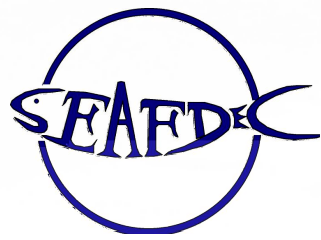


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# REPORT

**THE REGIONAL CORE EXPERT MEETING ON COMPARATIVE STUDIES  
FOR THE MANAGEMENT OF PURSE SEINE FISHERIES IN THE  
SOUTHEAST ASIAN REGION**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

Prepared by:

**Mohammad Faisal Md Saleh,  
Adam Luke Pugas,  
Raja Bidin Raja Hassan,  
Abdul Razak Latun**

**SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER  
MARINE FISHERY RESOURCES DEVELOPMENT AND MANAGEMENT  
DEPARTMENT**

# REPORT

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MARINE FISHERY RESOURCES DEVELOPMENT AND MANAGEMENT  
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Mohammad Faisal Md. Saleh

REPORT: THE REGIONAL CORE EXPERT MEETING ON COMPARATIVE STUDIES FOR THE MANAGEMENT OF PURSE SEINE FISHERIES IN THE SOUTHEAST REGION, Kuala Lumpur, Malaysia, 09-11 August 2016 /

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**The Core Expert Meeting on Comparative Studies for the  
Management of Purse Seine Fisheries  
in the Southeast Asian Region**

**9 – 11 August 2016, Kuala Lumpur, Malaysia**

**Adopted Report**

**I. INTRODUCTION**

1. The Core Expert Meeting on Comparative Studies for the Management of Purse Seine Fisheries in the Southeast Asian Region was organized by SEAFDEC/MFRDMD at Furama Hotel, Kuala Lumpur, Malaysia from 9 - 11 August 2016. The meeting was attended by the representatives from Cambodia, Indonesia, Malaysia, The Philippines, Thailand, Viet Nam and an observer from Lao PDR; as well as resource persons from Japan and Malaysia, the representatives from SEAFDEC/Secretariat, SEAFDEC/TD, DOF Malaysia, the Chief, Deputy Chief and Officials from SEAFDEC/MFRDMD. The List of Participants appeared in Annex 1.
2. The objectives of the meeting are; sharing of the latest information on characteristics of catch and effort of small pelagic purse seine fishery in the region, and to compare between application of TAC, TAE and other management options for its data requirement. Understanding the population structure of major species is also attempted.

**II. OPENING OF THE MEETING**

3. The Deputy Chief of SEAFDEC/MFRDMD, Dr. Osamu Abe, welcomed everyone to the meeting. He expressed his gratitude to all SEAFDEC participating member countries for their effort to attend this meeting. His welcome remarks appeared in Annex 2.
4. The meeting was officially opened by the Chief of SEAFDEC/MFRDMD, Mr. Ahmad Adnan Nuruddin. He emphasize that purse seine fishery is very important and need to manage regionally. He appreciates the attendance of resource persons from Japan and Malaysia for sharing their experiences in managing pelagic resources in this region. His opening address appeared in Annex 3.

**III. ADOPTION OF AGENDA AND OVERVIEW OF THE PROGRAM ACTIVITY**

5. This session was chaired by Chief of SEAFDEC/MFRDMD. Meeting agenda was presented by Dr. Osamu Abe, Deputy Chief of SEAFDEC/MFRDMD. The agenda was adopted without any amendment as in Annex 4.

6. Project Coordinator, Mr. Raja Bidin Raja Hassan, presented the Overview and Progress of the project as appeared in Annex 5. He emphasizes an urgent requirement for catch and effort data submission in a timely manner and complies with the data format as provided by SEAFDEC/MFRDMD. He also highlighted several activities and outputs from this project especially on trend of landing and CPUE for purse seine fishery in this region. One publication entitled “Current Status of Purse Seine Fisheries in the Southeast Asian Region” was published in 2015 and has been disseminated to all SEAFDEC member countries.

#### **IV. REVIEW OF PURSE SEINE MANAGEMENT SYSTEMS**

7. Dr. Takashi Matsuishi, invited resource person from Japan presented the “Comparison and Requirement for Catch and Fishing Effort Management Strategies for Purse Seine Fisheries”. He elaborated few types of fishery management systems applied in Japan. He also explained in detail about output control and Japanese Allowable Biological Catch (ABC) calculation rule. He proposed an input control “Allowable Biological Effort” (ABE) as a potential management system for pelagic resources in this region. He concluded that effort control will be easier to implement and population model is applicable for multispecies fisheries. His presentation slides appeared in Annex 6.
8. Mr. Mohd Noor Noordin, invited resource person from Department of Fisheries Malaysia presented a paper entitled “Management of Purse Seine Fisheries in Malaysia”. He elaborated the current scenario of capture fisheries in Malaysia including the management system used to manage purse seine fisheries. The presentation slides appeared in Annex 7.

#### **V. COUNTRY PRESENTATIONS**

9. Dr. Chea Tharith, Deputy Director of Marine Fisheries Research and Development Institute, Cambodia presented “Purse Seine Fishery in Cambodia”. His presentation appeared in Annex 8. The Cambodian fisheries dominated by inland fisheries which contributed about 570,000 MT compare to marine capture fisheries which only contributed about 120,000 MT. Cambodia recorded highest CPUE for pelagic fishes in January. Cambodia implement closed season for mackerels in January-March annually. Cambodia intended to establish quota for Total Allowable Catch (TAC) or Total Allowable Effort (TAE) in near future.
10. The Country Report for Indonesia was presented by Mr. Duto Nugroho, a Senior Fisheries Biologist from the Center for Fisheries Research and Development, Indonesia. His presentation appeared in Annex 9. His presentation only focused on two sub-area namely Malacca Strait and Natuna. Indonesia recorded dominant species caught by purse seine are *Decapterus* spp. and *Rastrelliger* spp. Indonesia reported that

heavy exploitation of pelagic fish occurred in Malacca Straits. Indonesia also has carried out acoustic survey to assess pelagic stock around Natuna Island.

11. The Report for the East Coast of Peninsular Malaysia was presented by Mr. Sallehudin Jamon, Senior Research Officer from FRI Kg. Acheh, Perak. Purse seine vessels were categorized based on tonnages and types of FADs used. He highlighted the management measures were based on the Malaysian Fisheries Act 1985. He also described the trend of landing and CPUE for top 7 pelagic species in the East Coast of Peninsular Malaysia. He reported that spawning season occurred twice a year. His presentation appeared in [Annex 10](#).
12. The report for the Purse Seine Fishery of the West Coast of Peninsular Malaysia was presented by Mr. Abdul Wahab Abdullah, a Senior Research Officer from FRI Kg. Acheh, Perak. He highlighted on the current trend of landings and CPUE for purse seine vessels on the West Coast of Peninsular Malaysia. His presentation appeared in [Annex 11](#).
13. The report for the purse seine fishery in Sarawak, Malaysia was presented by Mr. Jamil Musel, Senior Research Officer of FRI Bintawa, Sarawak. The main landings of pelagic fish by purse seine are *Decapterus* sp., *Rastrelliger* sp. and *Sardinella* sp. He also highlighted the biological information for the small pelagic fish namely *Decapterus* sp. and *Rastrelliger* sp. He elaborated on the fishing effort, biomass, MSY, local knowledge and existing management strategies for small pelagic. He mentioned that the trend of landing decreased recently due to labour shortage. His presentation appeared in [Annex 12](#).
14. Mr. Mohd Zamani Nayan, Fisheries Officer, Department of Fisheries Sabah, Malaysia presented on the “Purse Seine Fisheries in Sabah”. He briefly described the total marine fish landings, landing by purse seines and number of fishing vessels for the year 2013 and 2014. He also described the fishing effort and management strategies for the purse seine fisheries. His presentation appeared in [Annex 13](#).
15. Country report of the Philippines was presented by Mr. Napoleon Lamarca. Based on his presentation, ring net is the most used fishing gear in the Philippines. He also showed the CPUE of the ring net fishery in Sindangan and Zamboanga areas. As for management purpose, BFAR only authorizes the commercial fishing activities beyond 15 kilometers from the shoreline. His presentation appeared in Annex 14a. Mr. Francisco Torres, from National Fisheries Research and Development Institute (NFRDI) of the Philippines also presented the report on national production of small pelagics. He reported that production for pelagic fish is quite stable for municipal fishery. He mentioned that BFAR has to come out with Target Reference Point (TRP) as stipulated in their national law. TRP will be used as management tool for purse seine fisheries in the Philippines. His presentation appeared in [Annex 14b](#).
16. Ms. Sampan Panjarat, Senior Fisheries Biologist, Andaman Sea Fisheries Research & Development Center, Thailand presented on “Purse Seine Fishery in Thailand”. She



reported the pelagic fish production increased in late 70's but decreased recently in 2010. She highlighted Thailand's Royal Ordinance on Fisheries 2558 (2015) has been used in the management of purse seine fisheries. Thailand has introduced Maximum Allowable Catch (MAC) as one of the potential management tools. She also mentioned that Observer on Board Program has already been initiated for vessel operating outside EEZ of Thailand. Her presentation appeared in [Annex 15](#).

17. Mr. Phan Dang Liem from Research Institute for Marine Fisheries (RIMF), Vietnam presented on "The Purse Seine Fisheries in Vietnam". He briefly described the fishing ground and annual landing of purse seine fisheries. He also showed the trend of landing and CPUE of purse seine fisheries, the list and biological information of the dominant species. Vietnam recorded the highest number of purse seine vessel in 2010 and the number decreased drastically in 2011 due to changes in type of fishing gear for catching pelagic fish. His presentation appeared in [Annex 16](#).

