

SC-03-06.2(06)

3rd Meeting of the Southern Indian Ocean Fisheries Agreement (SIOFA) Scientific
Committee
20-24 March 2017, Saint Denis, La Reunion

Bottom Fishing Impact Assessment – Thailand

Relates to agenda item: 6.2

Working paper Info paper

Delegation of Thailand

Abstract

This paper presents the Bottom Fishing Impact Assessment of Thailand.

Recommendations

SC is invited to consider this BFIA.

SIOFA Bottom Fishing Impact Assessment: Thailand Report for the Southern Indian Ocean Fisheries Agreement

**Department of Fisheries
Thailand**

Disclaimer

Department of Fisheries, Thailand (DOF, Thailand) suggests that this publication includes general statements based on preliminary scientific research. So, it needs to be aware that the information may be incomplete or unable to be used in any specific purpose. No reliance or actions shall therefore be made on this material without prior advices of experts, professional, scientific and technical persons. To the most extent permitted by law, DOF, Thailand (including its officials and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damage, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

The geographical information, maps and figures used in this publication have been made available to illustrate the area of competent of the Southern Indian Ocean Fisheries Agreement (SIOFA) that is properly described in legal terms in Article 3 of the Agreement. They are for the scientific purpose only and unable to be used in any compliance purpose or any other specific situation. They are not part of an Agreement or Convention texts as well as no legal status. They neither reflect accurately maritime space of coastal states nor cannot be considered to constitute recognition of the claims or position of any of the participants in the negotiations leading to the adoption of the Convention concerning the legal status and extent of water and maritime spaces claimed by such participants.

Copyright and Disclaimer

© 2016-2017 Department of Fisheries, Ministry of Agriculture and Cooperatives, Thailand
To the extent permitted by law, all rights are reserved and no part of this publication covered by copyright may be reproduced or copied in any form or by any means except with the written permission of DOF, Thailand

Citation: DOF, Thailand. 2018. SIOFA Bottom Fishing Impact Assessment: Thailand Report for the Southern Indian Ocean Fisheries Agreement. 26 pp.

Enquiries should be addressed to:

Sampan Panjarat
Overseas Fisheries and Transshipment Control Division
Department of Fisheries,
Kaset Klang, Chatuchak, Bangkok, Thailand 10900
Tel: +66 86 9423404
e-mail: spanjarat@yahoo.com

Contents

ABBREVIATIONS AND ACRONYMS.....	iv
EXECUTIVE SUMMARY	v
1. INTRODUCTION	1
2. AREA OF APPLICATION	1
3. BOTTOM FISHERY IMPACT ASSESSMENT PROCESS.....	1
3.1 Preparation of This Document	1
3.2 Data Used for Assessment	2
4. BOTTOM FISHERY IMPACT ASSESSMENT SECTION	2
4.1 Description of the Proposed Fishing Activities	2
4.2 Mapping and Description of Proposed Fishing Areas	6
4.3 Impact Assessment	7
4.3.1 Spatial Impact.....	7
4.3.2 Effort Analysis in Relation to Fishing “Footprint”	9
4.4 Information on Status of the Deep-sea Stock to be Fished.....	11
4.4.1 Catch and Species Composition.....	11
4.4.2 Fish size distribution of dominant species	13
4.5 Monitoring, Management and Mitigation Measure	14
4.5.1 Fleet Management	14
4.5.2 MCS for Thai Oversea Fisheries	14
4.5.3 Mitigation Measures.....	17
5. NEW FISHERIES	18
6. FURTHER ACTIONS ON SCIENTIFIC RESEARCH	18
7. SUPPORT REQUIREMENT AND CAPACITY BUILDING	19
8. ACKNOWLEDGEMENT.....	20
9. REFERENCES	20
10. APPENDICES	21
Appendix I – List of Miscellaneous Fish.....	21
Appendix II – Protocol to Control the Oversea Fisheries and Transshipment	22
Appendix III – Fishing Logbook	25
Appendix IV – Guidelines for the Preparation and Submission of Notifications of Encounters with VMEs	26

List of Table

Table 1 Thai trawling vessels in the SIOFA area during 2015-2017	3
Table 2 The area (km ²) covered by the voluntary BPAs implemented by the SIODFA by ecologically meaningful bathomes. Also given is the percentage the closed areas represent of each bathomes in the entire SIOFA Area.	7
Table 3 Effort of Thai fishing fleet during June 2016 – February 2017	9
Table 4 Percentage of Thai fishing footprint comparing to SIOFA area	9
Table 5 Catch from Thai Fishing Vessels Operated in Western Indian Ocean During 2016-2017	11
Table 6 Minimum requirement for Thai oversea fishing vessel and carriers authorized to transship outside Thai waters	15
Table 7 The forbidden fishing areas regulated in Thai fisheries law	17
Table 8 The data collecting tools and information to be collected.....	19

List of Figures

Figure 1 Trap of Thai vessel.....	4
Figure 2 Thai Trawler.....	4
Figure 3 Paired Trawlers	5
Figure 4 Otter-Board Trawlers	5
Figure 5 Profile of trawling net of Trawlers.....	5
Figure 6 Fishing ground of Thailand fleet within the SIOFA area of competence	6
Figure 7 Locations of the SIODFA BPAs in the Southern Indian Ocean	8
Figure 8 Fishing footprint of Thai trawlers in SIOFA area.....	10
Figure 9 Species composition of catch from demersal trawl	11
Figure 10 Species composition of catch from pair trawl.....	12
Figure 11 Species composition of catch from otter board trawl.....	12
Figure 12 Species composition of catch from trap	13
Figure 13 Size distribution of Lizardfish (<i>Saurida undosquamis</i>).....	14
Figure 14 Size distribution of Round scad (<i>Decapterus russelli</i>)	14

ABBREVIATIONS AND ACRONYMS

BFIA	Bottom Fishing Impact Assessment
BPA	Benthic Protected Area
CCTV	Closed-Circuit Television
CMM	Conservation and Management Measure
CPUE	Catch per Unit of an Effort
DOF	Department of Fisheries, Thailand
EM	Electronic Monitoring System (EM)
ENGA	United Nations General Assembly
ERS	Electronic Reporting System (ERS)
ETP	Endangered, Threatened or Protected species
FAO	Food and Agriculture Organization of the United Nations
FMC	Fisheries Monitoring Center, Department of Fisheries, Thailand
MCTD	Marine Catch Transshipping Document
MSC	Monitoring, Control and Surveillance
NAFO	Northwest Atlantic Fisheries Organization
PIPO	Port In – Port Out Control
RFMO	Regional Fisheries Management Organization
SEAFDEC	Southeast Asian Fisheries Development Center
SEAFO	South East Atlantic Fisheries Organization
SIODFA	Southern Indian Ocean Deepsea Fishers Association
SIOFA	Southern Indian Ocean Fisheries Agreement
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System

EXECUTIVE SUMMARY

This Bottom Fishing Impact Assessment (BFIA) intend to assess the potential impacts of the bottom fishing activities of Thai vessels on relating VMEs and deep sea fish stocks in the SIOFA area. The assessment used data and information from fishing logbook and observer report of the trawl and trap fishery from June 2016 to February 2017. The information shows that fishing activities of Thai fleet did not impact to any current Benthic Protected Area (BPA) which defined by SIODFA.

Fishing Gear Information of Thai Fishing Activities

During 2015 – 2017, there were 76 fishing vessels had been authorized by DOF, Thailand to fish in high sea. From the total 76 individual vessels, trawling net was the most used fishing gears, composed with 1 paired trawl and 73 otter board trawls. There was only 1 vessel used both of purse seine and trap. However, there were only 62 authorized vessels that were active and had fishing operations in the western Indian Ocean during 2015 – 2017. For latest fishing period, June 2016 to February 2017, there were 14 vessels were active and operated in that area [Section 4.1]. The historical information derived from the total 62 active vessels will contribute to the SIOFA scientific committee to review and analysis while information derived from the 14 vessels contribute to this BFIA

Spatial Information of Fishing Areas

The main fishing grounds of Thai fleet within the SIOFA area of competence were mostly distributed in the Western Indian Ocean, where in high sea of Saya de Malha Bank. This assessment defines ‘trawlable area’ as depths of <2000 m. Thai fishing ground cover 7.15% of trawlable area mainly on continental shelf or 0.12% of total SIOFA area [Section 4.3].

Status of Target Stocks

From June 2016 to February 2017, Thai trawlers had operated in the high sea that targeted demersal species composing three (3) main species; lizardfish, round scads, and threadfin bream. The scientific observer onboard of fishing vessel designed to record length of major economic fish classified to species. For this assessment, the two major species, lizardfish (*Saurida undosquamis*) and round scad (*Decapterus russelli*), are analyzed as representatives of demersal fish and pelagic species. Total lengths of the both species are larger than first mature size.

Interim Bottom Fishing Management and Mitigation Measures

Thailand has adopted the fleet management plan and management measures for fishing vessels operating in the SIOFA area of competent. These measures include mandatory levels of observer coverage, move-on requirements encountered by levels of evidence of Vulnerable Marine Ecosystems (VMEs) (>60 kg accidental catch of corals and >700 kg accidental catch of sponges), restrictions on particular fishing gear, and restriction of the spatial extent of Thai trawlers from a ‘footprint’ based on their collective distribution of historical fishing activity during 2016-2017 [Section 4.5].

1. INTRODUCTION

The United Nations General Assembly (UNGA) called for the implementation of the Law of the Sea Convention 1982 (LOSC 1982). This, it had adopted the UNGA Resolutions 61/105 and UNGA Resolution 64/72 that call on States to take action immediately, whether individually and/or through the appropriate RFMOs, to protect vulnerable marine ecosystems (VMEs) from destructive fishing activities. In particular, UNGA Resolution 61/105 call the States to “*conduct impact assessments to determine whether bottom fishing activities would have significant adverse impacts on VMEs, and ensure effective management to prevent such impacts, or else prohibit the activity*”.

Thailand has been a Contracting Parties of SIOFA since 21st May 2017. To response the SIOFA conservation and management measures (CMMs), Thailand controls their fishing activities in the SIOFA Area of competent and taken all necessary precautionary approach to prevent the adverse impact to the ecosystem. (Section 4.5). Some of those measures include:

- limits on total capacity of Thai fleet;
- constraints on the spatial distribution of bottom fishing effort;
- legal provisions to ensure that bottom fishing will not have significant adverse impacts on VMEs; and
- legal provisions ensuring that any vessel flying Thai flag is not authorized to fish in any areas that the Meeting of the Parties has decided to close to fishing.

