108°35'.60E
	2132-2144		L10°52'.90N λ108°35'.50E
	2145-2153	- Neuston net	L10°53'.20N λ108°35'.50E
	2156-2200	- Plankton net - CTD	L10°53'.40N λ108°35'.70E
	2200-0230	Acoustic survey to station OS 59	
25 June 12	0230	Oceanographic survey op.62 station OS 62,depth132	L10°29'.70N λ109°09'.80E
	0238-0248		L10°29'.70N λ109°09'.90E
	0250-0302	- Neuston net	L10°29'.90N λ109°10'.10E
	0303-0318	- Plankton net - CTD	L10°30'.20N λ109°10'.40E
	0515-0538	Shooting Mid-water trawl Op.10 Sea depth 1,500 m.	L10°20'.60N λ109°24'.90E - L10°20'.40N λ109°17'.30E
	0638-0653	Hauling Mid-water trawl Op.10 And then proceed to St.OS.62	L10°19'.30N λ109°21'.80E - L10°19'.10N λ109°21'.80E
	0953	Oceanographic survey op.63 station OS 62, sea depth 1,295 m	L10°07'.60N λ109°46'.40E
	0955-1005	- Neuston net	L10°07'.60N λ109°46'.40E
	1006-1018	- Plankton net	L10°08'.00N λ109°46'.40E
	1020-1045	- CTD	L10°08'.30N λ109°46'.90E
	1045-2002	Acoustic survey to station 26 and then continue to station OS.63.	
	2002	Oceanographic survey op.63 station OS 62,	L10°06'.50N λ109°21'.60E
	2005-2015	Sea depth 257 m	L10°06'.50N λ109°21'.60E
	2016-2030	- Neuston net	L10°06'.90N λ109°21'.70E
	2031-2100	- Plankton net - CTD	L10°07'.30N λ109°22'.30E
	2100-0525	Acoustic survey to station OS 64	
26 June 12	0525	Oceanographic survey op.65 station OS 64,	L10°12'.10N λ108°44'.10E
	0530-0540	Sea depth 77 m	L10°12'.00N λ108°44'.30E
	0542-0555	- Neuston net	L10°12'.20N λ108°44'.20E
	0557-0603	- Plankton net - CTD	L10°12'.40N λ108°44'.50E
	1150-1203	Shooting Mid-water trawl Op.11	L10°17'.90N λ108°12'.80E -

		Sea depth 48.5 m.	L10°17'.80N λ108°12'.60E
	1303-1318	Hauling Mid-water trawl Op.11 And then proceeded to station OS. 65	L10°16'.30N λ108°09'.90E - L10°16'.20N λ108°09'.40E
	1605	Oceanographic survey op.66 station OS 65,	L10°20'.80N λ107°49'.50E
	1606-1616	Sea depth 34 m	L10°20'.80N λ107°49'.50E
	1619-1623	- Neuston net	L10°20'.70N λ107°49'.40E
	1627-1632	- Plankton net - CTD	L10°20'.80N λ107°49'.50E
	1723-1735	Shooting Mid-water trawl Op.12 Sea depth 35 m.	L10°15'.10N λ107°54'.10E - L10°14'.60N λ107°54'.00E
	1835-1845	Hauling Mid-water trawl Op.12 And then proceeded to station OS. 66	L10°11'.30N λ107°53'.20E - L10°10'.90N λ107°53'.50E
	2200	Oceanographic survey op.67 station OS 66,	L09°51'.70N λ108°13'.90E
	2201-2210	Sea depth 60 m	L09°51'.70N λ108°13'.90E
	2212-2220	- Neuston net	L09°51'.60N λ108°13'.80E
	2222-2230	- Plankton net - CTD	L09°51'.80N λ108°14'.10E
	2230-0255	Acoustic survey to station OS 67	
27 June 12	0255	Oceanographic survey op.68 station OS 67,	L09°22'.50N λ108°33'.70E
	0257-0305	Sea depth 95 m	L09°22'.50N λ108°37'.50E
	0308-0329	- Neuston net	L09°22'.80N λ108°38'.60E
	0332-0340	- Plankton net - CTD	L09°23'.20N λ108°39'.00E
	0353-0741	Acoustic survey to station OS. 68	
	0741	Oceanographic survey op.69 station OS 68,	L08°58'.10N λ108°59'.50E
	0745-0757	Sea depth 136 m	L08°58'.00N λ108°59'.60E
	0758-0817	- Neuston net	L08°58'.30N λ108°59'.40E
	0819-0835	- Plankton net - CTD	L08°58'.70N λ108°59'.90E
	0845-1420	Acoustic survey to station OS. 69	
	1420	Oceanographic survey op.70station OS 69,	L09°14'.00N λ108°29'.10E
	1424-1432	Sea depth 90 m	L09°14'.00N λ108°29'.00E
	1440-1447	- Neuston net	L09°14'.40N λ108°29'.40E
	1449-1458	- Plankton net - CTD	L09°14'.70N λ108°29'.80E
	1458-2205	Acoustic survey to station OS. 70	
	2205	Oceanographic survey op.71 station OS 70,	L09°34'.20N λ107°48'.50E
	2206-2217	Sea depth 45 m	L09°34'.60N λ107°48'.50E
	2218-2227	- Neuston net	L09°34'.60N λ107°48'.80E
	2228-2237	- Plankton net - CTD	L09°34'.70N λ107°49'.10E
	2237-0453	Acoustic survey to station OS. 71	
28 June 12	0453	Oceanographic survey op.72 station OS 71,	L09°56'.40N λ107°05'.00E
	0456-0505	Sea depth 24 m	L09°56'.50N λ107°04'.80E
	0507-0512	- Neuston net	L09°56'.70N λ107°04'.90E
	0516-0521	- Plankton net	L09°52'.80N λ107°05'.00E