## **VI. DATA REQUIREMENT AND REGIONAL SYNTHESIS**

18. Professor Emeritus Dr. Mohd Azmi Ambak talked on the procedure for catch and effort data analyses.
19. Mr. Mohammad Faisal Md Saleh Senior Researcher at SEAFDEC/MFRDMD presented on the Regional Synthesis for Andaman Sea. His presentation appeared in [Annex 17](#).
20. Mr. Raja Bidin Raja Hassan, Special Departmental Coordinator of SEAFDEC/MFRDMD presented the "Regional Synthesis for South China Sea". Landings for small pelagic were observed quite stable, however CPUE showed decreasing trend especially in Malaysia. All participating member countries were requested to submit their complete data timely, so that MFRDMD could proceed for a comprehensive regional synthesis. Existing data is not sufficient to conclude a strong basis for management regime for pelagic fish in the South China. His presentation appeared in [Annex 18](#).
21. Ms. Wahidah Mohd Arshaad, a Senior Researcher at SEAFDEC/MFRDMD presented on "Genetic Population on Spotted Sardine (*Amblygaster sirm*) in Southeast Asian Region". The preliminary result based on four sampling locations (namely Muara; Brunei Kuantan, Kudat; Malaysia, and Songkla, Thailand) found that *Amblygaster sirm* is a single evolutionary unit and therefore can be regarded as a single conservation unit for the management of sustainable fisheries. She also highlighted the issues regarding species misidentification and difference in legislation on sample export to MFRDMD. Her presentation appeared in [Annex 19](#).

## VII. MANAGEMENT STRATEGY OF PURSE SEINE FISHERY

22. Dr. Takashi Matsuishi, the resource person from Japan presented “Case Studies and Some Application of Catch and Fishing Effort Management Strategies for Purse Seine Fisheries”. He demonstrated the calculation of ABE to the meeting. His presentation appeared in Annex 20.

## VIII. CLOSING SESSION

23. This session was chaired by Special Departmental Coordinator of SEAFDEC/MFRDMD, Mr. Raja Bidin Raja Hassan. The way forward and new project activity were identified and presented as below;

No.	Activities	Time frame	Remarks
1	Catch and effort data submission	30 Sept 2016	1. All participating member country 2. Develop baseline data
2	Mini workshop	December 2016	Budget availability - to include scientist
3	Publication of regional synthesis for purse seine fishery	November 2016	
4	Submission of genetic samples to MFRDMD	End December 2016	Viet Nam, Cambodia, Myanmar and Thailand
5	Analysis of DNA samples	End February 2017	Indonesia will analyze the sample by themselves and the rest by MFRDMD
6	Submission of DNA report	August 2017	
7	Core Expert meeting	August 2017	- to include scientist and manager
8	Project terminal report	December 2017	Include suggestions and recommendations for pelagic fishery management strategy
<b>Issues</b>			
<ol style="list-style-type: none"> <li>1. Capacity building – related to activities for a mini workshop</li> <li>2. Cost estimation of mini workshop</li> </ol>			
<b>New project activity</b>			
<ol style="list-style-type: none"> <li>1. Establishment of scientific working group for small pelagic at regional level</li> </ol>			



**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
PURSE SEINE FISHERIES IN THE SOUTHEAST ASIAN  
REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

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**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
PURSE SEINE FISHERIES IN THE SOUTHEAST ASIAN  
REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**WELCOMING REMARKS**

by

**Dr. Osamu Abe  
Deputy Chief of SEAFDEC/MFRDMD**

## WELCOMING REMARKS

*Dr. Osamu Abe*  
Deputy Chief of SEAFDEC/MFRDMD

**Core Expert Meeting on Comparative Studies for Management of Purse Seine Fisheries  
in the Southeast Asian Region  
(9<sup>th</sup> – 11<sup>th</sup> August 2016, Furama Hotel, Kuala Lumpur, Malaysia)**

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Distinguished experts from participating Member Countries; Local Delegates from Malaysia; Chief of SEAFDEC/MFRDMD *Mr. Ahmad Adnan Nurrdin*; Dr. Matsuishi from Hokkaido-University; My colleagues from SEAFDEC/SEC, TD, and MFRDMD; Ladies and Gentlemen, very good morning!

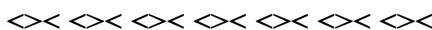
In opening the Core Expert Meeting on Comparative Studies for Management of Purse Seine Fisheries in the Southeast Asian Region, I would like to express my sincere appreciation to all of you for your participation in this meeting. Welcome to Kuala Lumpur, Malaysia.

As you have been well aware of, management of purse seine fishery is one of the biggest issues among the fisheries in ASEAN region. The purpose of the meeting is to share the latest information about landings and CPUEs of purse seine fisheries in the region, to compare between application of TAC, TAE and other management options for its data requirement, and to understand the population structure for *Amblygaster sirm*.

Through these discussions, we are expecting to deepen our knowledge for PS management system which is more applicable in the ASEAN region. On the 2<sup>nd</sup> day, we are going to visit Weather Forecasting Connection, Kuala Lumpur, which is to monitor fishing ground environment. Also for me, this is the first chance to visit there, so I am exciting to learn about the latest technic in Malaysia. I take this opportunity to appreciate DOF Malaysia and our SDC for the arrangement of the technical visit.

Although it is only a 2 and half days meeting, I wish you all enjoy staying in Kuala Lumpur. There is a sky train station just in a walking distance from this hotel. You can easily take a visit to KLCC, Bukit Bintang, China Town and many other places. The meeting is expected to finish until lunch of the 2<sup>nd</sup> day, so you may have a time to enjoy Kuala Lumpur.

Thank you very much again and wish you have a good day.





**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
PURSE SEINE FISHERIES IN THE SOUTHEAST ASIAN  
REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**OPENING ADDRESS**

by

**Mr. Ahmad Adnan Nuruddin  
Chief of SEAFDEC/MFRDMD**

## OPENING ADDRESS

*Mr. Ahmad Adnan Nuruddin*  
Chief of SEAFDEC/MFRDMD

**Core Expert Meeting on Comparative Studies for Management of Purse Seine Fisheries in the Southeast Asian Region**  
**(9<sup>th</sup> – 11<sup>th</sup> August 2016, Furama Hotel, Kuala Lumpur, Malaysia)**

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Distinguished experts from participating Member Countries; Deputy Chief of SEAFDEC/MFRDMD Dr Osamu Abe; Resources person Dr. Matsuishi from Hokkaido-University; My colleagues from SEAFDEC/SEC, TD, and MFRDMD; Ladies and Gentlemen, very good morning!

First of all, I would like to express my appreciation to MFRDMD for organizing this Core Experts Meeting on Comparative Studies for Management of Purse Seine Fisheries in the Southeast Asian Region in Kuala Lumpur, Malaysia. For your information, this meeting is part of a series of consultations and gatherings organized by SEAFDEC to promote sustainable fisheries by addressing many issues relevant for the better management of purse seine fisheries in the Southeast Asian region. As mentioned by Deputy Chief *Dr Osamu Abe* before, the management of purse seine is among the biggest issues in the ASEAN region.

Therefore, SEAFDEC with funding support from the Japanese Trust Fund (JTFVI) was given the mandate to recommend the applicable management options of purse seine fisheries in the Southeast Asian region. Through SEAFDEC/MFRDMD, the data requirement related to purse seine fisheries were collected and compiled from each member countries. SEAFDEC has also invited the resources person from Hokkaido University *Dr Matsuishi Fritz* to help us to formulate the applicable catch and fishing effort management strategies for purse seine fisheries based on the collected data from MFRDMD. Besides, the genetic study was also done to understand the population structure of *Amblygaster sirm.*

We are aware that many member countries have different fisheries management system and its quite challenging for us to standardize the requirement data. Hence, throughout this discussion, we are expecting of each member countries could give fully support and cooperation and at the same time deepen our knowledge for PS management system which is more applicable in the ASEAN region. Before I forgot, on the 2<sup>nd</sup> day, we are going to visit Weather Forecasting Connection, Kuala Lumpur to monitor fishing ground environment. This technical visit was arranged by DOF Malaysia and our SDC.

Since the task ahead of us is indeed enormous, I would not take much of your time. Before I end this meeting, let me reiterate our request for your cooperation and active participation during the discussion. With that note Ladies and Gentlemen, I now declare this meeting is open. Thank you very much and wish you have a good day!