This BFIA aims to assess the potential impacts of the proposed bottom fishing activities of Thai vessels on relating VMEs and deep sea fish stocks in the SIOFA area. The result, then, will benefit the SIOFA to later define the appropriate management measures. So, this is part of Thailand’s commitment to the UNGA, SIOFA CMMs, in particular the Conservation and Management Measure for the Interim Management of Bottom Fishing in the SIOFA Agreement Area (CMM 2017/01), as well as it has been prepared in accordance to the FAO International Guidelines for the Management of deep sea fisheries in the high seas.

2. AREA OF APPLICATION

The BFIA report is assessment of the potential impacts of the proposed bottom fishing activities on VMEs and deep sea fish stocks in the SIOFA Area.

3. BOTTOM FISHERY IMPACT ASSESSMENT PROCESS

This BFIA is prepared in accordance with the FAO deep-sea fisheries Guidelines and the SIOFA BFIA Standard. The assessment uses the data and information from fishing logbook and observer report of the trawl and trap fisheries during the year 2016-2017.

3.1 Preparation of This Document

On 25-26 September, 2017, consultation meeting on preparing the first draft had been carried out. The participants were from the Divisions in DOF including:

- Oversea Fisheries Cooperation Group
- Oversea Fisheries and Transshipment Control Group
- Oversea Fisheries and Transshipment Monitoring Group
- Oversea Fisheries and Transshipment Inspection Group
- Eastern Gulf Fisheries Research and Development Center (Rayong)
- Southern Marine Fisheries Research and Development Center (Songkhla)
- Fishing Ground Development and Rehabilitation Group
- Fisheries Resources Assessment Group

During October – November, 2017, the first draft of this document had been reviewed by fisheries Legal Affairs Division of DOF and the peer and experts of Southeast Asian Fisheries Development Center (SEAFDEC) and their comments has been contributed into this document.

Along the period of preparation of this document (September-December, 2017), the informal consultations with fishermen had been carried out from time to time regarding their fishing grounds, catch and effort. Lastly, on 28 December, 2017, the formal consultation meeting between Department of Fisheries, oversea fishers and Thai Oversea Fisheries Association had been in place.

The final version of the document had been review and approved by the executive level of the DOF.

3.2 Data Used for Assessment

Logbook data

During 2016-2017, Thailand had one paired trawler, eleven otter board trawlers and one fish trap vessel operated in the area of Saya de Malha Bank where under the competent of the SIOFA. The vessels sizes were 164 - 721 Gross Tonnage (GRT) (Table 1). The data was mainly derived from their fishing logbooks provided to the Department of Fisheries (DOF), Thailand that included the information of fishing operations and catch. The key information used in impact assessment including fishing effort (number of hour or times of fishing operation), position of fishing, and catch and species composition.

Scientific Observer Report (5%)

Prior to be a member of SIOFA on May 21st, 2017, DOF, fisheries competent authority, required the coverage of the observer onboard of the fishing vessel for 5% of their fishing operations. The observer has a role in observe, collect and record of fishing activities and biological data such as composition of fish species, type of fishing gear, bycatch species, releasing species, discard species, the compliance of fishers of the vessel to the conservation and management measures, transshipment and other relevant activities. The key information used in impact assessment composes of fish size distribution of dominant species and record of encounter with Endangered, Threatened or Protected (ETP) species.

4. BOTTOM FISHERY IMPACT ASSESSMENT SECTION

4.1 Description of the Proposed Fishing Activities

Vessel

During 2015 – 2017, there were 76 fishing vessels had been authorized by DOF, Thailand to fish in high-sea. From the total 76 individual vessels, trawling net was the most used fishing gears, composed with 1 paired trawl and 73 otter board trawls. There was only 1 vessel used both of purse seine and trap. However, there were only 62 authorized vessels that were active and had fishing operations in the western Indian Ocean during 2015 – 2017. For latest fishing period, June 2016 to February 2017, there were 14 vessels were active and operated in that area (Table 1). The historical information derived from the total 62 active vessels will contribute to the SIOFA scientific committee to review and analysis while information derived from the 14 vessels contribute to this BFIA.

Table 1 Thai fishing vessels in the SIOFA area during 2015-2017

Gear type	Gross Tonnage (GRT)	No. of authorized vessel 2015-2017	No. of active vessel 2015-2017	No. of active vessel during June2016-Feb2017 ^b
Pair trawl	164 ^a	1	1	1
	398 ^a	1	1	1
Otter board trawl	100 – 200	18	12	3
	201 – 300	27	22	5
	301 – 400	18	15	2
	401 – 500	4	4	-
	501 – 600	2	2	-
	601 – 700	1	1	-
	701 – 800	2	2	1
	801 – 900	-	-	-
	901 – 1,000	-	-	-
	1,001 – 1,100	-	-	-
Purse seine	200	1	1	1
Trap				
Total number of vessel		76	62	14
Total Gross tonnage		23,409.2	20,219.0	4,012.1

Remark: ^a pair trawl vessels

^b Number of vessel evaluated in this BFIA

Gear

As to derive only the best recent available data and information to contribute in the BFIA, this report was based on totally 14 fishing vessels which operated from June 2016 to February 2017. The total gross tonnage of Thai fleet during this period was 4,012.1 GRT, these included 1 (one) pair of trawlers with the vessel sizes of 164 and 398 GRT, the 11 (eleven) otter board trawlers with the vessel sizes between 164 to 721 GRT, and 1 (one) portable trap vessel with the vessel size of 200 GRT (Table 1).

• Demersal Trawl

The pair trawler used net with head rope length 62-76 meters, and the ground rope is 65-82 meters long. For otter-board trawlers, their head rope lengths are between 20-43 meters, and the ground rope lengths are between 22-46 meters. There are several bobbins at ground rope. Bobbin diameter are between 70-140 mm. Most of the nets are two-seam types with mesh size ranging from 60 to 240 mm for wings and 50 mm for cod-end. The otter boards are made of rectangular wood with the size approximately 1.5x3 meters.

• Portable Trap

Fish traps are made of metal and wood with the size of 3x4x1.6 meters (Figure 1). Mesh size is 3.5 x5 inches.



Figure 1 Trap of Thai vessel



Figure 2 Thai Trawler

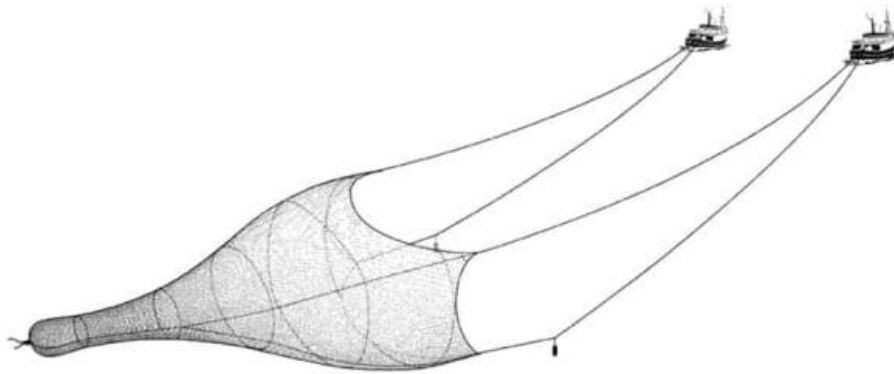


Figure 3 Paired Trawlers

Source: Fishingworld - Available online at URL:
<http://www.fishingworld.com.au/news/afma-approves-pair-trawling-for-the-spf>

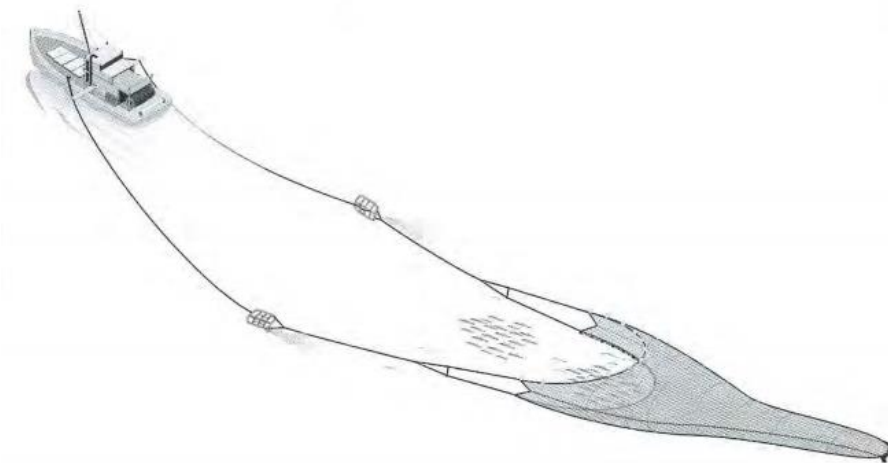


Figure 4 Otter-Board Trawlers

Source: Fishing Gear and Methods in Southeast Asia: Brunei Darussalam, 2007

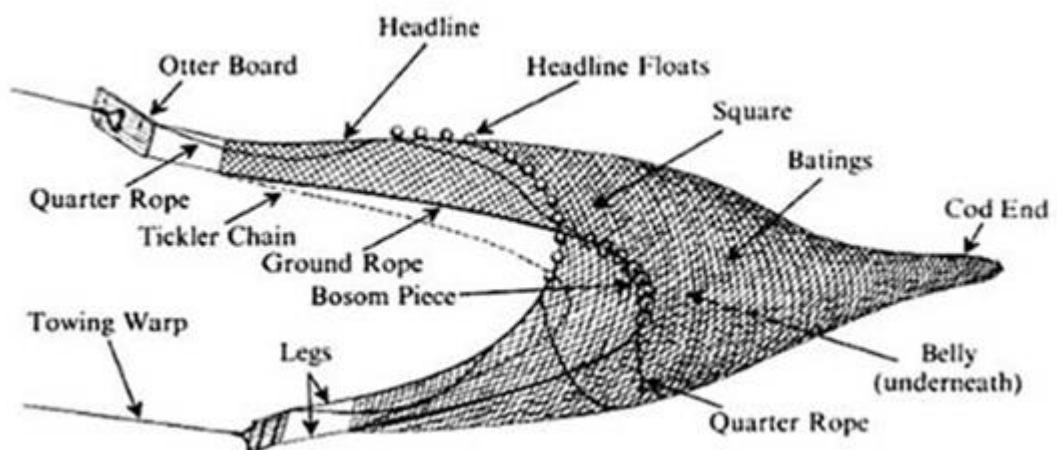


Figure 5 Profile of trawling net of Trawlers

Source: Granton and Leith Trawlers - Available online at URL:
<http://www.grantontrawlers.com/steam%20trawler.html>

4.2 Mapping and Description of Proposed Fishing Areas

The main fishing grounds of Thai trawler fleet within the SIOFA area of competence were mostly distributed in the Western Indian Ocean. The location (latitude and longitude) of fishing operation were shown in Figure 6.