		- CTD	
		Proceed to Vung Tao	
	0745	Let go anchor ,depth 26 m	

Leg IV: 2 to 9 July 2012

Date	Time	Activities	Remark
2 July 12	0600	Pilot onboard	
	0615	Leaved HA-LOC port, Port of Vung Tau for research survey	
	0937-0945	Shooting Bottom trawl Op.19 (st.29/OS.71) Sea depth 24.5 m	L09°54'.90N λ107°06'.10E - L09°54'.70N λ107°06'.70E
	1045-1055	Hauling Bottom trawl Op.19	L09°53'.80N λ107°10'.20E - L09°53'.70N λ107°10'.60E
	1305-1315	Shooting Bottom trawl Op.20 Sea depth 34 m	L09°36'.50N λ107°17'.50E - L09°36'.40N λ107°18'.40E
	1408-1422	Hauling Bottom trawl Op.20 Then proceed to station OS.72	L09°36'.30N λ107°21'.70E - L09°36'.10N λ107°22'.60E
2 July 12	1623	Oceanographic survey op.73 station OS72,	L09°19'.30N λ107°27'.80E
	1627-1637	sea depth 36.9 m	L09°19'.20N λ107°27'.80E
	1638-1644	- Neuston net	L09°19'.50N λ107°28'.30E
	1649-1656	- Plankton net	L09°19'.60N λ107°28'.80E
		- CTD	
	1656-2050	Acoustic survey to station OS 73	
	2050	Oceanographic survey op.74 station OS73,	L08°46'.30N λ107°48'.00E
	2051-2102	sea depth 54.5 m	L08°46'.30N λ107°48'.00E
	2103-2111	- Neuston net	L08°46'.50N λ107°48'.20E
	2112-2123	- Plankton net	L08°46'.60N λ107°48'.30E
		- CTD	
	2123-0152	Acoustic survey to station OS 74	
3 July 12	0152	Oceanographic survey op.75 station OS74,	L08°10'.20N λ108°10'.30E
	0154-0204	sea depth 85. m	L08°10'.20N λ108°10'.30E
	0205-0215	- Neuston net	L08°10'.00N λ108°10'.30E
	0217-0225	- Plankton net	L08°10'.10N λ108°10'.40E
		- CTD	
	0225-0533	Acoustic survey to station OS 75	
	0533-0545	Shooting Bottom trawl Op.21 Sea depth 100 m.	L07°44'.80N λ108°25'.60E - L07°45'.20N λ108°26'.40E
	0645-0702	Hauling Bottom trawl Op.21	L07°47'.10N λ108°29'.40E - L07°47'.40N λ108°29'.90E
	0702-0742	Acoustic survey to station OS 75	
	0742	Oceanographic survey op.76 station OS 75,	L07°43'.70N λ108°26'.20E
		0744-0753	sea depth 102 m
	0754-0806	- Neuston net	L07°43'.90N λ108°26'.20E
	0808-0829	- Plankton net	L07°44'.00N λ108°26'.20E
		- CTD	
	0829-1308	Acoustic survey to station 30 and then proceed to OS.76	
	1310-1325	Shooting Bottom trawl Op.22	L07°53'.50N λ108°01'.80E -