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**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**MEETING AGENDA**

by

**Dr. Osamu Abe  
Deputy Chief of SEAFDEC/MFRDMD**



**THE REGIONAL CORE EXPERT MEETING ON  
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PROVISIONAL AGENDA AND TIME TABLE

<b>Day 1: 9 August 2016 (Tuesday)</b>	
0830 – 0900	Registration
<b>Agenda 1: Opening of the Meeting</b>	
0900 – 0905	Welcome Remarks by Deputy Chief of SEAFDEC/MFRDMD
0905 – 0915	Opening Address by Chief of SEAFDEC/MFRDMD
<b>Agenda 2: Adoption of Agenda and Overview of the Program Activity</b> <i>Chairperson: Chief of SEAFDEC/MFRDMD</i>	
0915 – 0920	Adoption of the Agenda and Arrangement of the Meeting by Deputy Chief
0920 – 0950	Overview and progress of project by Project Coordinator: Mr. Raja Bidin Raja Hassan
<b>Agenda 3: Review of Purse Seine Management Systems</b>	
0950 – 1030	Presentation by Resource Person from Japan – Comparison and Requirement for Catch and Fishing Effort Management Strategies for Purse Seine fisheries: Dr Takashi Matsuishi
1030 – 1100	Group Photo and Refreshment
1100 – 1130	Management of Purse Seine Fisheries in Malaysia: Ms Haryati bt Abdul Wahab, DOF Malaysia
<b>Agenda 4: Country Presentations:</b> <i>Chairperson: Deputy Chief of SEAFDEC/MFRDMD</i>	
1130 – 1200	Cambodia
1200 – 1230	Indonesia
1230 – 1415	Lunch break
1415 – 1430	Malaysia – East Coast
1430 – 1445	Malaysia – West Coast
1445 – 1500	Malaysia – Sarawak
1500 – 1515	Malaysia – Sabah
1515 - 1545	Refreshment
1545 – 1615	Myanmar

1615 – 1645	The Philippines
1645 - 1715	Thailand
<b>Day 2 : 10 August 2016 (Wednesday)</b>	
0900 – 0930	Vietnam
0930 – 1030	General discussion of pelagic fisheries based on country presentations
1030 – 1100	Tea Break
<b>Agenda 5: Data Requirement and Regional Synthesis</b>	
<i>Chairperson : Chief of SEAFDEC/MFRDMD</i>	
1100 - 1130	Procedure for catch and effort data analyses – Prof Emeritus Dr Mohd
1130 – 1200	Azmi Ambak
1200 - 1230	Regional synthesis for Andaman Sea : Mr Mohamad Faisal Md Saleh Regional synthesis for South China Sea : Mr Raja Bidin Raja Hassan
1230 – 1400	Lunch Break
1400 – 1430	Genetic Population Structure of <i>Amblygaster sirm</i> in Southeast Asian and other Region – Ms Wahidah Mohd Arshaad
<b>Agenda 6: Management Strategy of Purse Seine Fishery</b>	
<i>Chairperson : Deputy Chief of SEAFDEC/MFRDMD</i>	
1430 – 1630	Case Studies and some Application of Catch and Fishing Effort Management Strategies for Purse Seine Fisheries (mini workshop) by Dr Matshuishi
1630-1700	Refreshment
<b>Day 3 : 11 August 2016 (Thursday)</b>	
0730 – 1045	Technical Visit to MMD Kuala Lumpur – Weather Forecasting and its correlation with operation of purse seine
1045 – 1100	Refreshment
<b>Agenda 7: Closing of the Meeting</b>	
<i>Chairperson: Special Departmental Coordinator of SEAFDEC/MFRDMD</i>	
1100 - 1130	Way forward and new project proposal
1130 – 1245	Adoption of meeting report
1245 – 1300	Closing Remarks by Deputy Chief of SEAFDEC/MFRDMD
1300	Lunch





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**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**PROJECT OVERVIEW**

by

**Mr. Raja Bidin Raja Hassan  
Project Coordinator  
SEAFDEC/MFRDMD**



## Overview and Progress of Project

Comparative Studies for Management of Purse Seine Fisheries in the Southeast Asian Region  
(Japanese Trust Fund VI Program: 2013-2019)



## Background

- Small pelagic fishes such as Indian mackerels, scads and sardinellas are very important in the Southeast Asian region, not only for food resources, but also for employment and livelihood of fishers.
- Purse seine is one of the major fishing gears to catch those small pelagic fishes.
- Although formulation of a management plan is required for sustainable use of these resources, management of PS fisheries is still neglected because information of stocks is lacking.
- Therefore, we need to develop the best way to assess the size and state of the stocks for accurate TAC allocation and to find the most applicable management system for the PS fisheries in the region.
- Also, effective management of shared stocks requires management measures to be taken for the whole coverage area that is beyond national waters.

## Overview

- The project involves compilation and comparison of annual and/or monthly CPUE to examine the trend of resource level for the last three decades in the region.
- MFRDMD will compare purse seine fisheries management systems including TAC systems and other management measures in the world and conduct the genetic study of a commercially important pelagic species.
- At the end of the project, MFRDMD will review available information including stock levels, and MFRDMD and member countries will examine applicable management strategies for sustainable purse seine fisheries in the Southeast Asian region

## Objectives

1. To compile and compare annual and/or monthly catch per unit effort (CPUE) data for the last three decades in SEA region,
2. To assess unit of effort and to examine other indicators for stock assessment,
3. To compare existing management systems/measures of PS fishery which is applicable for management of PS fishery in the region,
4. To compare genetic structures of commercially important small pelagic species in the region,
5. To propose management strategies for sustainable PS fisheries.

## Expected Final Goals of the Project

1. To contribute for the formulation of management strategies for small pelagic fish fisheries in the region;
2. To provide monitoring tools for pelagic fishery resources in the region.

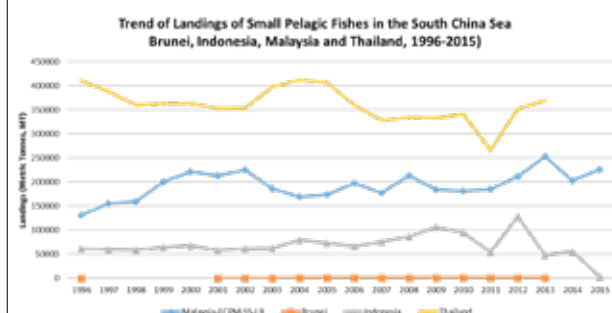
## Activities

1. Comparative Studies for CPUE and TAC
  - 1.1 Case studies for CPUE in the Southeast Asian region
  - 1.2 Suitable CPUE and other indicators for resource levels in member countries
  - 1.3 Comparison of TAC systems in the world (including other management measures)
2. Genetic Data Collection and Analysis
  - 2.1 Equipment preparation for genetic study
  - 2.2 Sample collection
  - 2.3 Genetic study
  - 2.4 Data compilation and analysis
3. Meetings for Effective Program Implementation
  - 3.1 Core Expert Meeting/Workshop
4. Recommendation for Purse Seine Fisheries Management in the Southeast Asian region
  - 4.1 Recommendation for fisheries Management
  - 4.2 Preparation and publishing of terminal report

Activity	Sub-Activity	Y1 2013	Y2 2014	Y3 2015	Y4 2016	Y5 2017	Y6 2018	Y7 2019
1: Comparative Studies for CPUE and TAC	1.1 Case studies for CPUE in the Southeast Asian region	20,000	5,000					
	1.2: Suitable CPUE and other indicators for resource levels in member countries			10,000	6,500			
	1.3 : Comparison of TAC systems in the world (including other management measures)	25,000	5,000	10,000	6,500	7,933	8,933	
2: Genetic Data Collection and Analysis	2.1 Equipment preparation for genetic study	15,000						
	2.2: Sample collection		8,000	5,000				
	2.3: Genetic study		9,866	15,972	9,773			
	2.4: Data compilation and analysis					5,000		
3: Meetings for Effective Program Implementation	3.1: Core Expert Meeting/Workshop		30,394		25,000	21,000	25,000	
4: Recommendation for Purse Seine Fisheries Management in the Southeast Asian region	4.1: Recommendation for fisheries Management							3,933
	4.2: Preparation and publishing of terminal report							30,000
	<b>Sub-Total Budget</b>	<b>60,000</b>	<b>58,260</b>	<b>40,972</b>	<b>47,773</b>	<b>33,933</b>	<b>33,933</b>	<b>33,933</b>

## Comparative Studies for CPUE and TAC

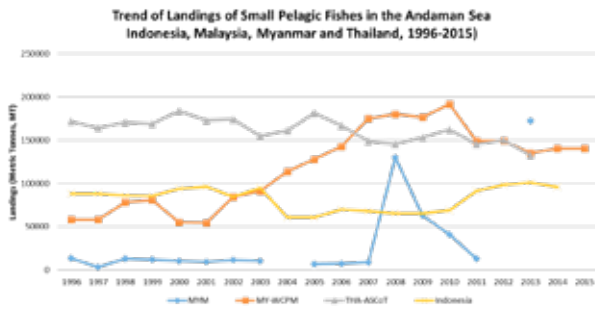
### - Trend of Landing for Purse Seine



Resources : a. MAL : Annual Fisheries Statistics 1996-2015.  
b. CoT : Statistic provided by the country 1996-2015.  
c. BRU : Current Status of Purse Seine Fisheries in the South East Asia 2015  
d. IND : Statistic provided by the country 1992-2014.

## Comparative Studies for CPUE and TAC

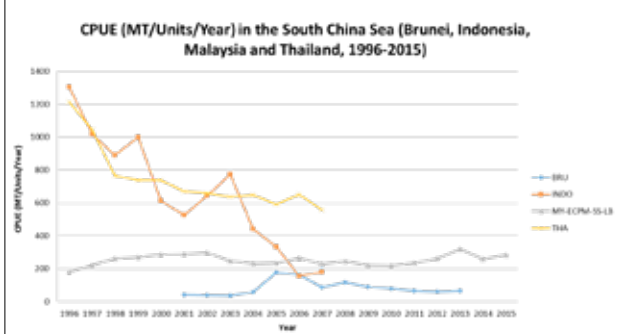
### - Trend of Landing for Purse Seine



Resources : a. MAL : Annual Fisheries Statistics 1996-2015.  
b. ASCOT : Statistic provided by the country 1996-2015.  
c. MYM : Current Status of Purse Seine Fisheries in the South East Asia 2015  
d. IND : Statistic provided by the country 1992-2014.