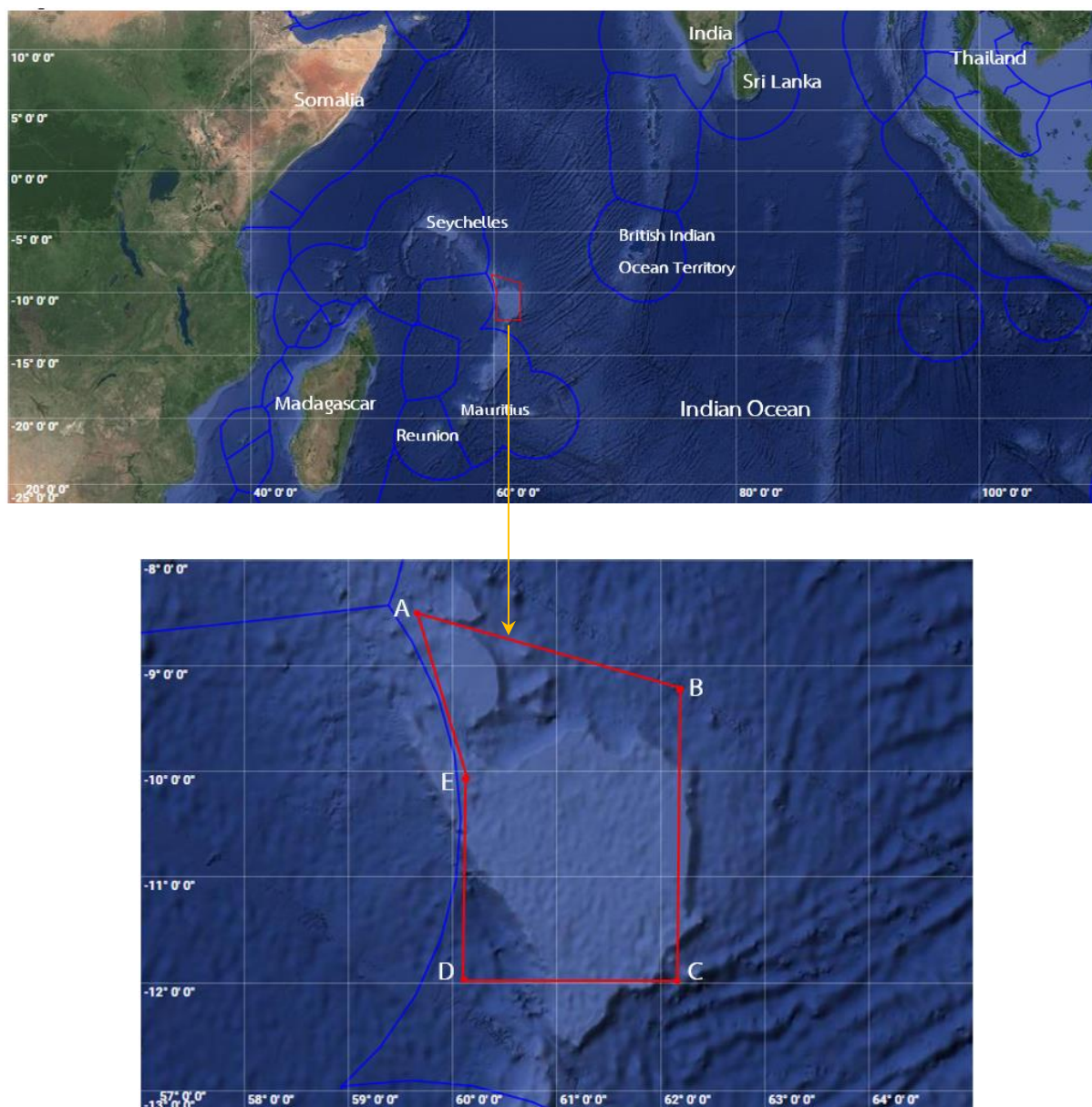


Figure 6 Fishing ground of Thailand fleet within the SIOFA area of competence

- A. Lat. 08° 33' 00" S Long. 059° 39' 00" E
- B. Lat. 09° 12' 00" S Long. 062° 12' 00" E
- C. Lat. 12° 00' 00" S Long. 062° 12' 00" E
- D. Lat. 12° 00' 00" S Long. 060° 06' 00" E
- E. Lat. 10° 03' 00" S Long. 060° 06' 00" E

4.3 Impact Assessment

4.3.1 Spatial Impact

The fishing area of Thai fleet is approximately 33,336 square km, mostly on continental shelf and shallow upper continental slope, which cover 0.12 % of total SIOFA area. This fishing ground was not close to the Benthic Protected Areas (BPAs) that defined by Southern Indian Ocean Deepwater Fisheries Association (SIODFA) even the nearest, Mid-Indian Ridge. So, the fishing activities of Thai fleet did not impact to any current BPA.

Table 2 The area (km²) covered by the voluntary BPAs implemented by the SIODFA by ecologically meaningful bathomes. Also given is the percentage the closed areas represent of each bathomes in the entire SIOFA Area.

BPA	Shelf	Shallow upper slope	Deep upper slope	Shallow mid slope	Deep mid slope	Total Area
	1 – 200 m	201 – 700 m	701 – 1000 m	1001 – 1500 m	1501 – 2000 m >2000 m	
East Broken Ridge		1	34	80	321	8,731
Guiden Draak				146	1,678	6,777
Fools Flat		62	62	519	1,912	12,402
Rusky		35	36	80	128	5,010
Mid-Indian Ridge			53	224	76	584
Atlantis Bank				4,294	4,784	10,847
Bridle					1,481	133,345
Coral				135	11	146
South Indian Ridge			152	5,080	14,031	40,052
Walters Shoal	169	741	848	1,050	526	3,470
Total	169	840	1,185	11,608	24,948	223,364
Percent of bathomes in SIOFA Area	0.45%	2.62%	4.71%	10.48%	9.57%	0.83%

Source: Last *et al.*, 2010 cited by William *et al.*, 2011

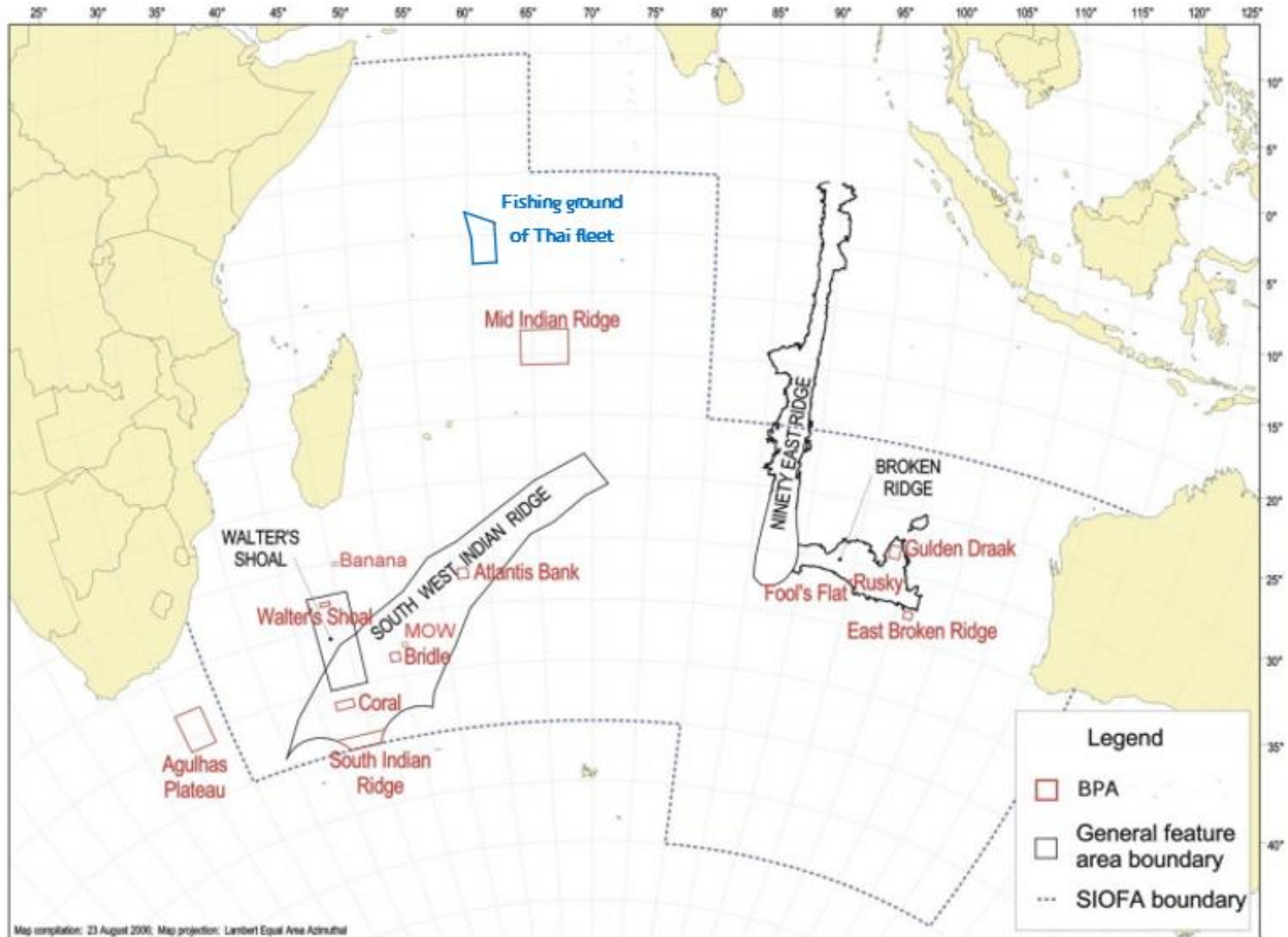


Figure 7 Locations of the SIODFA BPAs in the Southern Indian Ocean
Modified from: SIODFA XVII Technical Report XVII 16/02, 2016

4.3.2 Effort Analysis in Relation to Fishing “Footprint”

Effort Analysis

This BFIA was evaluated by using the best available data and information from June 2016 to February 2017, composed with 1 pair trawler, 11 otter board trawlers and 1 fish trap vessel. These vessels had fished in the high seas of Saya de Malha Bank. The total number of fishing operation of paired trawler was 559 times, while the otter board trawler’s was 3,159 times or 287 times/vessel, in average. Total fishing effort of trawl was 16,749 hours and 28 minutes. The total number of fishing operation of fish trap vessel was 18 sets. CPUE of trap was 604.44 kg/set.