	Sea depth 82 m.	L07°53'.30N λ108°01'.40E
1425-1442	Hauling Bottom trawl Op.22	L07°51'.20N λ107°58'.90E - L07°51'.30N λ107°58'.70E
1548	Oceanographic survey op.76 station OS 75,	L07°43'.70N λ108°26'.20E
1550-1600	sea depth 102 m	L07°43'.60N λ108°26'.20E
1601-1609	- Neuston net	L07°43'.90N λ108°26'.20E
1612-1620	- Plankton net	L07°44'.00N λ108°26'.20E
	- CTD	
1717-1727	Shooting Bottom trawl Op.23 Sea depth 63 m.	L08°02'.80N λ107°47'.20E - L08°02'.70N λ107°46'.80E
1810-1825	Hauling Bottom trawl Op.23	L08°02'.70N λ107°46'.80E - L08°02'.60N λ107°44'.80E
1825-2252	Acoustic survey to station OS 77	
2252	Oceanographic survey op.78 station OS 77,	L08°23'.80N λ107°15'.80E
2253-2304	sea depth 44 m	L08°23'.80N λ107°15'.80E
2305-2314	- Neuston net	L08°24'.20N λ107°16'.00E
2315-2322	- Plankton net	L08°24'.30N λ107°16'.10E
	- CTD	
4 July 12	0437	Oceanographic survey op.79 station OS 78,
	0440-0447	sea depth 30 m.
	0452-0459	- Neuston net
	0501-0507	- Plankton net
		- CTD
	0624-0632	Shooting Bottom trawl Op.24 Sea depth 30 m.
	0650-0702	Hauling Bottom trawl Op.22 (otter board was obstructed with the muddy bottom)
	0702-0947	Acoustic survey to station OS 79
	0947	Oceanographic survey op.80 station OS 79,
	0949-0957	sea depth 25 m.
	0958-1005	- Neuston net
	1006-1010	- Plankton net
		- CTD
	1010-1354	Acoustic survey to station OS 80
	1354	Oceanographic survey op.81 station OS 80,
	1357-1408	sea depth 29 m.
	1409-1415	- Neuston net
	1418-1422	- Plankton net
		- CTD
	1422-1758	Acoustic survey to station OS 81
	1758	Oceanographic survey op.82 station OS 81,
	1801-1811	sea depth 34 m.
	1812-1818	- Neuston net
	1819-1823	- Plankton net
		- CTD

	1823-2224	Acoustic survey to station OS 82	
	2224	Oceanographic survey op.83 station OS 82,	L07°25'.90N λ107°05'.10E
	2225-2236	sea depth 53 m.	L07°25'.90N λ107°05'.10E
	2237-2245	- Neuston net	L07°26'.20N λ107°05'.40E
	2246-2255	- Plankton net - CTD	L07°26'.40N λ107°05'.60E
5 July 12	0206	Oceanographic survey op.84 station OS 83,	L06°59'.30N λ107°19'.70E
	0207-0217	sea depth 61 m.	L06°59'.30N λ107°19'.70E
	0220-0230	- Neuston net	L06°59'.40N λ107°19'.50E
	0231-0240	- Plankton net - CTD	L06°59'.50N λ107°19'.60E
	0240-0925	Acoustic survey to station 32 and then proceed station OS 84	
	0925	Oceanographic survey op.85 station OS 84,	L07°18'.50N λ106°54'.50E
	0927-0938	sea depth 51. m	L07°18'.50N λ106°54'.50E
	0939-0947	- Neuston net	L07°18'.90N λ106°54'.40E
	0949-0955	- Plankton net - CTD	L07°19'.00N λ106°54'.60E
	0955-1136	Acoustic survey to station OS 85	
	1136-1145	Shooting Bottom trawl Op.25 Sea depth 42 m.	L07°31'.20N λ106°43'.10E - L07°31'.10N λ106°42'.70E
5 July 12	1230-1300	Hauling Bottom trawl Op.22	L07°30'.00N λ106°40'.30E - L07°29'.70N λ106°40'.10E
	1300-1515	Acoustic survey to station OS 85	
	1515	Oceanographic survey op.86 station OS 85	L07°49'.00N λ106°25'.70E
	1518-1527	sea depth 37 m.	L07°49'.00N λ106°25'.70E
	1528-1538	- Neuston net	L07°49'.20N λ106°25'.60E
	1535-1542	- Plankton net - CTD	L07°49'.00N λ106°25'.60E
	1545-1555	Shooting Bottom trawl Op.26 Sea depth 36 m.	L07°49'.20N λ106°25'.70E - L07°49'.00N λ106°25'.30E
	1655-1705	Hauling Bottom trawl Op.26	L07°47'.00N λ106°22'.40E - L07°47'.50N λ106°22'.20E
	1725-2228	Acoustic survey to station OS 86	
	2228	Oceanographic survey op.87 station OS 86,	L08°17'.70N λ105°58'.90E
	2229-2240	sea depth 30 m.	L08°17'.70N λ105°58'.90E
	2242-2247	- Neuston net	L08°17'.90N λ105°59'.30E
	2250-2254	- Plankton net - CTD	L08°18'.00N λ105°59'.60E
	2254	Acoustic survey to station 33/OS87	
6 July 12	0100	Let go anchor	L08°32'.50N λ105°44'.90E
	0530	Heaved up anchor	
	0550-0600	Shooting Bottom trawl Op.27 Sea depth 25 m.	L08°32'.60N λ105°45'.00E - L08°32'.40N λ105°44'.60E
	0700-0710	Hauling Bottom trawl Op.27	L08°30'.80N λ105°41'.80E - L08°30'.70N λ105°44'.50E
	0735-0930	Acoustic survey to station OS 87	
	0930	Oceanographic survey op.88 station OS	L08°47'.50N λ105°30'.30E