## Comparative Studies for CPUE and TAC

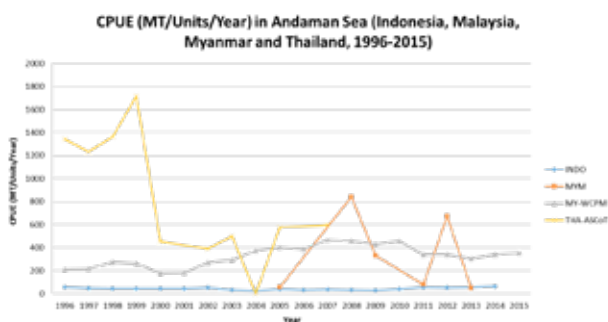
### - Trend of CPUE for Purse Seine



Resources : a. MAL : Annual Fisheries Statistics 1996-2015.  
b. GoT : Statistic provided by the country 1996-2015.  
c. BRU : Current Status of Purse Seine Fisheries in the South East Asia 2015  
d. IND : Statistic provided by the country 1992-2014.

## Comparative Studies for CPUE and TAC

### - Trend of CPUE for Purse Seine



Resources : a. MAL : Annual Fisheries Statistics 1996-2015.  
b. ASCOT : Statistic provided by the country 1996-2015.  
c. MYM : Current Status of Purse Seine Fisheries in the South East Asia 2015  
d. IND : Statistic provided by the country 1992-2014.

## Comparative Studies for CPUE and TAC

### - Compilation of Current PS Management



- Information of Fisheries, Biology Fishing Effort, and Management in AMs are compiled both in the AS and SCS.
- **“Current Status of Purse Seine Fisheries in the Southeast Asian Region”** was Published in 2015
- During the CM in 2015, MFRDMD has requested to consider other management options such as **Total Allowable Effort (TAE)**, which would be applicable for management of small pelagic fishery in SE Asian region.

## Comparative Studies for CPUE and TAC

### - Examination of TAE and other systems

- MFRDMD consulted with an expertise from Japan (Dr. Matsuishi)
  - to study on “Sustainable Fishery Management - latest movement in Japan” (08 March 2015, MFRDMD)
  - to discuss on “Total Allowable Effort (TAE) System and Possibility for its Application to the Management of Purse Seine Fishery in the ASEAN region” (19 Nov 2015, MFRDMD)
  - To discuss on “Total Allowable Effort (TAE) system and Possibility for its Application to the Management of PS Fishery in the ASEAN region” (18 Nov 2016, Hokkaido University)
- MFRDMD conducted internal Workshop in Tok Bali, Malaysia on 6-7 Jan 2016 to discuss regional synthesis of PS fisheries information.
- Participating Member Countries requested MFRDMD to convene a workshop to share the above information for better understanding of possible purse seine fisheries management systems in the region.

## Genetic Data Collection and Analysis

- Genetic samples from spotted sardinella (*Amblygaster sirm*) collected by participating member countries were analyzed and the preliminary result based on four sampling locations (Muara, Kuantan, Kudat, Songkla) was presented during the Core Expert Meeting.
- The results found that *Amblygaster sirm* in South China Sea is a single evolutionary unit and therefore can be regarded as a single conservation unit for the management of sustainable fisheries.



## Meetings for Effective Program Implementation

- “CEM on Comparative Studies for Management of PS Fisheries in the SE Asian Region”, 26-28 Aug 2014, Kuala Lumpur, Malaysia
  - The meeting shared the latest information about landings and CPUEs of PS fisheries in the region, made comparison on application of TAC, TAE and other management options as well as its data requirement, and understanding the population structure for *Amblygaster sirm*.



## Recommendation for Purse Seine Fisheries Management in the Southeast Asian region

- Expected Output of this Project
  - To Present **Recommendations** for Purse Seine Fisheries Management in the Region
  - To Publish a **Terminal Report**
- 2017: CEM
  - To further discuss and update on the current status of purse seine fisheries in the SCS and AS as well as the result of genetic study.
- 2018: CEM:
  - To draft recommendations
- 2019: Terminal Meeting:
  - To compile updated information of PS Fisheries and Management in the ASEAN Region
  - To finalize recommendations



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**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**Comparison and Requirement for Catch and Fishing Effort Management Strategies  
for Purse Seine Fisheries**

by

**Dr. Takashi Matsuishi  
Resource Person  
Hokkaido University**

## Comparison and Requirement for Catch and Fishing Effort Management Strategies for Purse Seine Fisheries

MATSUISHI Takashi, Fritz  
Hokkaido Univ.

1

## Contents

- ▶ Types of Fishery Management
- ▶ Output Control
- ▶ Japanese ABC Calculation Rule
- ▶ Input Control – an Proposal –
- ▶ Conclusion and Remarks

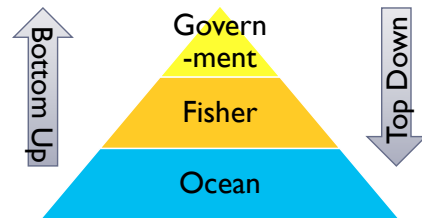
▶ 2

## Types of Management

3

## Types of Fisheries Management

- ▶ Bottom up Control
  - ▶ Control by the fishers themselves
- ▶ Top Down Control
  - ▶ Control from Government



▶ 4

## Types of Fisheries Management

- ▶ Input Control
  - ▶ Control of Fishing Effort
- ▶ Output Control
  - ▶ Control of Catch



▶ 5

## Japanese Fisheries Management

	Input Ctrl	Output Ctrl
Bottom Up Ctrl	CBFM	
Top Down Ctrl	TAE Fishing Rights Licence	TAC

▶ 6

## Output Control

7

## Types of Fisheries Management

- ▶ Input Control
  - ▶ Control of Fishing Effort
- ▶ Output Control
  - ▶ Control of Catch



▶ 8

## TAC Total Allowable Catch

- ▶ Applied for 8 species 19 stocks (very important)
- ▶ Decided once a year for each stock / species
- ▶ Based on scientific recommendation
  - ▶ Allowable Biological Catch / ABC
  - ▶ Calculated by ABC Rule from Catch statistics
  - ▶ ABC is calculated for 44species 84 stocks

▶ 9

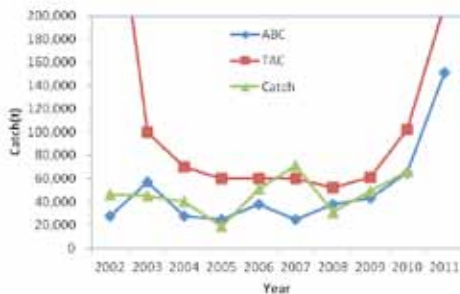
## TAC Total Allowable Catch(cont.)

- ▶ Taking into socio-economic considerations
- ▶ Recently TAC has been very close to ABC
- ▶ TAC is distributed to various fishery sectors (Ministry permitted fishery, Prefecture permitted fishery etc)
- ▶ Government collects catch statistics every day, and disclose the achievement to the TAC.
- ▶ If the total catch in the year is achieved to TAC, Government should order to stop fishing
- ▶ Real-time monitoring of the catch is essential
- ▶ All the catch should be reported properly

▶ 10

## TAC, ABC, and Catch of Sardine

*Sardinops melanostictus*



▶ 11

## Japanese ABC Calculation Procedures

13

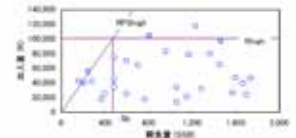
## ABC Rule and Required Data

Rule	1-1	1-2	1-3	2-1	2-2
Catch(C)	○	○	○	○	○
Biomass(B)	○	○	○		
Effort		○			
Stock Index		○		○	
S-R Relation(Blimit)	○	△			
Biological Reference Point (BRP)	○		○		
Stock Level(SL)			○	○	○
Trends(TR)			○	○	○

▶ 14

## Blimit

- ▶ The lower limit of the biomass that the shortage of the SSB does not affect to Recruit.
- ▶ Ideally it should be decided from long term catch and recruit relationship.
- ▶ Usually we estimate R and SSB from Age-based model (e.g.VPA)



A schematic explanation for decide the Blimit "scientifically" (S<sub>b</sub>), as the SSB level of the cross point of the 90%ile of Recruit (R<sub>high</sub>) and 90%ile of R/SSB (RPS<sub>high</sub>)

▶ 15

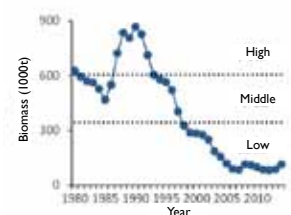
## Biological Reference Point (BRP)

- ▶ As MSY, various reference point has been proposed which indicate an "optimum" fishery mortality.
- ▶ F30%SPR: Fishing mortality that SSB will be 30% comparing to no fishing situation
  - ▶ SPR model : Growth Curve, L-W relationship, M
- ▶ Fmax: Fishing mortality that YPR become maximum
- ▶ F0.1: A conservative but reliable estimator of Fmax
  - ▶ YPR model: Growth Curve, L-W relationship, M
- ▶ Fmsy: Fishing mortality that makes MSY
  - ▶ Production model: Catch and Effort time series

▶ 16

## Stock Level (SL)

- ▶ Level of the current stock.
- ▶ Categorized as High / Middle / Low.
- ▶ Ideally the thresholds should be decided from long (over 20 years) data series of Biomass,
- ▶ but sometimes by catch or CPUE.
- ▶ Sometimes decided as 33% and 67% of the range or maximum.
- ▶ Sometimes decided as the consensus of stakeholders.

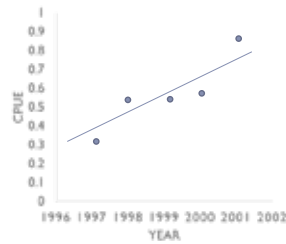


An example of the stock level (Walleye Pollock J-stock). The threshold was decided as the 33% and 67% of the range.