Table 3 Effort of Thai fishing fleet during June 2016 – February 2017

Gear type	No. of vessel	Average Fishing effort (hr/trawling operation)	Average no. of operation/day
Pair trawl	2	4.83	3
Otter board trawl	11	4.45	3

Footprint

Thai fleet operated fishing in high seas, Saya de Malha Bank, between latitude 9 to 12 degree South and longitude 60 to 62 degree East, average depth of fishing operation is 80 meters. The fishing area of Thai fleet is around 33,336.00 km², mostly on continental shelf area which covers 7.15% of trawlable area or 0.12% of total SIOFA area (Table 4). However, this fishing footprint is for trawling as the calculation is based on the fishing ground of Thai trawlers. This footprint should not apply to the ‘New Fisheries’ that may introduced in the future.

Table 4 Percentage of Thai fishing footprint comparing to SIOFA area

	SIOFA Area			Thailand Footprint	
	Bathome (m)	Name	Area (km ²)	Thailand Fishing Area (km ²)	Thailand Fishing Area (%)
Fishable area	0-200	Continental shelf	37,402	20,001.60	53.48
	201-700	Shallow upper Continental slope	32,101	6,667.20	20.77
	701-1000	Deep upper Continental slope	25,133	3,333.60	13.26
	1001-1500	Shallow mid – Continental slope	110,781	1,574.20	1.42
	1501-2000	Deep mid – Continental slope	260,633	1,759.40	0.67
	Subtotal of fishable area (A)			466,050	33,336.00
Unfishable area (B)	> 2000		26,414,597		0
Total SIOFA area (A + B)			26,880,647	33,336.00	0.12

Source: modified from Last *et al.*, 2010 cited by William *et al.*, 2011

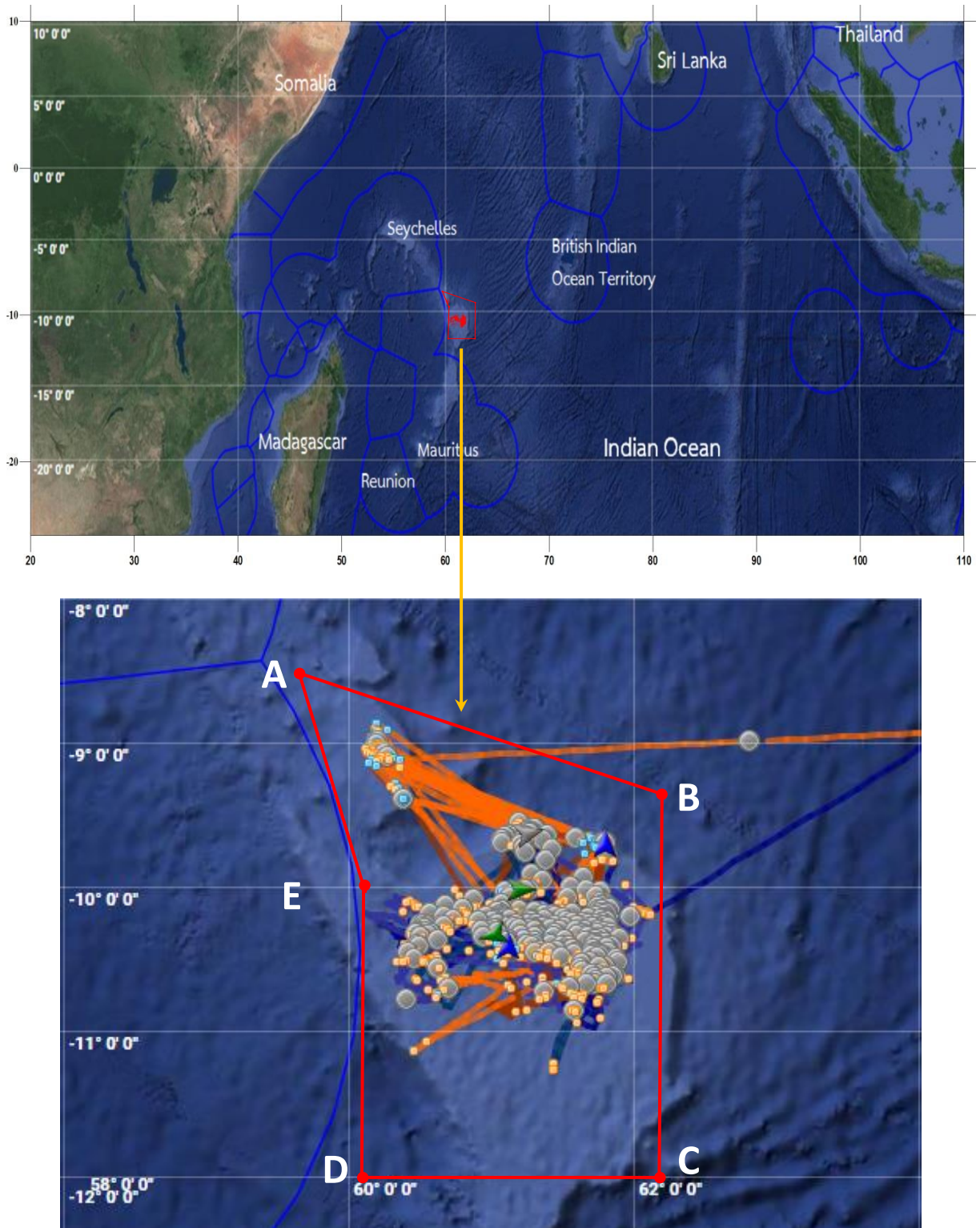


Figure 8 Fishing footprint of Thai trawlers in SIOFA area

4.4 Information on Status of the Deep-sea Stock to be Fished

4.4.1 Catch and Species Composition

The data used to assess catch and species composition are from fishing logbook. The total catch was 9,879.5 tons which 9,868.6 tons was from demersal trawl and 10.9 tons was from portable trap (Table 5).

Table 5 Catch from Thai Fishing Vessels Operated in Western Indian Ocean During 2016-2017

Fishing Gear	Catch	
	Weight (tons)	Percent (%)
<u>Demersal Trawl</u>		
- Paired Trawl	2,734.7	27.68
- Otter-Board Trawl	7,133.9	72.21
Subtotal	9,868.6	99.89
Portable Trap	10.9	0.11
Grand Total	9,879.5	100.00

Demersal Trawl

The catch from pair trawl was 2,734.7 tons and from otter board trawl was 7,133.9 tons. So, the total catch was 9,868.6 tons which composed of lizardfish 44%, round scads 21%, threadfin bream 8%, bigeye scads 6%, goatfish 5%, miscellaneous species 13% (list of miscellaneous fish *see* appendix I), and trash fish 3% (Figure 9). However, this catch had not been identified into species level while the trash fish is the mixed species of low value and non-consumption fish.

Although the trawlers targeted demersal fish, the fishing ground was in the area of 0-200 and 200-700 meters that allowed the possibility of catching of pelagic species which move between the water columns e.g. round scad, Indian mackerel.

However, there is no record from observer report that these fishing activities encounter with Endangered, Threatened or Protected (ETP) species neither marine mammals, corals or sponges.

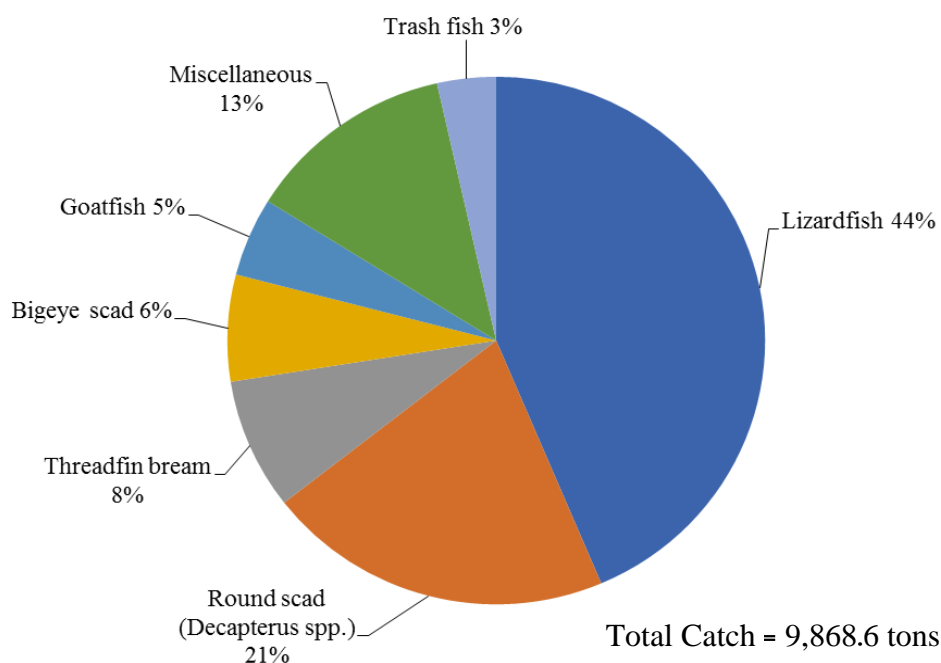


Figure 9 Species composition of catch from demersal trawl

• **Pair Trawl**

Catch from pair trawler is 2,734.7 tons that composed of lizardfish 40%, round scad 28%, threadfin bream 6%, bigeye scad 6%, yellow goatfish 3%, Indian mackerel 3%, miscellaneous species 8%, and trash fish 6% (Figure 10)