	0932-0940 0944-0948 0950-0957	87, sea depth 30 m. - Neuston net - Plankton net - CTD	L08°47'.70N λ105°30'.30E L08°47'.80N λ105°30'.30E L08°47'.80N λ105°30'.40E
	1138-1150	Shooting Bottom trawl Op.28 Sea depth 25 m.	L08°34'.60N λ105°34'.40E - L08°34'.20N λ105°34'.20E
	1250-1303	Hauling Bottom trawl Op.28	L08°31'.30N λ105°33'.10E - L08°31'.20N λ105°33'.20E
	1532-1540	Shooting Bottom trawl Op.29 Sea depth 32 m.	L08°09'.80N λ105°41'.10E - L08°09'.50N λ105°40'.80E
	1640-1650	Hauling Bottom trawl Op.28	L08°07'.40N λ105°38'.60E - L08°07'.10N λ105°38'.40E
	1650-1727	Acoustic survey to station OS88	
	1727 1728-1738 1739-1745 1747-1751	Oceanographic survey op.89 station OS88,depth32 - Neuston net - Plankton net - CTD	L08°05'.50N λ105°42'.40E L08°05'.40N λ105°42'.40E L08°05'.60N λ105°42'.20E L08°05'.60N λ105°42'.30E
	1751-2147	Acoustic survey to station OS 89	
6 July 12	2145 2147-2158 2159-2205 2207-2214	Oceanographic survey op.90 station OS89,depth 37 - Neuston net - Plankton net - CTD	L07°26'.40N λ105°53'.50E L07°26'.40N λ105°53'.50E L07°26'.50N λ105°53'.80E L07°26'.60N λ105°53'.80E
	2214	Acoustic survey to station OS90	
7 July 12	0212	Stop engine, and clutch off for drifting	L06°52'.00N λ106°03'.50E
	0545-0555	Shooting Bottom trawl Op. 30 Sea depth 42 m.	L06°52'.60N λ106°04'.20E - L06°52'.10N λ106°04'.10E
	0655-0710	Hauling Bottom trawl Op.30	L06°48'.90N λ106°03'.00E - L06°48'.10N λ106°03'.70E
	0710-0735	Acoustic survey to station OS 90	
	0735 0736-0745 0747-0755 0756-0805	Oceanographic survey op.60 station OS91,depth 51 - Neuston net - Plankton net - CTD	L06°45'.70N λ106°05'.10E L06°45'.70N λ106°05'.10E L06°45'.80N λ106°05'.00E L06°45'.80N λ106°05'.10E
	0805-1025	Acoustic survey to station OS 91	
	1025 1027-1037 1038-1045 1046-1054	Oceanographic survey op.92 station OS 91,depth 55 - Neuston net - Plankton net - CTD	L06°23'.30N λ106°11'.40E L06°23'.20N λ106°11'.50E L06°23'.30N λ106°11'.40E L06°23'.40N λ106°11'.40E
	1135-1145	Shooting Bottom trawl Op. 31 Sea depth 52 m.	L06°28'.50N λ106°08'.70E - L06°28'.00N λ106°08'.60E
	1245-1254	Hauling Bottom trawl Op.31	L06°25'.20N λ106°07'.50E - L06°24'.90N λ106°07'.50E
	1630-1638	Shooting Bottom trawl Op. 32 Sea depth 42 m.	L06°55'.70N λ105°53'.40E - L06°56'.10N λ105°53'.60E
	1717-1728	Hauling Bottom trawl Op.32	L06°57'.90N λ105°54'.90E - L06°58'.10N λ105°55'.10E
	1728-2005	Acoustic survey to station OS 92	

	2005 2007-2018 2019-2030 2031-2039	Oceanographic survey op.93 station OS 92,depth 37 - Neuston net - Plankton net - CTD	L07°17'.50N λ105°41'.00E L07°17'.60N λ105°41'.00E L07°17'.60N λ105°41'.30E L07°17'.60N λ105°41'.50E
	2039	Acoustic survey to station OS 93	
	2300	Let go anchor in depth 34 m	L07°36'.60N λ105°30'.50E
8 July 12	0530	Heaved up anchor	
	0545-0555	Shooting Bottom trawl Op. 33 Sea depth 35 m.	L07°36'.60N λ105°30'.60E - L07°36'.40N λ105°30'.30E
	0655-0705	Hauling Bottom trawl Op.33	L07°34'.40N λ105°27'.60E - L07°34'.20N λ105°27'.50E
	0705-0910	Acoustic survey to station OS94	
	0910 0913-0923 0924-0929 0931-0937	Oceanographic survey op.94 station OS 93, Sea depth 55 m - Neuston net - Plankton net - CTD	L07°51'.20N λ105°22'.00E L07°51'.20N λ105°22'.00E L07°51'.40N λ105°21'.90E L07°51'.40N λ105°22'.10E
	1050-1057	Shooting Bottom trawl Op. 34 Sea depth 35 m.	L08°01'.40N λ105°16'.30E - L08°01'.20N λ105°16'.00E
8 July 12	1157-1208	Hauling Bottom trawl Op.34	L07°59'.20N λ105°13'.60E - L07°58'.90N λ105°15'.80E
	1353-1403	Shooting Bottom trawl Op. 35 Sea depth 31 m.	L08°13'.80N λ105°09'.20E - L08°13'.60N λ105°09'.00E
	1503-1524	Hauling Bottom trawl Op.35	L08°12'.00N λ105°06'.30E - L08°11'.80N λ105°06'.20E
	1524-1645	Acoustic survey to station OS 94	
	1645 1649-1659 1700-1705 1706-1710	Oceanographic survey op.95 station OS 94, Sea depth 29 m - Neuston net - Plankton net - CTD	L08°23'.40N λ105°03'.90E L08°23'.50N λ105°03'.80E L08°23'.70N λ105°03'.70E L08°23'.80N λ105°23'.80E
		Proceeded to PhuQuoc Island	
9 July 12	0700	Arrived Duong dong, Phu Quoc pilot station	