▶ 17

## Trend(TR)

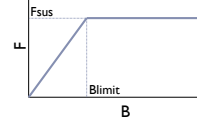
- ▶ Trend of the current biomass.
- ▶ Categorized into Increasing / Flat / Decreasing.
- ▶ Basically decided from 5 years trends of Biomass, Stock Index (CPUE), or Catch
- ▶ Do not need to use statistical test of regression.



▶ 18

## Rule 1-1

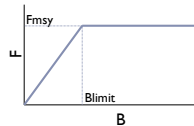
- ▶ Data: Catch, Biomass, S-R Relationship, Blimit, BRP
- ▶ Decide proper BRP for  $F_{sus}$
- ▶ If  $B > B_{limit}$ 
  - ▶  $F_{limit} = F_{sus}$
- ▶ If  $B < B_{limit}$ 
  - ▶  $F_{limit} = F_{sus} \times (B_{cur}/B_{limit})$
- ▶ ABC is the estimated catch at  $F_{limit}$  of the next year
- ✓ Requires precise stock assessment and forecast
- ✓ Age-based analysis is necessary



▶ 19

## Rule 1-2

- ▶ Data: C, B, Stock Index (CPUE)
- ▶ Fit the Catch and Effort data to a Production Model
- ▶ If  $B_{limit}$  is not decided from S-R Relationship,  $B_{limit} = 0.5 B_{msy}$
- ▶ If  $B > B_{limit}$ 
  - ▶  $F_{limit} = F_{msy}$
- ▶ If  $B < B_{limit}$ 
  - ▶  $F_{limit} = F_{msy} \times B / B_{limit}$
- ▶ ABC is the estimated catch at  $F_{limit}$  of the next year
- ✓ In Japan, we do not use this rule because of the lack of the reliability of the Production Model



▶ 20

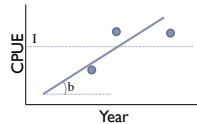
## Rule 1-3

- ▶ Data: C, B, BRP, SL, TR
- ▶ Applicable even if  $B_{limit}$  can not be decided
- ▶ Decide proper BRP for  $F_{sus}$
- ▶ If [High, Increasing] or [High, Flat]
  - ▶  $F_{limit} = F_{sus}$
- ▶ If [High, Decreasing], [Middle, Increasing], [Middle, Flat]
  - ▶  $F_{limit} = \beta_1 \times F_t$        $\beta_1 \leq 1$
- ▶ If [Middle, Decreasing] or Low
  - ▶  $F_{limit} = \beta_2 \times F_t$        $\beta_2 \leq 0.9$
- ▶ ABC is the estimated catch at  $F_{limit}$  of the next year

▶ 21

## Rule 2-1 (Feedback Control)

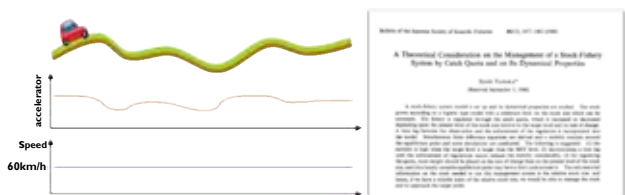
- ▶ Data: C, SL, CPUE
- ▶  $ABC = \delta_1 \times C_t \times \gamma_1$
- ▶  $\delta_1 = 1.0$  (High)  
0.9 (Middle)  
0.8 (Low)
- ▶  $\gamma_1 = 1 + b / I$ 
  - ▶ b: tangent of the CPUE for recent 3 years
  - ▶ I: Average of the CPUE for recent 3 years



▶ 22

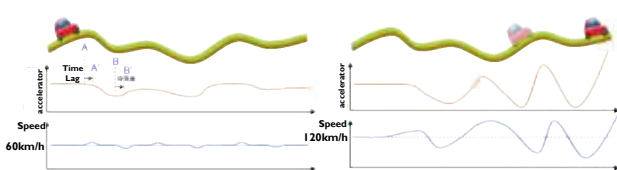
## Feedback Effort Control

- ▶ The idea is appeared in Tanaka(1980)
  - ▶ Tanaka, S. (1980). A theoretical consideration on the management of a stock-fishery system by catch quota and on its dynamical properties. *Bulletin of the Japanese Society of Scientific Fisheries*.
- ▶ If the biomass is increasing, more fishing effort can be allowed, and vice versa.



▶ 23

## Failure of Feedback Control

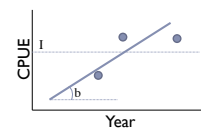


- ▶ Time lag of the control will make the system unstable.
- ▶ If the speed is too high (time lag is too large) the system may become uncontrollable.

▶ 24

## Rule 2-1 (Feedback Control)

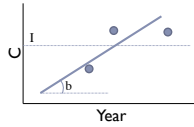
- ▶ Data: C, SL, CPUE
- ▶  $ABC = \delta_1 \times C_t \times \gamma_1$
- ▶  $\delta_1 = 1.0$  (High)  
0.9 (Middle)  
0.8 (Low)
- ▶  $\gamma_1 = 1 + b / I$ 
  - ▶ b: tangent of the CPUE for recent 3 years
  - ▶ I: Average of the CPUE for recent 3 years



▶ 25

## Rule 2-2

- ▶ Data: C, SL,
- ▶  $ABC = \delta_2 \times Ct \times \gamma_2$
- ▶  $\delta_2 = 1$  (High)  
0.9 (Middle)  
0.8 (Low)
- ▶  $\gamma_2 = 1 + 0.5(b/I)$ 
  - ▶ b: tangent of the CPUE for recent 3 years
  - ▶ I: Average of the CPUE for recent 3 years



▶ 26

## Input Control an proposal

▶ 27

## Types of Fisheries Management

- ▶ **Input Control**
  - ▶ Control of Fishing Effort
- ▶ **Output Control**
  - ▶ Control of Catch



▶ 28

## Japanese Input Control

- ▶ Licensing
- ▶ Fishery Rights
- ▶ Permission / Regulation
- ▶ TAE

▶ 29

## TAE Total Allowable Effort

- ▶ Applied for 8 species 8 stocks (minor fishes)
- ▶ Decided once a year for each stock / species
- ▶ Mainly based on socio-economic considerations
- ▶ Scientific discussion is not disclosed
- ▶ Government distribute the TAE to each prefecture and prefectural government controls the effort
- ▶ Sometimes it is combined with SUBSIDIES.

▶ 30

## Difficulty and Perspective of the TAC Control in Asia

- ▶ **Difficulty to get catch data**
  - ▶ No catch quantity collecting system (only Log-book?)
  - ▶ Many small scale fishery, fishers, and ports
- ▶ Scientific recommendation of Fishing Effort is necessary for sustainable fishery and conservation
- ▶  $E_{MSE}$  calculated by a production model would be a scientific figure for this purpose, but sometimes not reliable.
- ▶ Realistic and applicable method is needed.

▶ 31

## Production Model Fitting

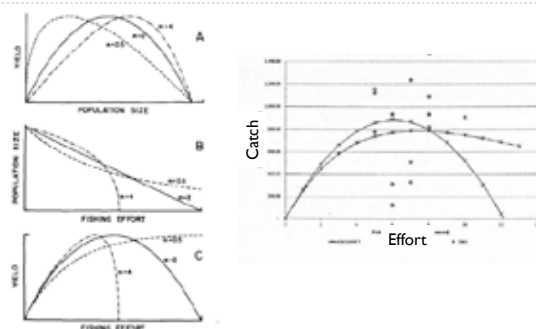


Figure 1... Equilibrium relationship of the generalized stock production model for three values of  $\alpha$ : (A) Equilibrium yield and population size; (B) population size and fishing effort; (C) equilibrium yield and fishing effort.

▶ 32

## Japanese TAC and TAE

	Catch	Effort
Implementation	TAC	TAE
Scientific Recommendation	ABC	?

▶ 33




### New approach to decide the TAE

	Catch	Effort
Implementation	TAC	TAE
Scientific Recommendation	ABC	<b>ABE</b>

▶ 34

### New approach to decide the TAE

	Catch	Effort
Implementation	TAC	TAE
Scientific Recommendation	ABC	

▶ 35

### New approach to decide the TAE

	Catch	Effort
Implementation	TAC	TAE
Scientific Recommendation	ABC	<b>ABE</b>

▶ 36

### Equations

▶  $C = q E B$

- ▶ C: Catch
- ▶ q: Catchability Coefficient
- ▶ E: Fishing Effort
- ▶ B: Biomass

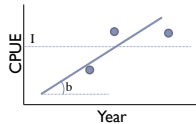
▶ Catch control and Effort control is theoretically equivalent.

▶  $C \propto E$  (B const.)