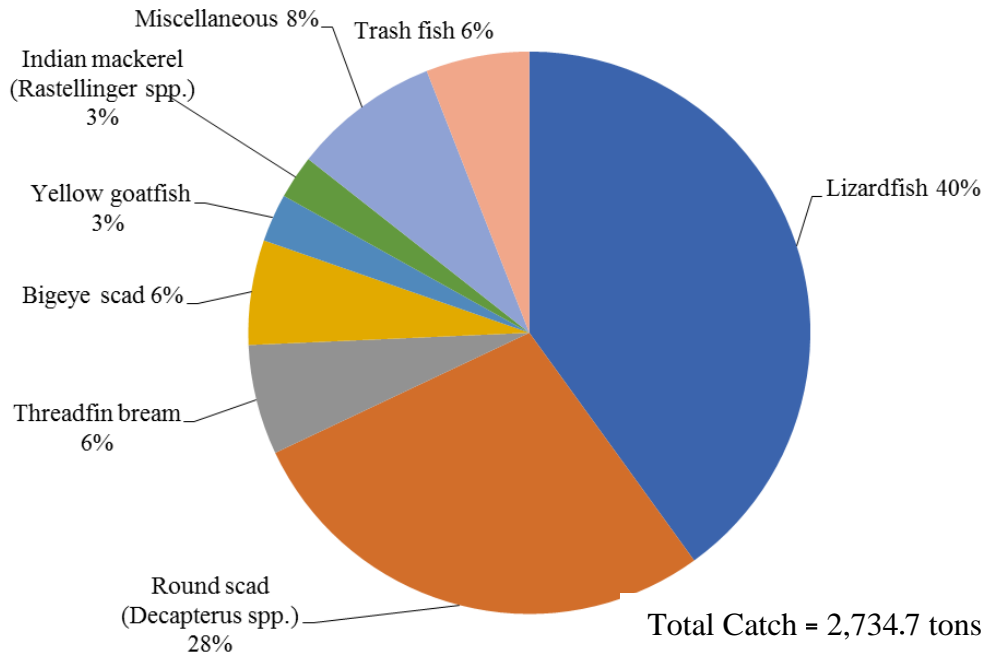


Figure 10 Species composition of catch from pair trawl

• **Otter board trawl**

Catch from Otter board trawl is 7,133.9 tons composed of lizardfish 45%, round scad 18%, threadfin bream 9%, bigeye scad 7%, goatfish 6%, miscellaneous species 12%, and trash fish 3% (Figure 11).

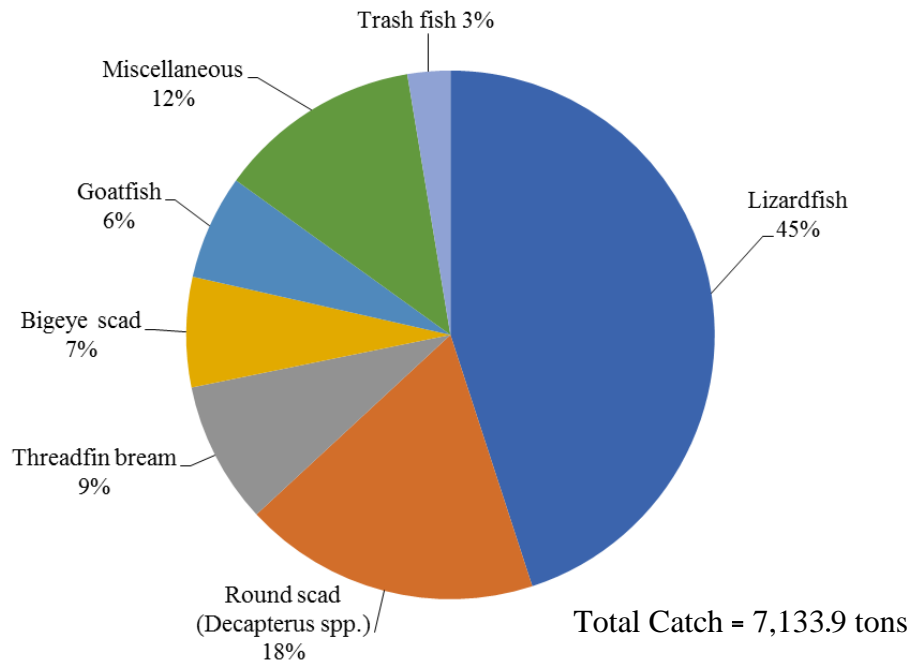


Figure 11 Species composition of catch from otter board trawl

Portable Trap

The catch from fish trap vessel was 10.9 tons that composed of Golden trevally 29.36%, Red snapper 21.44%, Triggerfish 18.63%, Rabbit fish 18.50% and others 12.07% (Figure 12).

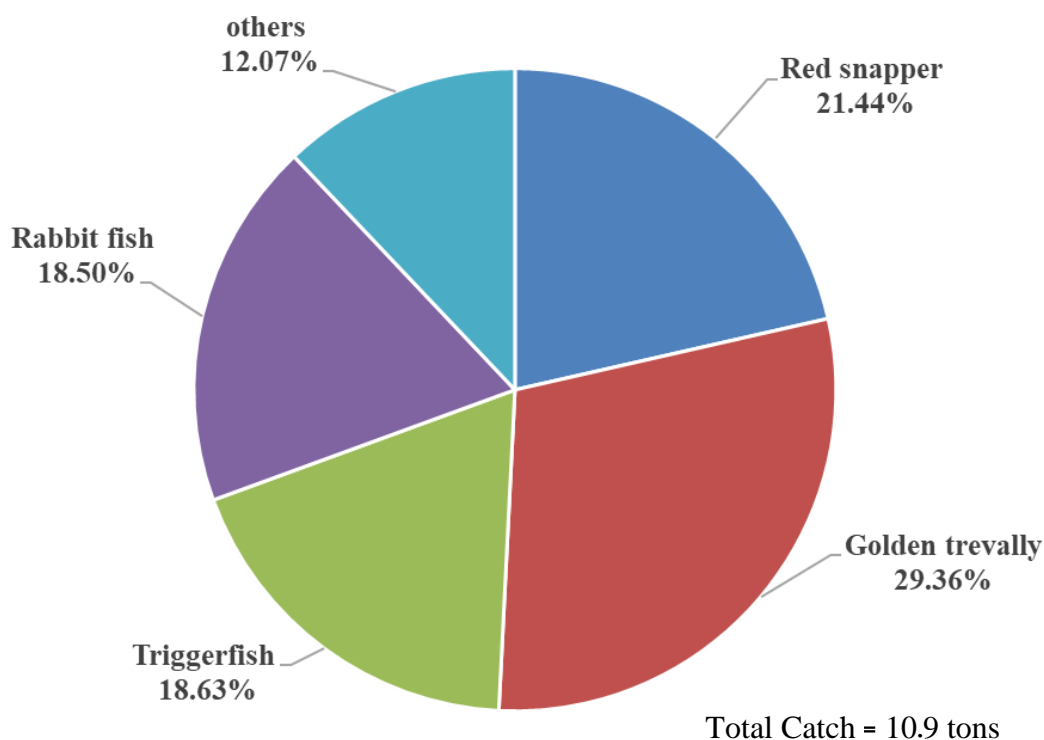


Figure 12 Species composition of catch from trap

4.4.2 Fish size distribution of dominant species

The data of fish sizes was derived from observers on board of fishing vessel. The data collection was designed including measuring the total length of major economic fish that classified to species level. For this assessment, the two major species, lizardfish (*Saurida undosquamis*) and round scad (*Decapterus russelli*) are analyzed as representatives of demersal fish and pelagic fish species.

Lizardfish (*Saurida undosquamis*)

The average length of lizardfish is 29.92 cm., which 94.37% of fish is larger than the length at first maturity (19.8 cm) and only 5.63% of them is smaller than the length at first maturity (FishBase, 2017), see Figure 13.

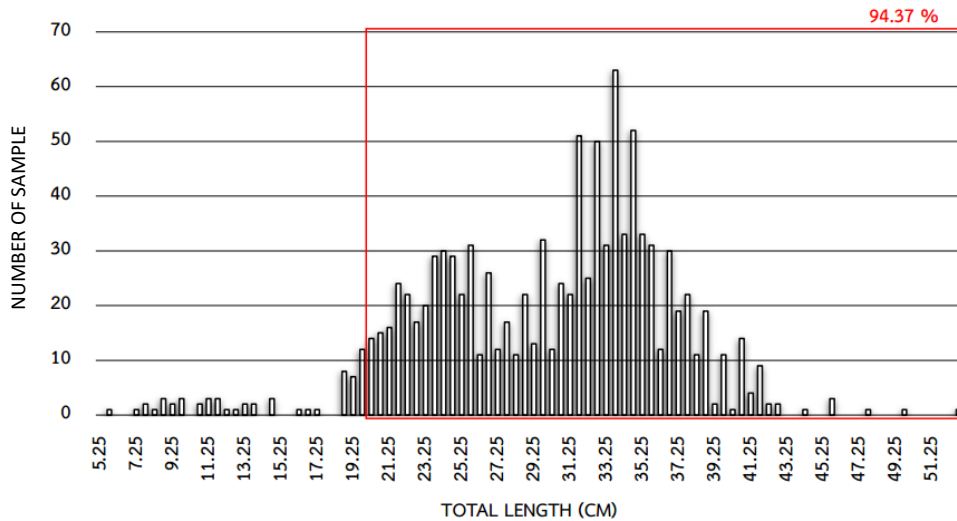


Figure 13 Size distribution of Lizardfish (*Saurida undosquamis*)

Round scad (*Decapterus russelli*)

The average length of round scad is 18.02 cm., which 85.79% of fish is longer than the length at first maturity (16.1 cm.) and 14.21% of them is shorter than the length at first maturity (FishBase, 2017), see Figure 14.