Leg V: 11to 18 July 2012

Date	Time	Activities	Remark
11 July 12	0300	Heaved up anchor and then proceeded to survey station S.45	
	0615-0625	Shooting Bottom trawl Op.36 Sea depth 23 m	L09°49'.30N λ104°10'.30E - L09°49'.30N λ104°09'.20E
	0637-0645	Hauling Bottom trawl Op. 36	L09°48'.80N λ104°09'.20E - L09°48'.70N λ104°09'.10E
	0655-0754	Acoustic survey to station OS 120	
11 July 12	0754 0755-0805 0807-0810	Oceanographic survey op.96 station OS 120, sea depth 18 m - Neuston net	L09°45'.10N λ104°19'.70E L09°45'.00N λ104°19'.80E L09°45'.10N λ104°19'.80E

	0811-0815	- Plankton net - CTD	L09°45'.10N λ104°18'.80E
	0827-1052	Acoustic survey to station OS 119	
	1052	Oceanographic survey op.97 station OS 119,	L09°37'.00N λ104°44'.40E
	1053-1103	sea depth 11.5 m	L09°36'.90N λ104°44'.40E
	1104-1108	- Neuston net	L09°37'.30N λ104°44'.40E
	1110-1112	- Plankton net - CTD	L09°37'.40N λ104°44'.60E
	1112-1348	Acoustic survey to station OS 118	
	1345	Oceanographic survey op.98 station OS 118,	L09°30'.40N λ104°20'.70E
	1348-1355	sea depth 18 m	L09°30'.40N λ104°20'.70E
	1356-1400	- Neuston net	L09°30'.10N λ104°20'.70E
	1402-1407	- Plankton net - CTD	L09°30'.10N λ104°20'.70E
	2123-0152	Acoustic survey to station OS 74	
	1410-1420	Shooting Bottom trawl Op.37 Sea depth 19.6 m.	L09°30'.10N λ104°20'.70E - L09°30'.10N λ104°20'.00E
	1520-1532	Hauling Bottom trawl Op. 37	L09°30'.40N λ104°16'.90E - L09°30'.70N λ104°16'.80E
	1543-1727	Acoustic survey to station OS 117	
11 July 12	1727	Oceanographic survey op.99 station OS 117,	L09°24'.70N λ104°00'.00E
	1729-1738	sea depth 28 m	L09°24'.70N λ104°00'.00E
	1740-1747	- Neuston net	L09°24'.50N λ103°59'.60E
	1748-1752	- Plankton net - CTD	L09°24'.50N λ103°59'.80E
	2020-0310	Acoustic survey to station OS 116 and then drifting	L09°09'.80N λ103°07'.60E
12 July 12	0433-0441	Oceanographic survey op.100 station OS 116,	L09°10'.10N λ103°07'.60E
	0444-0450	sea depth 49 – 50 m	L09°10'.20N λ103°07'.70E
	0453-0502	- Plankton net - CTD - Neuston net and then proceed to st. OS115	L09°10'.20N λ103°07'.80E
	0552-0603	Shooting Bottom trawl Op.38 Sea depth 48 m.	L09°09'.90N λ103°14'.20E - L09°09'.30N λ103°14'.00E
	0703-0715	Hauling Bottom trawl Op. 38	L09°06'.03N λ103°12'.90E - L09°06'.00N λ103°12'.70E
	0740-0935	Acoustic survey to station OS115	
	0935	Oceanographic survey op.101 station OS 115,	L09°09'.60N λ103°34'.10E
	0937-0946	sea depth 40 m	L09°09'.60N λ103°34'.20E
	0947-0957	- Neuston net	L09°09'.50N λ103°33'.90E
	0958-1008	- Plankton net - CTD And then proceed to station. OS 114	L09°09'.60N λ103°34'.10E
	1132-1140	Shooting Bottom trawl Op. 39 Sea depth 35 m.	L09°09'.50N λ103°48'.50E - L09°09'.30N λ103°48'.10E
	1240-1251	Hauling Bottom trawl Op. 39	L09°07'.50N λ103°45'.40E - L09°07'.50N λ103°45'.10E