▶ 37

### Rule 3-1 (from 2-1)

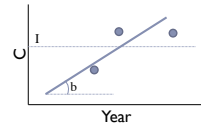
- ▶ Data: E, SL, CPUE
- ▶  $ABE = \delta_1 \times Et \times \gamma_1$
- ▶  $\delta_1 = 1.0$  (High)  
0.9 (Middle)  
0.8 (Low)
- ▶  $\gamma_1 = 1 + k(b / I)$ 
  - ▶ b: tangent of the CPUE for recent 3 years
  - ▶ I: Average of the CPUE for recent 3 years
  - ▶ k: feed back parameter. default = 1



▶ 38

### Rule 3-2

- ▶ Data: E, SL
- ▶  $ABC = \delta_2 \times Ct \times \gamma_2$
- ▶  $\delta_2 = 1$  (High)  
0.9 (Middle)  
0.8 (Low)
- ▶  $\gamma_2 = 1 + 0.5(b / I)$ 
  - ▶ b: tangent of the CPUE for recent 3 years
  - ▶ I: Average of the CPUE for recent 3 years



▶ 39

### ABC Rule and Required Data

Rule	1-1	1-2	1-3	2-1	2-2	3-1	3-2
Catch(C)	○	○	○	○	○		
Biomass(B)	○	○	○				
Effort		○				○	○
Stock Index		○		○		○	
Blimit	○	△					
BRP	○		○				
Stock Level(SL)			○	○	○	○	○
Trends(TR)			○	○	○	○	○

▶ 40

### Input Control Implementation

Type	Control	Monitor
# Vessel / Fishers	Difficult	Easy
# Operation day	Easy	Easy
# Hauls per day	Easy	Difficult
# Hook, Gillnet, Pods per a vessel	Easy	Easy
# Purse seine per a vessel	Difficult	Easy

▶ 41

## Fishing Effort Control by Operation Day

- ▶ Duration of Fishing Season
- ▶ Port Holiday
  - ▶ Close Landing Port once or twice a week
- ▶ Landing Holiday (for Far sea fishery)
  - ▶ If a fishing vessel come back to port, it should be stay some days in a port.
  - ▶ at least 1 day stay after 3 days operation.
  - ▶ Not only for fishery management but also labour welfare

▶ 42

## Conclusion and Remarks

▶ 43

## Conclusion and Remarks

- ▶ Feedback control will be applicable in the data poor situation.
- ▶ Effort control will be easier to implement
- ▶ Effort reduction leads stock rehabilitation via Catch reduction.
- ▶ Improvement of monitoring and data collection is necessary.
- ▶ Some parameter optimization should be researched by simulation study.
- ▶ For mix species data, validation should be confirmed by simulation study.

▶ 44

▶ 45

## MATSUISHI Takashi Fritz (1964- )



- ▶ MSc (Univ. Tokyo), PhD (Univ. Tokyo)
- ▶ Associate Prof.
  - ▶ Laboratory of Bioresource Science, Faculty of Fisheries Sciences Hokkaido University (April 1993- )
  - ▶ Global Station for Food, Land and Water Resources /GSF, Global Institution for Collaborative Research and Education /GI-CoRE Hokkaido University (Aug 2016- )
  - ▶ Graduate School of Global Food Resources /GFR, Hokkaido University (Expected April 2017- )
- ▶ Major
  - ▶ Stock Assessment / Fisheries Management
  - ▶ Cetology (Whale / Dolphin / Porpoise)



▶ 46

## Japanese Universities

	Imperial U	National U	Private U
Global U (Top 13)	Hokkaido Tohoku Tokyo Nagoya Kyoto Osaka Kyushu	Tsukuba Tokyo Inst. Tech. Hiroshima	Keio Waseda
Non Global U (Fishery)	-	TUMSAT Mie Nagasaki Kagoshima ...	Kinki Kitasato ...

Universities having Faculty of Fisheries  
Universities having Division of Fisheries Faculty of Agriculture

▶ 47

## MoU with SEAFDEC



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## Graduate School of Global Food Resources

- ▶ Start at April 2017
- ▶ 15 students per year for Master Course.
  - ▶ 8 students per year for Doctor Course from 2019.
- ▶ Educate Global Leader to Solve Food Resource Issues
  - ▶ Invite-World Top Class Lecturers
  - ▶ All English Program
  - ▶ Multi Disciplinary Education
  - ▶ Wonder Vogel Style Cubiculum
  - ▶ Wide range of lecture topics and overseas experience
- ▶ Recommended to Agriculture and Fishery Sector Staffs of Government who need Higher Degree.

▶ 49



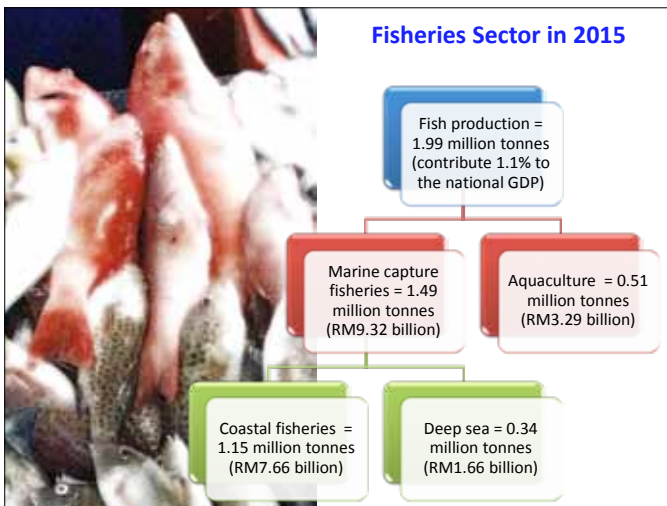
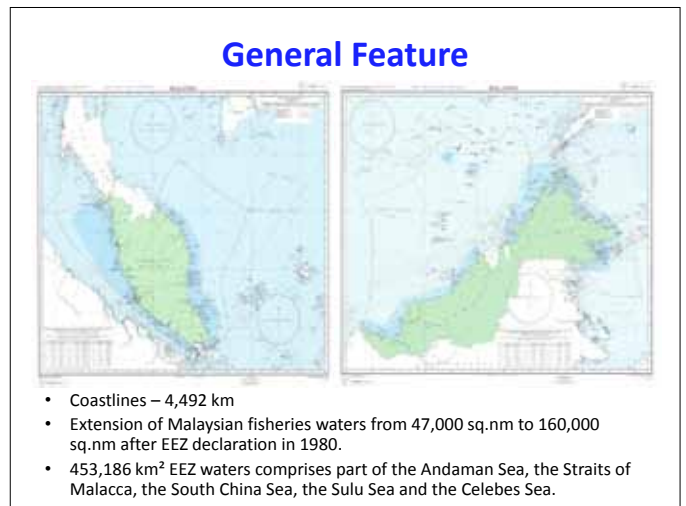
**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
PURSE SEINE FISHERIES IN THE SOUTHEAST ASIAN  
REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**Management of Purse Seine Fisheries in Malaysia**

by

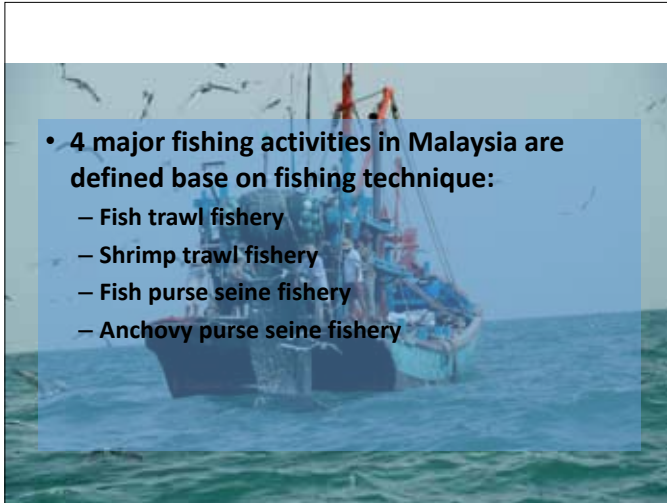
**Mr. Mohd Noor Noordin  
Resource Person  
Department of Fisheries Malaysia**



- ### Management Tools
- Regulating the issuance of fishing gear and fishing vessel license to limit fishing effort
  - Zoning system
  - Conservation and rehabilitation of marine ecosystems through establishment of MPA and deployment of artificial reefs
  - Prohibition of destructive fishing methods
  - Vessel monitoring system (VMS)
  - Fishermen registration

	0- 5 nm Zone A	5 - 12 nm Zone B	12- 30 nm Zone C	30 nm to EEZ Boundary Zone C2	High Seas Zone C3
	<40 GRT	<40 GRT	40 – <70GRT	70 GRT & above	70 GRT & above
Fishing Gears	Traditional (owner operator), Anchovy Purse Seiners	Trawlers, Purse Seiners (owner operator)	Trawlers, Purse Seiners (owner operator & non owner operator)	Trawlers, Purse Seiners (owner operator & non owner operator)	Tuna Longliners & Tuna Purse Seiners
No. of Vessel (56,211)	48,252	4,949	1,977	1,028	5
No. of Fishermen (140,949)	85,373	20,457	17,169	17,871	79
Landings (1,486,051)	442,938	353,714	352,078	337,322	

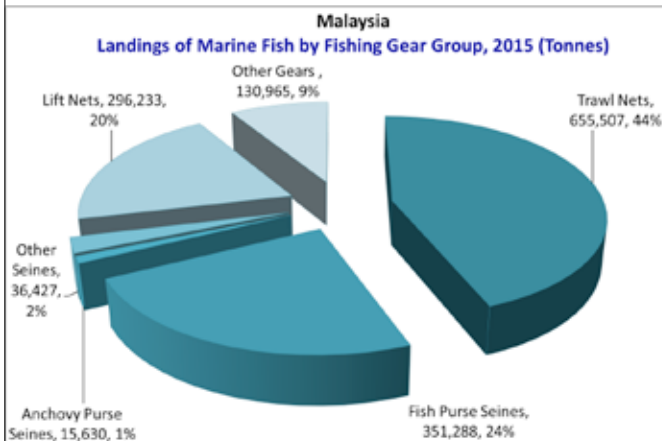
\* There is no restriction for vessels operating in the inner zones to fish in the zones further up e.g. vessels in Zone A are allowed to fish in Zone B, C and C2.



- 4 major fishing activities in Malaysia are defined base on fishing technique:
  - Fish trawl fishery
  - Shrimp trawl fishery
  - Fish purse seine fishery
  - Anchovy purse seine fishery

## Purse Seiner

- Fish purse seiner is the main fishing gear to catch pelagic fish.
- Purse seiner are 2<sup>nd</sup> most efficient fishing gear in contributing fish landings after trawler.
- Pelagic fishes contribute around 40% (596,240 tonnes) of the total marine production.
- The rest was contributed by demersal fish 25% (370,697 tonnes), molluscs 0.4% (6,288 tonnes), crustacean 8.7% (129,119 tonnes) and others 25.8% (383,707 tonnes).