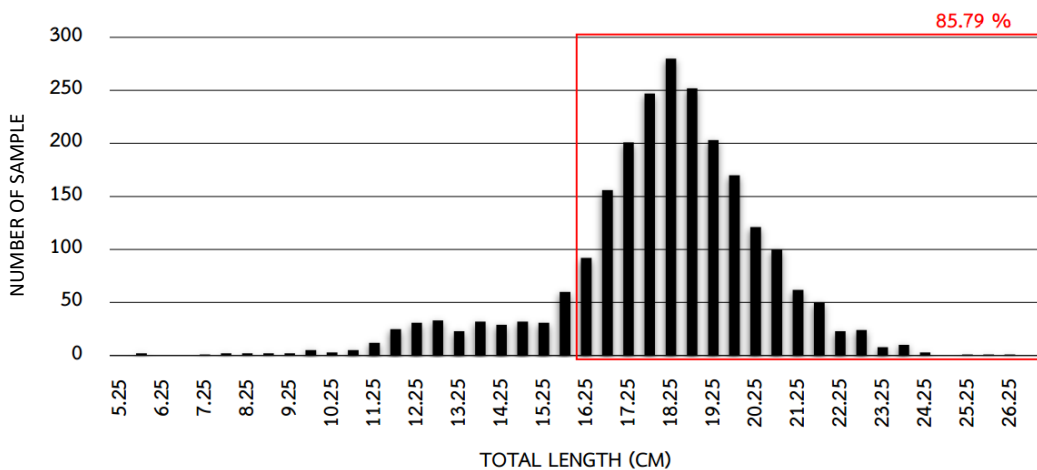


Figure 14 Size distribution of Round scad (*Decapterus russelli*)

4.5 Monitoring, Management and Mitigation Measure

4.5.1 Fleet Management

Thailand has limited the number of trawlers. Thus, the fleet is limited to 61 trawling vessels that was active during 2015-2017. In addition, vessel will be authorized to fish only in the footprint area of Thai trawl fleet.

4.5.2 MCS for Thai Oversea Fisheries

The duration of data set used in this assessment is from June 2016 to February 2017 that's before Thailand become a member of SIOFA. After the ratification of Thailand on 21st May 2017, Department of Fisheries, the competent authority of Thailand amend and issued the regulations for Thai overseas fishing vessels operating in SIOFA area to reflect the SIOFA CMMs. In addition, the protocol to control the oversea fisheries and transshipment has been established. The principle of the control is to effectively monitoring of vessel before port out,

during operating at sea or in foreign port and until the vessel return to the port of Thailand (Appendix II).

Thailand defines the minimum requirement for the authorized vessel including; the installation of the VMS, Electronic Reporting System (ERS) and Electronic Monitoring System (EMS), the submission of the transshipment plan that the vessel need to submit before authorized to port out (PO); the transshipment declaration that the vessel need to submit after completion of the transshipment; the designated port of authorized to port-in and port-out; and the requirement of submission of the logbook (Table 6).

Table 6 Minimum requirement for Thai oversea fishing vessel and carriers authorized to transship outside Thai waters

Transshipment plan	PIPO at Designated Port	VMS	ERS	EM (CCTV)	Transshipment Declaration	Logbook
√	√	√	√	√*	√	√

* 4 cameras with 360° coverage

- **Port-Out and Port-In Controlling Center**

It is important to recall that this Thai authority have set a clear target to control at port in and port out inspections process. The inspection includes documentation and physical checks of vessels and labor. The inspection carried out by PIPO co-team inspectors of relevant competent authorities including from Immigration Office, Department of Labor Protection and Welfare, Customs, Marine Department, Department of Fisheries.

- **Inspection at Port**

Apart from documentation and physical checks on board for port in – port out permission, the video recorded by the EM will be inspected by port inspector prior to authorize to unloading of fish. Besides, the Thai authorities also carry out the catch landing inspection for reliability and accuracy of information on landed fish before entering the supply chain. During this process, catch weight is verified with landing declaration documents, fishing logbook, fishing gears and Marine Catch Transshipment Document (MCTD) in case of transshipments.

- **Vessel Monitoring System (VMS)**

A vessel monitoring system (VMS) is a tool of fisheries surveillance, the equipment installed onboard provides information on the position of the vessels and implied activities. This is an effective tool not only to prevent and deter Illegal, Unreported and Unregulated (IUU) fishing, but also to benefit the monitoring of fishing crews in Thai fishing vessels while operating in high seas.

Thailand started and implemented the VMS system on all fishing vessels size over than 30 gross ton since 2015. The VMS of fishing vessels must be all-time active and transmitted signal every 1 hour. Not only the real-time system can be monitored by online application but can trace back navigation data of fishing vessel to analysis behavior of fishing vessel. In addition, the oversea fishing vessel may carry another approved spared VMS set to switching in case of the malfunction or out of order of the main VMS. The switching must be informed and request the FMC to update information accordingly and the FMC shall reply the vessel owner or operator on signal switching within six hours.

•Electronic Reporting System (ERS) and Electronic Monitoring System (EM) installation

The new electronic surveillance system has been developed, comprising of 2 main components : Electronic Reporting System (ERS) and Electronic Monitoring System (EMS)

Electronic Monitoring (EM) is a component tool using for monitor the fishing activity, transshipment activity and seaman transfer. The CCTV continuously records activities in the oversea vessels and carriers for further analysis. Besides, electronic sensors are attached to fishing gear and transshipment equipment such as winch, crane and door of fish storage compartment. Any use and move of these gears and equipment, the snapshot will be taken and automatically send through satellite to the Fisheries Monitoring Center (FMC), DOF.

Thai fishing vessel and carrier vessel are required to equip the Electronic Monitoring System (EM). The EM is a system using information technology and satellite communications for getting information on the use at sea of fishing gear and transshipments equipment. Information on the use of these gears will be confirmed by information regarding vessels' position and direction from the vessel monitoring system (VMS) as well as information from the closed circuit televisions system (CCTV) captured in snapshots and transmitted through a satellite communication in real time. The electronic sensors signal from winch, capstans and cranes on fishing vessels will be the sensor equipment identifying the start and end of fishing and transshipment activities. This can be real time monitored as well as examined the video recordings.

Electronic Reporting System (ERS) is an electronic report component to facilitate FMC staffs to receive fisheries and transshipment information and response to the relevant requests from fishing vessels and carriers, in order to control vessel activities. The application of ERS comprise the functions as follows:

- Transshipment request
- Transshipment declaration
- Electronic Fishing logbook
- Crew transfer request
- Loading/landing request
- Loading/landing declaration

•Human Observer

As to comply with the SIOFA CMM 2017/02, CMM for the Collection, Reporting, Verification and Exchange of Data relating to fishing activities in the Agreement Area (Data Standards), DOF requires the authorized fishing vessels undertaking bottom fishing in the Agreement Area having the observer onboard as following criteria.

Scientific observer coverage

(a) using trawl gear has scientific observer coverage for the duration of the trip (100% coverage) in any fishing year.

(b) using any other bottom fishing gear types have 20 percent scientific observer coverage in any fishing year.

Transshipment Observer

In case that the vessels request to transshipment at sea, the vessels must have transshipment observer 100% of transshipment period.

The Royal Ordinance on Fisheries B.E. 2558 (2015) and the amendment has the provisions, Section 50 and 51, on fisheries observer requirement. The observers will be qualified and approved by DOF Director General only after obtaining the observer training based on the FAO Guidelines for Developing an at-Sea Fisheries Observer Program. The

training course included the onboard training that particularly emphasized the learning on trawl configuration which is the major fishing gear of Thai fleet as well as the species identification multi-species situation. Currently, there are 22 qualified observers for SIOFA. The DOF also have a training course for the debriefers or training for the trainer course. Debriefers are the ones who are in charge of the briefing activity for observers before their deployment and in charge of the debriefing activity when they return. The briefing and debriefing activity will ensure the quality of the collecting information by observers as well as to improve their capacity and performance.

• Logbook

The masters of fishing vessels have been required to collect fishing data and input in the electronic logbook and report via the ERS. The data included information related to fishing trips and operations. The trip data was composed of dates and ports of vessel departure and return, weight of catch and effort by species. The fishing operation included the time of the operation, position (latitude and longitude), catch, other related information to the operation (Appendix III).

• Catch Labeling

It is required that all catch retained onboard shall be identified by a clearly legible label or stamp. The label or stamp on each box, carton, container, bag or block of frozen fishery resources or fishery resource products derived from fishing, shall indicate the species (e.g. group of species name/ common name/ scientific name/ FAO 3-Alpha code/codes as defined by the Scientific Committee), presentation, production date, and vessel identification number of the catching vessel.

4.5.3 Mitigation Measures

• Closures

Although SIOFA does not define the VMEs or closure area but Thailand has a regulation for prohibiting entering to BPAs as defined by SIODFA which are meaningful bathomes by monitoring through VMS. The forbidden fishing areas are as *Table 7*.

Table 7 The forbidden fishing areas regulated in Thai fisheries law

Area	Lat (N)	Long (W)	Lat (S)	Long (E)
Gulden Draak	28° 00'	98° 00'	29° 00'	99° 00'
Rusky	31° 32'	94° 55'	31° 30'	95° 00'
Fools Flat	31° 30'	94° 40'	31° 40'	95° 00'
East Broken Ridge	32° 50'	100° 50'	33° 25'	101° 40'
Mid Indian Ridge	13° 00'	64° 00'	15° 50'	68° 00'
Atlantis Bank	32° 00'	57° 00'	32° 50'	58° 00'
Bridle	38° 03'	49° 00'	38° 45'	50° 00'
Walters Shoal	33° 00'	43° 10'	33° 20'	44° 10'
Coral	41° 00'	42° 00'	41° 40'	44° 00'
South Indian Ridge (North)	44° 00'	40° 878'	44° 00'	46° 544'
South Indian Ridge (South)	45° 00'	42° 124'	45° 00'	45° 711'

• **Detection of ‘Evidence of VMEs’ and move on rule**

Thailand has adopted the protocol of detection of evidence of VMEs base on the reference benchmarks from related RFMOs e.g. Northwest Atlantic Fisheries Organization (NAFO) and South East Atlantic Fisheries Organization (SEAFO) which are 60 kg of coral and 600 kg of sponges.

Thailand has set the regulations for Thai fishing vessels when detect corals or sponges in the area which are likely to be a vulnerable ecosystem. These include stop fishing when catch living corals or sponges more than the defined benchmarks and take actions follow rules which classified by gear type as follow;

Trawler

Stop fishing when catch living corals more than 60 kg or 700 kg of sponges per one time of the operation and move at least 2 nautical miles from that area. Then, report catch of living coral or sponge to DOF, Thailand with 24 hours.