	1320-1423	Acoustic survey to station OS114	
	1423	Oceanographic survey op.102 station OS 114,	L09°09'.50N λ104°00'.10E
	1428-1437	sea depth 28 m	L09°09'.40N λ104°00'.10E
	1438-1443	- Neuston net	L09°09'.50N λ103°59'.90E
	1444-1450	- Plankton net - CTD And then proceed to station. OS 113	L09°09'.60N λ104°00'.00E
	1558-1607	Shooting Bottom trawl Op. 40 Sea depth 25 m.	L09°09'.40N λ104°10'.90E - L09°09'.30N λ104°10'.50E
	1707-1715	Hauling Bottom trawl Op. 40	L09°08'.30N λ104°07'.40E - L09°08'.20N λ104°07'.20E
	1740-1830	Acoustic survey to station OS113	
	1830	Oceanographic survey op.103 station OS 113,	L09°09'.40N λ104°20'.50E
	1832-1840	sea depth 23 m	L09°09'.30N λ104°20'.50E
	1843-1850	- Neuston net	L09°09'.20N λ104°20'.30E
	1851-1855	- Plankton net - CTD And then proceed to station. OS 112	L09°09'.20N λ104°20'.30E
	1855-2054	Acoustic survey to station OS112	
12 July 12	2054	Oceanographic survey op.104 station OS 112,	L09°09'.20N λ104°41'.10E
	2055-2105	sea depth 14 m	L09°09'.20N λ104°41'.10E
	2107-2110	- Neuston net	L09°09'.10N λ104°41'.10E
	2111-2115	- Plankton net - CTD And then proceed to station. OS 111	L09°09'.10N λ104°41'.10E
	2115-0346	Acoustic survey to station OS112	
13 July 12	0553-0603	Shooting Bottom trawl Op. 41 Sea depth 38 m.	L08°58'.60N λ103°44'.90E - L08°58'.60N λ103°44'.90E
	0703-0712	Hauling Bottom trawl Op. 41 And then proceed to station OS111	L08°55'.10N λ103°43'.70E - L08°55'.10N λ103°43'.50E
	1000-1005	Shooting Bottom trawl Op. 42 Sea depth 50 m.	L08°48'.80N λ103°15'.60E - L08°48'.40N λ103°15'.60E
	1105-1118	Hauling Bottom trawl Op. 42 And then proceed to station OS111	L08°45'.20N λ103°15'.30E - L08°44'.80N λ103°15'.10E
	1140-1415	Acoustic survey to station OS112	
	1415	Oceanographic survey op.105 station OS 111,	L08°41'.90N λ102°46'.50E
	1417-1427	sea depth 69 m	L08°41'.90N λ102°46'.50E
	1428-1435	- Neuston net	L08°42'.30N λ102°46'.40E
	1436-1445	- Plankton net - CTD And then proceed to station. OS 110	L08°42'.40N λ102°46'.40E
	1510-1520	Shooting Bottom trawl Op.43 Sea depth 60 m.	L08°41'.90N λ102°50'.20E - L08°41'.40N λ102°50'.30E
	1620-1632	Hauling Bottom trawl Op.43	L08°38'.20N λ102°50'.90E - L08°38'.00N λ102°50'.90E
	1655-2058	Acoustic survey to station OS 110	
	2058	Oceanographic survey op. 106 station OS 110,	L08°42'.30N λ103°33'.80E
	2100-2111	sea depth 37.5 m	L08°42'.30N λ103°33'.80E