## Purse Seine Fishery



## Anchovy Purse Seiner

- Commercial fishing gear (based on level of exploitation)
- Allowed to operate in Zone A & B (depending on the anchovy resources)
- Main area: Perak, Kedah (West Cost Peninsular); Kelantan, Terengganu & Pahang (East Cost Peninsular)
- Moratorium on the issuance of new anchovy purse seiner fishing licenses has been imposed
- Maximum mesh size:  $\leq 1$  cm
- Not allowed to use FAD

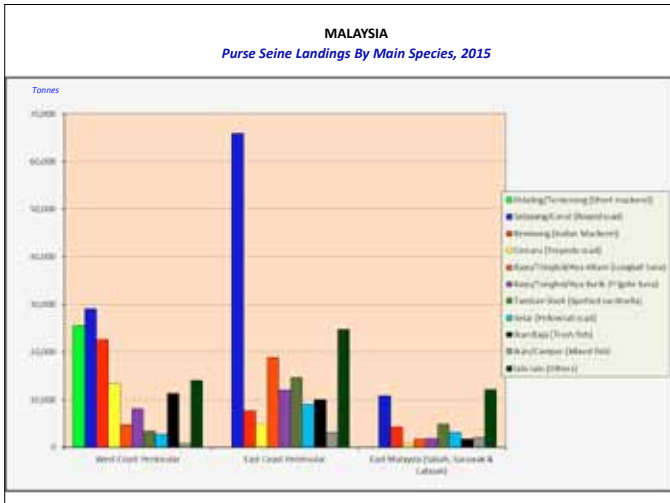
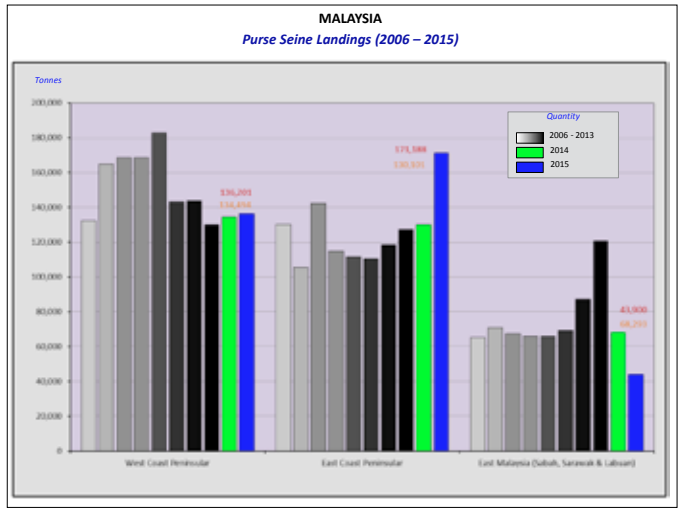
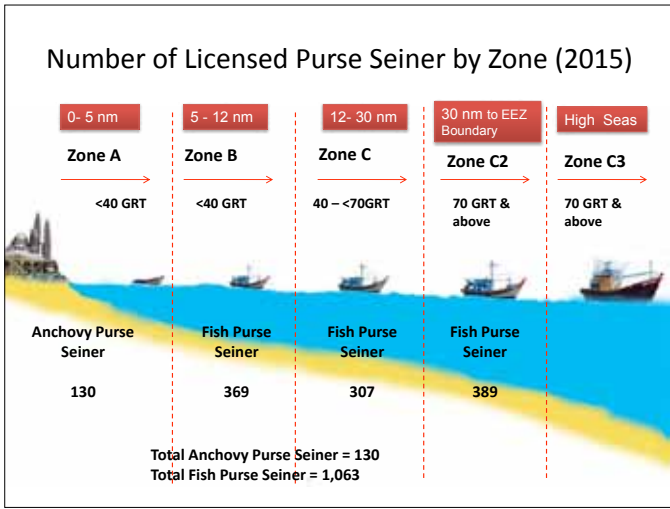
## Fish Purse Seiner

- Commercial fishing gear
- Prohibited to fish in Zone A
- Moratorium on the issuance of new fish purse seiner fishing licenses has been imposed
- 2 methods: using FADs or without FADs (free searching)
- FADs normally set in the areas with a depth exceeding 40m.
- Material for FADs: made of biodegradable & anchored by several concrete sacks.

## Supporting Vessel for Fish Purse Seiner (Menunggu Peranti Pengumpul Ikan- MPPI)

- Allowed to use by Zon C, C2 and C3 vessel
  - Zon C: 1 MPPI
  - Zon C2 & Zon C3: not more than 2 MPPI
- MPPI:  $\leq 40$  GRT,  $\leq 250$  HP, light intensity  $\leq 30$  kw
- Not allowed to catch fish





### Way Forward

- The future of fisheries rely on the effort to
  - Understand the resource well, scientifically
  - Understand the current level of exploitation
  - Collaboration in managing the stocks





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(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**Country Presentation  
CAMBODIA**

**The Report for the Purse Seine Fishery in Cambodia**

by

**Dr. Chea Tharith  
Presenter  
Deputy Director of Marine Fisheries  
Research and Development Institute, Cambodia**

# PURSE SEINE FISHERY IN CAMBODIA

09-11 August 2016, FURAMA Hotel, Kuala Lumpur, Malaysia

Prepared by  
Chea Tharith

Marine Fisheries Research and Development Institute  
Fisheries Administration (Cambodia)

## Overview

- Area: 181,035 km<sup>2</sup>
- Wetlands: >30%
- Inland: 570,000 tonnes
- The marine sub-sector: 120,000 tonnes, contributes 19-25% of total each year
- Aquaculture: 71,610 tonnes



2

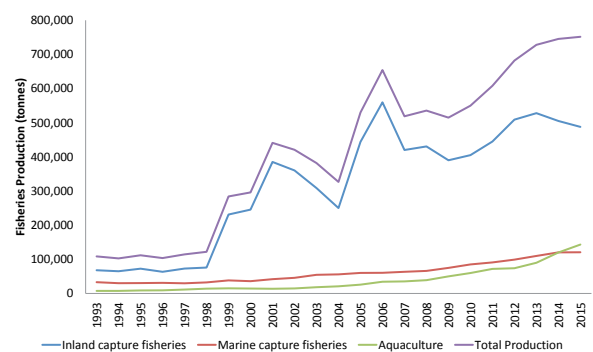
## Overview

- Cambodia's fisheries provide full-time, part-time and seasonal employment for up to 6 million people.
- Fisheries production is estimated to be worth around US\$200-300 million per year
- National food security and adding approximately US\$1.5 Billion per year to the economy, corresponding to around 8-12% of total Gross Domestic Product (GDP).
- It provides over 81.5% of the animal protein in the national diet.



3

The marine sub-sector contributes 19-25% to this total production each year and is now just over 120,000 tonnes.



## Marine Waters in Cambodia

Coastline of the country is 435 Km:

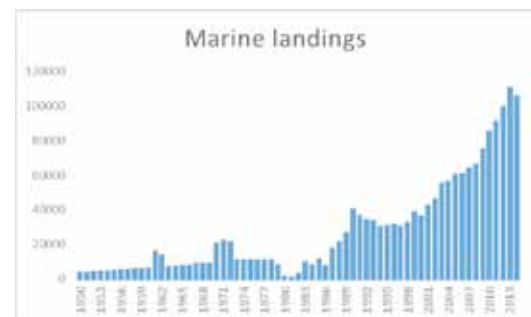
- ☐ Koh Kong - 237 Km
- ☐ Preah Sihanouk- 175.81 Km
- ☐ Kampot- 67 Km
- ☐ Kep- 26.50 Km

Kingdom of Cambodia:

- ❖ Exclusive Economic Zone (EEZ) the area extended from the shoreline to 200 nautical miles, covers 55,600 Km<sup>2</sup>



## Cambodia's catch and effort

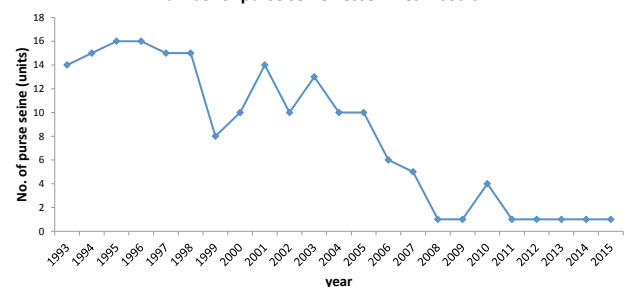


Source: FAO & FiA

Fish landed in Thailand and Viet Nam not included  
APFIC estimate: 26,500 - 37,500 tonnes

## PURSE SEINE FISHERIES

### Number of purse seine vessel in Cambodia





### Fishing Areas

In the Tobnob Rolork (Shihanoukville) and in Veal Renh Bay (Kampot) provinces. Three purse seine boats, which one in Kampot and two in Sihanouville, mostly boats operated in the coastal zone between of depth of water ranged 10-25 m.