Longliner

Stop fishing when catch living corals or sponges more than 10 kg per 1,000 hooks or per 1,200 meters of longline and move at least 1 nautical mile from the center of the line Segment. Then, report catch of living coral or sponge to DOF, Thailand with 24 hours.

Fish Trap Vessel

Stop fishing when catch living corals or sponges more than 10 kg and move at least 1 nautical mile from that area. Then, report catch of living coral or sponge to DOF, Thailand with 24 hours.

In addition, observers onboard are required to record and report species and quantities of coral and other marine organisms derived from each fishery and area. The data will be used to analyze the abundance and diversity of benthic marine organisms. This for further define VMEs in the SIOFA area.

• **Operational measures to minimize benthic impacts**

General Thai trawl nets composed with bobbin at the ground rope which can minimize the impact on benthic habitat and organism. Furthermore, acoustic equipment will be used to monitor the sea bottom of the fishing grounds in order to prevent fishing on VMEs area.

5. NEW FISHERIES

Base on the historical record, there were trawl and trap fisheries. In the future, the new less impact fishing gear may be introduced to the fishing ground e.g. bottom longline, purse seine. This will be identified as new fisheries that further need the bottom impact assessment approach.

6. FURTHER ACTIONS ON SCIENTIFIC RESEARCH

This BFIA is the preliminary research based on the available historical information. Therefore, the collecting of information for further impact assessment of the fisheries will be continue. Under the BFIA scheme, these following activities will be included to strengthening the research scheme

Refresh training and briefing session for observer

The refresh training is required for the present scientific observer as well as the briefing session before deployment onboard of fishing vessel. The observers will be designed to record the weight of catch, incidental catch, bycatch, position and detection of VMEs. Then, report in the “five days report” and ERS daily report will be used to verified catch that retained on board.

Fishermen involvement in collecting of data and understanding on the rules to comply with

The consultation meeting between DOF officers, fisherman and observer is required to increase the understanding on data collection for the next BFIA. The fishermen will be informed the practice on species labeling and relating implementing rules. The most important element of those is the move on rule that the fisher shall comply with.

Training of EM tools for Inspector

The EM is the tool of the inspection using for identify the activities of fishermen. The deriving video from the EM will be used to monitor the events when the coral, sponges or sea fan etc. are caught. Thus, the training of inspector is required to have capacity on analysis of EM information.

As previous mention, to authorize the fishing vessel operating in SIOFA area, it required the minimum requirement, among other, it includes VMS, EM and observer onboard. The information derived from these monitoring tools will be either used for scientific purpose. This will result the data set of bottom impact assessment e.g. stock density, biomass, abundance, species diversity and variability (Table 8).

Table 8 The data collecting tools and information to be collected.

Data collection Methods	Scientific Information to be collected							Fish size frequency
	Oceanography/ Environmental data	Species composition of catch	Species of bottom sea animals (Coral, Sponges, Sea fan etc.)	Coverage of trawling area	Bycatch /Incidental catch	Discard species	Releasing species	
Human Observer	√	√	√	√	√	√	√	√
Logbook		√	√	√	√	√	√	
Species Labeling		√			√			
VMS/ERS		√	√	√	√	√	√	
EM in identification of species		√	√			√	√	

7. SUPPORT REQUIREMENT AND CAPACITY BUILDING

Although Thailand has experiences in coral and sponge exploration and identification, those experience are limit in coastal zone. To carry out the coral identification in the SIOFA deep sea area, Thailand needs scientific support in identification of the living organisms in particular coral, sponge, sea fan and etc. as required in SIOFA CMM 2017/01 Annex 1 - Guidelines for the Preparation and Submission of Notifications of Encounters with VMEs (Appendix IV). So, the cooperation and sharing of expertise from the SIOFA members or the SIOFA scientific committee may increase the capacity of Thailand marine scientists to assess the impact of bottom fisheries and then lead to the benefit of the SIOFA as a whole.

8. ACKNOWLEDGEMENT

We are deeply grateful to Southeast Asian Fisheries Development Center (SEAFDEC), Thailand, for review and valuable comments on the BFIA draft. These points of view make this report more complete.

9. REFERENCES

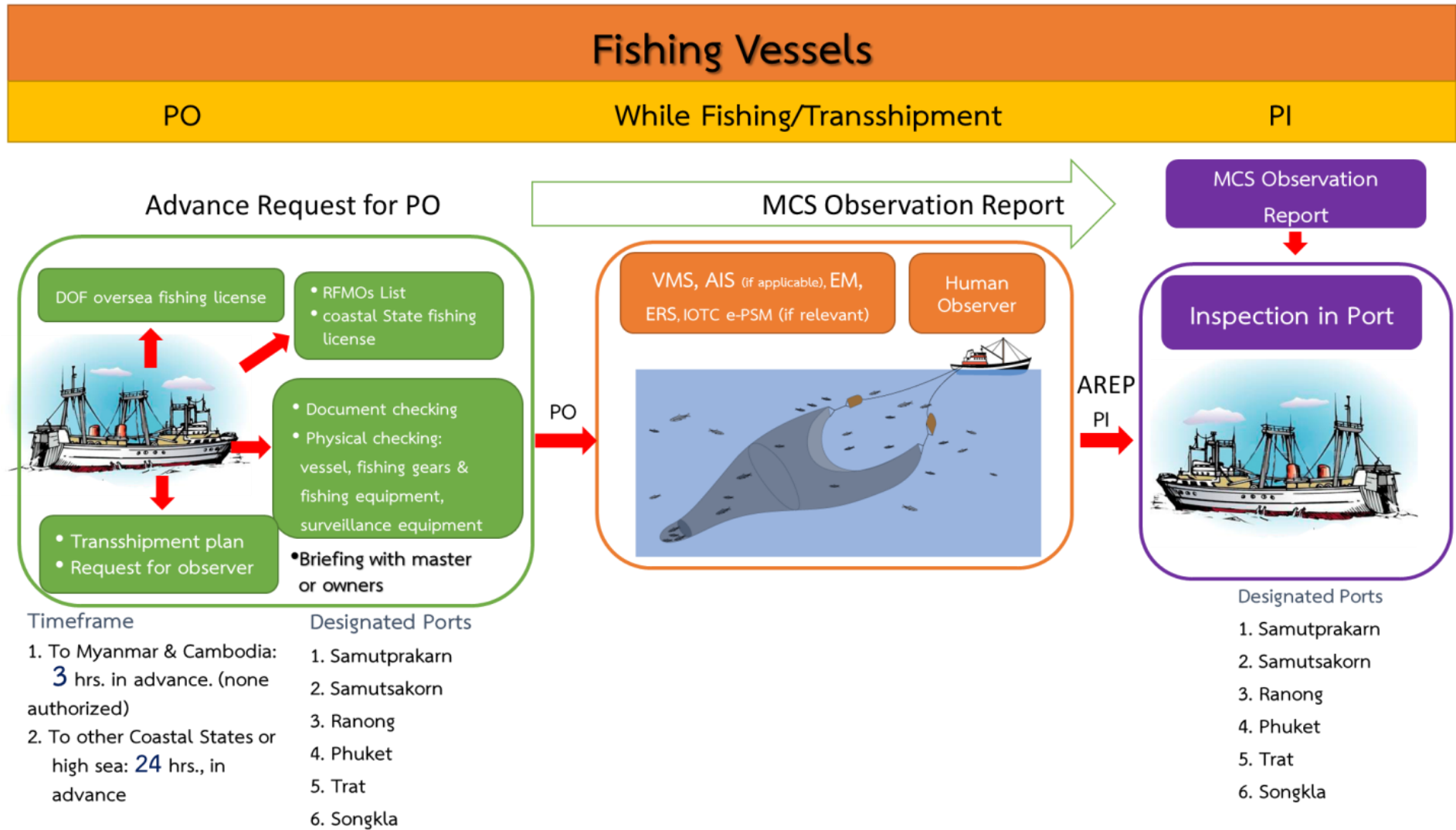
- FAO (2008). International Guidelines for the Management of Deep-sea Fisheries in the High Seas: Annex F of the Report of the Technical Consultation on International Guidelines for the Management of Deepsea Fisheries in the High Seas. Rome, 4– 8 February and 25-29 August 2008.
- FishBase (2017). Length at first maturity of *Decapterus russelli* – Available online at URL: <http://www.fishbase.se/summary/374>
- FishBase (2017). Length at first maturity of *Saurida undosquamis* – Available online at URL: <http://www.fishbase.se/summary/1055>
- Fishingworld (2017). AFMA approves pair trawling for the – Available online at URL: <http://www.fishingworld.com.au/news/afma-approves-pair-trawling-for-the-spf>
- Granton and Leith Trawlers (2017). The Steam Trawler. – Available online at URL: <http://www.grantontrawlers.com/steam%20trawler.html>
- Juna M., Cinco E. A., Wahab R., Selleh H. (2007). Fishing Gears and Methods in Southeast Asia: Brunei Darussalam. 185 pp.
- Last P.R., Lyne V.D., Williams A., Davies C.R., Butler A.J., Yearsley G.K. (2010). A hierarchical framework for classifying seabed biodiversity with application to planning and managing Australia's marine biological resources. *Biological Conservation* 143: 1675-1686.
- NAFO (2017). Conservation and Enforcement Measures 2017: Article 22 – Provisions in Case of Encounter.
- SEAFO (2015). Conservation Measure 30/15 on Bottom Fishing Activities and Vulnerable Marine Ecosystems in the SEAFO Convention Area.: Annex 6 VME indicators and threshold levels.
- SIODFA (2016). Southern Indian Ocean Deepwater Fisheries Association (SIODFA) Benthic Protected Areas in the Southern Indian Ocean. SIODFA Technical Report XVII 16/01. 40 pp.
- SIOFA (2017). SIOFA Bottom Fishing Impact Assessment Standard: Annex I of the Report of the Second Meeting of the Scientific Committee of the Southern Indian Ocean Fisheries Agreement (SIOFA). La Réunion, 13 – 17 March 2017.
- Williams A., Althaus F., Fuller M., Klaer N., Barker B. (2011). Bottom Fishery Impacts Assessment: Australian Report for the Southern Indian Ocean Fisheries Agreement (SIOFA). 70 pp.