	2112-2120 2121-2126	- Neuston net - Plankton net - CTD	L08°42'.10N λ103°33'.60E L08°42'.10N λ103°33'.60E
	2126-0200	Acoustic survey to station OS 109 and drifting	
14 July 12	0522 0530-0540 0542-0548 0550-0555	Oceanographic survey op. 107 station OS 109, sea depth 32.5 m. - Neuston net - Plankton net - CTD	L08°42'.70N λ104°00'.20E L08°42'.70N λ104°00'.10E L08°42'.60N λ104°00'.00E L08°42'.70N λ104°00'.00E
	0600-0607	Shooting Bottom trawl Op.44 Sea depth 32 m.	L08°42'.40N λ104°00'.20E - L08°42'.00N λ104°00'.20E
	0707-0717	Hauling Bottom trawl Op.44 And then proceed to station OS.108	L08°39'.10N λ104°01'.30E - L08°38'.90N λ104°01'.40E
	0914-0920	Shooting Bottom trawl Op.45 Sea depth 22.5 m.	L08°42'.90N λ104°17'.80E - L08°42'.70N λ104°17'.70E
	1020-1032	Hauling Bottom trawl Op.45 And then proceed to station OS.108	L08°40'.30N λ104°17'.70E - L08°40'.20N λ104°15'.80E
	1055-1110	Acoustic survey to station OS 108	
14 July 12	1110 1112-1123 1125-1128 1129-1134	Oceanographic survey op.108 station OS 80, sea depth 21.5 m. - Neuston net - Plankton net - CTD	L08°43'.10N λ104°20'.80E L08°43'.10N λ104°20'.80E L08°43'.30N λ104°20'.50E L08°43'.40N λ104°20'.50E
	1134-1248	Acoustic survey to station OS 107	
	1248 1251-1300 1302-1305 1307-1308	Oceanographic survey op.109 station OS 107, sea depth 10 m. - Neuston net - Plankton net - CTD	L08°42'.90N λ104°33'.10E L08°42'.80N λ104°33'.10E L08°42'.80N λ104°33'.00E L08°42'.90N λ104°33'.10E
	1543-1553	Shooting Bottom trawl Op.44 Sea depth 32 m.	L08°29'.40N λ104°12'.30E- L08°29'.30N λ104°11'.90E
	1653-1707	Hauling Bottom trawl Op.44	L08°27'.60N λ104°09'.40E - L08°27'.30N λ104°09'.10E
	1707-1808	Acoustic survey to station OS 85	
	1812 1814-1823 1824-1830 1832-1837	Oceanographic survey op.110 station OS 106 sea depth 27.5 m. - Neuston net - Plankton net - CTD	L08°22'.00N λ104°00'.10E L08°21'.90N λ104°00'.10E L08°21'.10N λ104°00'.10E L08°22'.20N λ104°00'.10E
	1837-0005	Acoustic survey to station st. 39	
15 July 12	0558-0607	Shooting Bottom trawl Op.47 Sea depth 53 m.	L08°01'.50N λ103°26'.00E - L08°01'.50N λ103°25'.50E
	0707-0718	Hauling Bottom trawl Op.47	L08°01'.40N λ103°22'.10E - L08°01'.20N λ103°21'.80E
	0723-0825	Acoustic survey to station OS105	
	0825 0828-0843	Oceanographic survey op111 station OS105, Sea depth27 m	L08°02'.30N λ103°34'.00E

	0835-0839 0840-0845	- Neuston net - Plankton net - CTD	L08°02'.30N λ103°34'.10E L08°02'.10N λ103°34'.10E L08°02'.20N λ103°34'.10E
	0845-1045	Acoustic survey to station OS 105	
	1045-1050	Shooting Bottom trawl Op.48	L08°06'.10N λ103°54'.90E L08°05'.60N λ103°55'.10E
	1150-1158	Hauling Bottom trawl Op.48 And then proceed to st.OS 103	L08°03'.60N λ103°57'.30E - L08°03'.70N λ103°57'.90E
15 July 12	1231 1234-1238 1239-1248 1250-1253	Oceanographic survey op.112 station OS103, Sea depth 51 m - Neuston net - Plankton net - CTD	L08°07'.10N λ104°00'.30E L08°07'.10N λ104°00'.30E L08°07'.10N λ104°00'.30E L08°07'.10N λ104°00'.30E
	1253-1413	Acoustic survey to station OS 102	
	1415-1424	Shooting Bottom trawl Op.49	L08°09'.60N λ104°13'.60E- L08°09'.20N λ104°13'.70E
	1524-1537	Hauling Bottom trawl Op.49 And then proceed to st.OS 102	L08°06'.40N λ104°15'.20E - L08°06'.60N λ104°15'.80E
15 July 12	1621 1623-1632 1634-1638 1640-1645	Oceanographic survey op.113 station OS 102, Sea depth 24.5 m - Neuston net - Plankton net - CTD	L08°11'.20N λ104°20'.40E L08°11'.30N λ104°20'.60E L08°11'.00N λ104°20'.80E L08°11'.10N λ104°20'.90E
	1645-1812	Acoustic survey to station OS 100	
	1812 1815-1824 1825-1830 1832-1837	Oceanographic survey op.114 station OS 100, Sea depth 25 m - Neuston net - Plankton net - CTD	L08°14'.30N λ104°36'.10E L08°14'.30N λ104°36'.40E L08°14'.10N λ104°36'.30E L08°14'.10N λ104°36'.40E
	1837-2110	Acoustic survey to station OS 99	
	2110 2112-2122 2123-2128 2130-2138	Oceanographic survey op.115station OS 99 Sea depth 35.5 m - Neuston net - Plankton net - CTD	L07°54.30N λ104°20.90 E L07°54.30N λ104°20.90 E L07°54.6N λ104°20.90 E L07°54.6N λ104°21.10 E
	2138-2235	Acoustic survey to station OS 98 and drifting	
16 July 12	0545-0553	Shooting Bottom trawl Op.50	L07°47'.70N λ104°17'.70E- L07°47'.40N λ104°17'.30E
	0653-0703	Hauling Bottom trawl Op.50 And then proceed to st.OS 98	L07°45'.70N λ104°14'.90E- L07°45'.50N λ104°14'.70E
	0827-0836	Shooting Bottom trawl Op.51	L07°34'.80N λ104°05'.90E- L07°35'.20N λ104°06'.30E
	0653-0703	Hauling Bottom trawl Op.51 And then proceed to st.OS 98	L07°37'.90N λ104°08'.40E- L07°38'.20N λ104°08'.70E
	1050 1053-1102	Oceanographic survey op.116station OS 98 Sea depth 46.5 m	L07°29.40N λ104°01.80 E L07°29.40N λ104°01.80 E

	1103-1110 1111-1117	- Neuston net - Plankton net - CTD	L07°29.60N λ104°01.60 E L07°29.70N λ104°01.60 E
	1117-1525	Acoustic survey to station OS97	
	1525 1527-1537 1538-1544 1545-1547	Oceanographic survey op.117 station OS 97, Sea depth 51 m - Neuston net - Plankton net - CTD	L07°03'.90N λ104°13'.70E L07°03'.90N λ104°13'.80E L07°04'.00N λ104°13'.70E L07°04'.10N λ104°13'.70E
	1631-1640	Shooting Bottom trawl Op. 52 Sea depth 48 m.	L07°11'.50N λ104°15'.30E - L07°11'.40N λ104°15'.20E
	1740-1750	Hauling Bottom trawl Op.52	L07°08'.00N λ104°14'.80E - L07°07'.60N λ104°15'.10E
16 July 12	1820-2157	Acoustic survey to station OS 96	
	2157 2158-2209 2210-2218 2219-2230	Oceanographic survey op.118 station OS 96, Sea depth 60.5 m - Neuston net - Plankton net - CTD	L06°43'.00N λ104°48'.00E L06°42'.90N λ104°48'.00E L06°43'.00N λ104°48'.00E L06°43'.10N λ104°48'.30E
	2230-0050	Acoustic survey to station OS 95b(104)	
17 July 12	0515-0523 0530-0537 0548-0545	Oceanographic survey op.119 station OS 95b, Sea depth 51.7 m - Plankton net - CTD - Neuston net	L07°08'.50N λ104°53'.50E L07°08'.60N λ104°53'.80E L07°08'.60N λ104°53'.90E
	0705-0710	Shooting Bottom trawl Op. 53 Sea depth 46 m.	L07°18'.40N λ104°53'.70E - L07°18'.20N λ104°53'.40E
	0810-0820	Hauling Bottom trawl Op.53 And then proceed to station OS.95	L07°16'.70N λ104°50'.60E - L07°16'.70N λ104°50'.50E
	0957 0959-1007 1008-1015 1016-1022	Oceanographic survey op.120 station OS 95, Sea depth 42 m - Neuston net - Plankton net - CTD	L07°32'.70N λ104°56'.10E L07°32'.70N λ104°56'.10E L07°32'.70N λ104°56'.00E L07°32'.70N λ104°56'.10E
	1025-1035	Shooting Bottom trawl Op. 54 Sea depth 42 m.	L07°39'.90N λ104°56'.60E - L07°32'.60N λ104°56'.40E
	1138-1151	Hauling Bottom trawl Op.52	L07°30'.60N λ104°53'.80E - L07°30'.50N λ104°53'.60E
	1151-1445	Acoustic survey to station OS 94b(101)	
	1445 1446-1455 1456-1503 1504-1510	Oceanographic survey op.121 station OS 94b, Sea depth 33 m - Neuston net - Plankton net - CTD	L07°59'.10N λ104°59'.60E L07°59'.10N λ104°59'.60E L07°59'.00N λ104°59'.90E L07°59'.00N λ105°00'.20E
	1557-1605	Shooting Bottom trawl Op. 55 Sea depth 33 m.	L08°05'.50N λ105°00'.90E - L08°05'.60N λ105°00'.50E
	1705-1718	Hauling Bottom trawl Op.55	L08°04'.50N λ104°57'.40E - L08°03'.80N λ104°57'.30E

	1742-1926	Acoustic survey to station OS 94 and then proceed to fishing area near st.OS80	
18 July 12	0541-0552	Shooting Bottom trawl Op. 56 Sea depth 28 m.	L08°44'.50N λ106°25'.30E - L08°44'.40N λ106°24'.80E
	0652-0702	Hauling Bottom trawl Op.56	L08°43'.40N λ106°24'.80E - L08°43'.30N λ106°21'.50E
	0917-0923	Shooting Bottom trawl Op. 57 Sea depth 27 m.	L09°05'.00N λ106°14'.40E - L09°04'.80N λ106°14'.00E
	1023-1047	Hauling Bottom trawl Op.57	L09°03'.60N λ106°11'.20E - L09°03'.00N λ106°11'.70E
		Proceed to port of Vung Tau	
	1900	Let go anchor	L10°15'.20N λ107°02'.90E
19 July 12	0500	Heaved up anchor and then proceeded to anchorage area	
	0600	Arrived Vung Tau pilot station and let go anchor	
	0855	Heaved up anchor and then proceeded to HA LOC port	
	1015	Alongside HA LOC port, port of Vung Tau	