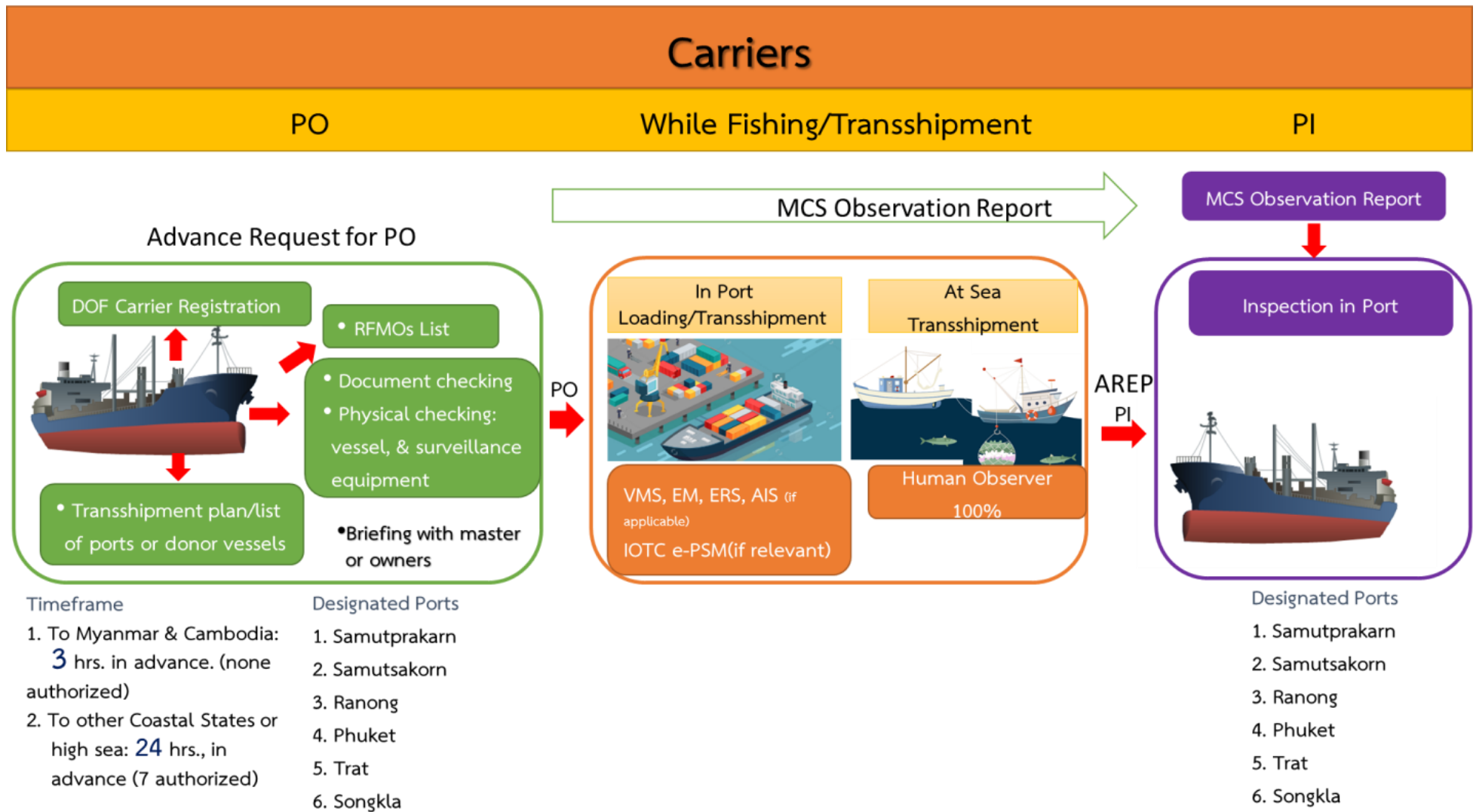
10. APPENDICES

Appendix I – List of Miscellaneous Fish

No.	Fish	No.	Fish
1	Barracuda	17	Lancetfish
2	Barred half-beak	18	Mullet
3	Bartail flathead	19	Prawn
4	Batfish	20	Yellowtail scad
5	Black-banded trevally	21	Purplespot bigeye
6	Blue-gray snapper	23	Ray
7	Cornetfish/ Trumpetfish	24	Red pinjalo
8	Crabs	25	Red snapper
9	Croaker	27	Shark
10	Cuttlefish	28	Sharptoothed bass
11	Emperor	29	Sweetlip
12	Flathead lobster	30	Toothed ponyfish
13	Giant grouper	31	Triggerfish
14	Golden trevally	32	Yellow stripe trevally
15	Grouper	33	Yellowtail fusilier
16	Squid		

Appendix II – Protocol to Control the Oversea Fisheries and Transshipment





Timeframe

- To Myanmar & Cambodia: **3** hrs. in advance. (none authorized)
- To other Coastal States or high sea: **24** hrs., in advance (7 authorized)

Designated Ports

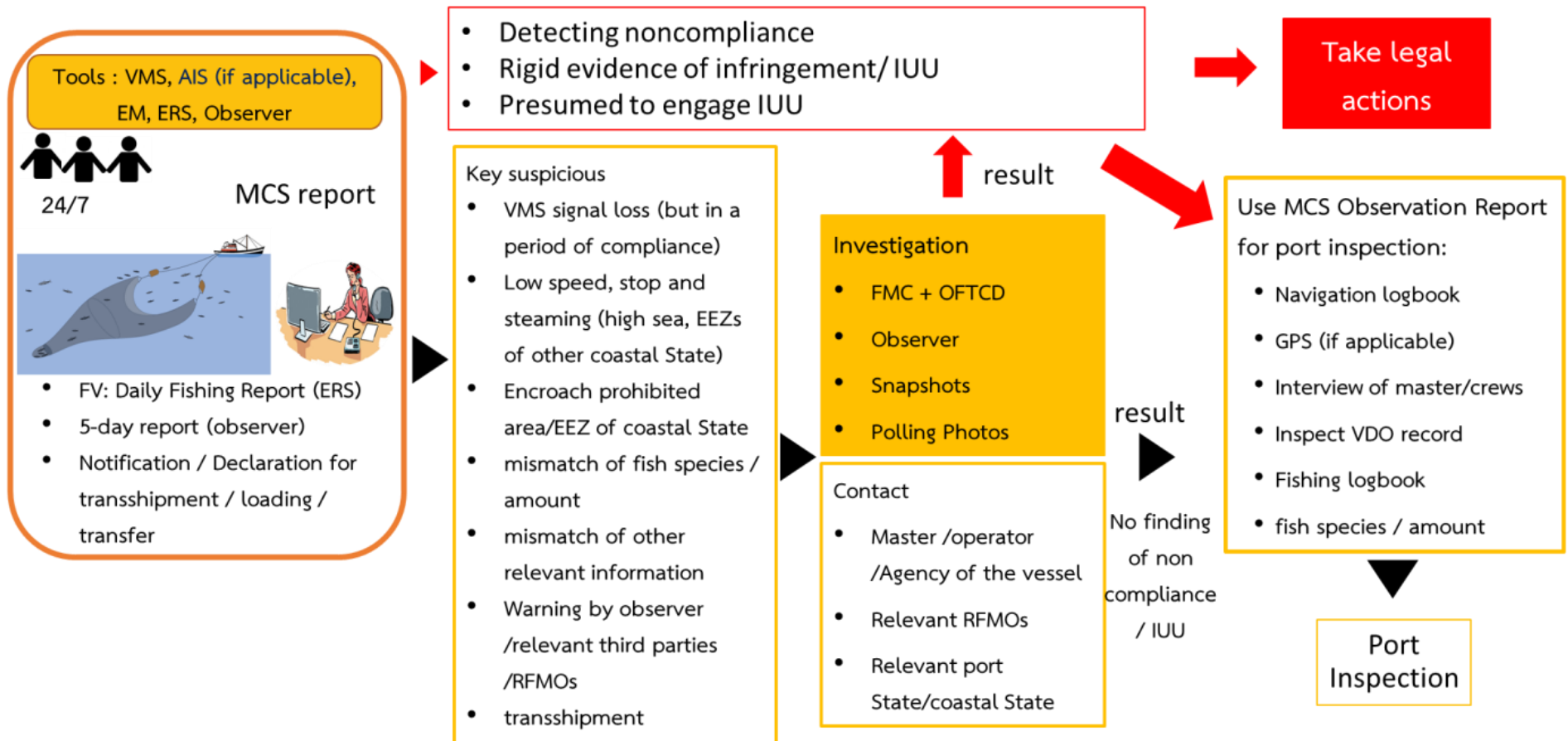
- Samutprakarn
- Samutsakorn
- Ranong
- Phuket
- Trat
- Songkla

Designated Ports

- Samutprakarn
- Samutsakorn
- Ranong
- Phuket
- Trat
- Songkla

Controls of Thai Oversea Fishing Vessel and Transshipment

While Fishing/Transshipment



Appendix IV – Guidelines for the Preparation and Submission of Notifications of Encounters with VMEs

In accordance with SIOFA CMM 2017/01 paragraph 12, where evidence of a VME is encountered above threshold levels established under paragraph 11 in the course of fishing operations. Contracting Parties, CNCPs and PFEs shall report any such encounter in their National Reports to the Scientific Committee in accordance with the guidelines at Annex 1, including any action taken by that Contracting Party, CNCP or PFE in respect of the relevant site. The text of Annex 1 as follows:

Annex 1 - Guidelines for the Preparation and Submission of Notifications of Encounters with VMEs

1. General Information

Include contact information, nationality, vessel name(s) and dates of data collection.

2. VME location

Start and end positions of all gear deployments and/or observations.

Maps of fishing locations, underlying bathymetry or habitat and spatial scale of fishing.

Depth(s) fished.

3. Fishing gear

Indicate fishing gears used at each location.

4. Additional data collected

Indicate additional data collected at or near the locations fished, if possible.

Data such as multibeam bathymetry, oceanographic data such as CTD profiles, current profiles, water chemistry, substrate types recorded at or near those locations, other fauna observed, video recordings, acoustic profiles etc.

5. VME taxa

For each station fished, provide details of VME taxa observed, including but not limited to their relative density, absolute density, or weight and/or number of ta