### Sampling period

Sampled from January to December in 2003-2004

### Sampling frequency

Boats purse seine operated about 2-5 days per trip, and 9-10 trips per month

### Fishing Areas



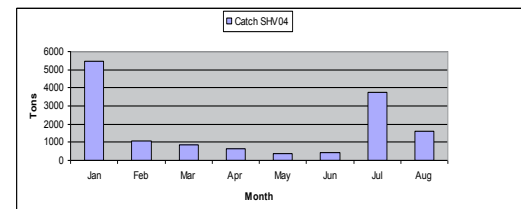
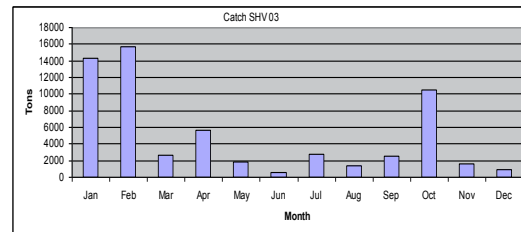
Figure. Map of tracking of BBO vessel in Sihanoukville

### Fishing vessel

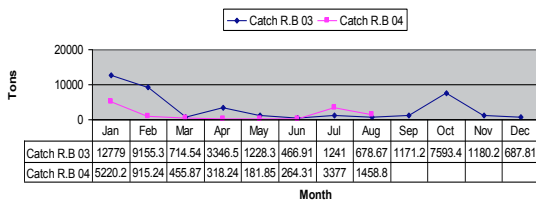


Figure. Fishing vessel of purse seine operation in Sihanoukville

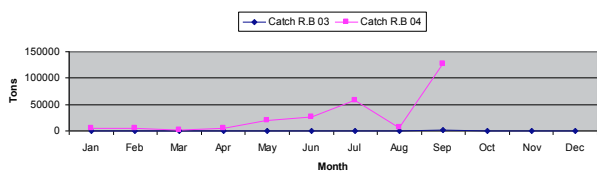
### Catch from long-tailed boat



### Catch Species-SHV-Year 03 & 04



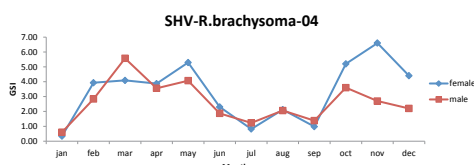
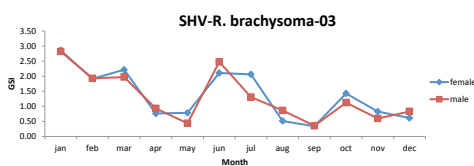
### Catch Year 03 & 04 of R.B



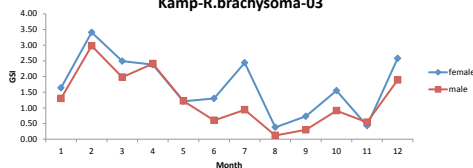
### Type of Purse Seine fisheries

Purse seine	Boat	Location
Scad, Sardine , <i>Rastrelliger</i> spp., Anchovy	Loa: 20 m	Tomnop Rolok
Anchovy purse seine	ph: 350	Sihanoukville
Scad, Sardine purse seine	Loa: 18 m	
	ph: 190	
	Loa: 17 m	
	ph: 300	

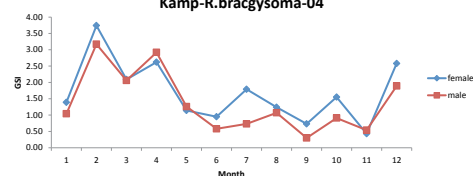
### Biological information (length at first maturity, spawning season)

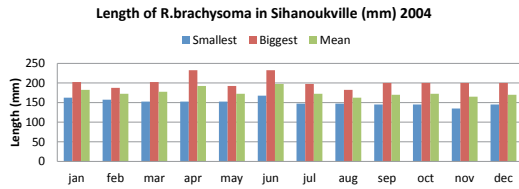
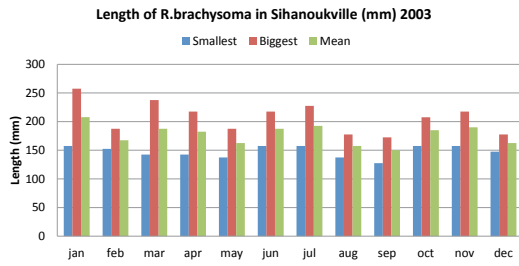


### Kamp-R.brachysoma-03

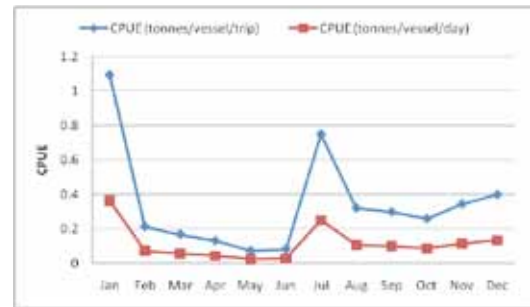


### Kamp-R.brachysoma-04



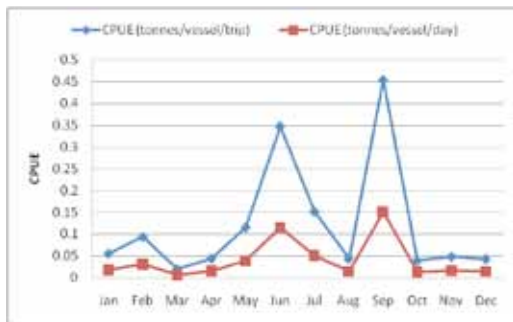


### Trend of CPUE by graph (by vessel, trips, days)



CPUE of purse seine in Sihanoukville 2004

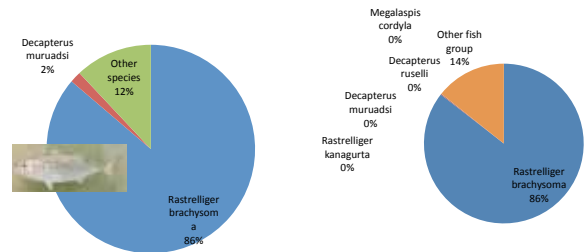
### Trend of CPUE by graph (by vessel, trips, days)



CPUE of purse seine in Kampot 2004

### Species composition

Catch composition in Tomnob Ro Lork (Sihanoukville) from June to December 2003-04 shown Short Mackerel (*Rastrelliger brachysoma*) was most dominated species 86%, followed by *Decapterus muruadsi* (2%), other species 12% in the total catch. In 2003 catch composition shown *R. brachysoma* 86%, other species was 14%, while in Kampot 2004 shown *R. brachysoma* comprised 63%, other species 37%.



### Spawning (area, season)

- Local knowledge of small pelagic fish Short Mackerel (*Rastrelliger brachysoma*) in Cambodia shown the peak of the spawning season in January and March.
- The post spawning phase from September to December
- Yearly closed season of Mackerel is between January and March.

### Problems and constraint

- Fishery resources are declining (diversity)
- Number of boats (especially small-scale) are increasing
- Small-scale boats are becoming motorized
- For trawlers HP is increasing
- Catch per boat is either staying the same because of the increase in technology.
- Fishing capacity is high (combined effect of Cambodian and foreign boats) and is still increasing
- Purse seine vessels had decreased

### Problems and constraint

- Lack of methodology for Determining TAC for Purse Seine
- Lack of specialist/expertise on (TAC, TAE, MSY and CPUE)
- Insufficient of national or regional to support marine fisheries sector.

### Suggestions

- Strengthen knowledge science based development of fisheries through enhancing the national capacity in the data collection
- Need capacity building on stock assessment, MSY and CPUE
- Need training on methodology for Determining TAC



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**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**Country Presentation  
INDONESIA**

**A Brief Notes on Small Pelagic Fish Purse Seine Fishery in Malacca Strait and  
Natuna Sea**

by

**Mr. Duto Nugroho  
Presenter  
Center for Fisheries Research and Development,  
Indonesia**

## COUNTRY REPORT

### INDONESIA

#### A BRIEF NOTES ON SMALL PELAGIC FISH PURSE SEINE FISHERY IN MALACCA STRAIT AND NATUNA SEA

Core Expert Meeting on Comparative Studies for Management of Purse Seine Fisheries in the Southeast Asian Region  
SEAFDEC / MRFDMD  
Kuala Lumpur, Malaysia, 9-11 August 2016



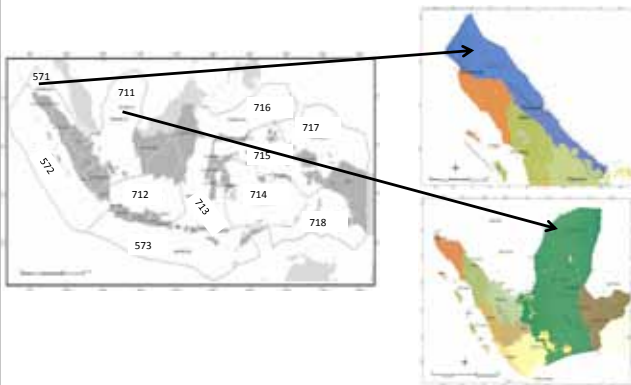
## I. INTRODUCTION

- As a tropical archipelagic country, Indonesia has vast marine waters (6.1 million km<sup>2</sup>) with fish resources that can be utilized as a potential source to support national sovereignty, sustainability and prosperity.
- In 2014, the marine capture fishery production reached approximately 6.0 million tons with a value of approximately 7.6 billion US\$.
- Group of small pelagic fish were the main contributor (30%) of the landing followed by large pelagic fish (28%), demersal fish (26%), coral fish (4%), crustaceans (6%), 4% mollusks, 0.8% other aquatic animal and 1.2% aquatic plant.
- The catches were landed by more than 35 types of fishing gears. Estimated number of people engaged on marine capture fisheries at around 2.2 million. The fishing fleet comprises 625 thousands boats (36% had engine) (DGCF, 2015)

2



### 11 IFMA's (MR. No. 18/PERMEN-KP/2014) sub FMA 571 and FMA 711



## FMA - 711

- Natuna Sea is geographically located between west Kalimantan and east Sumatera with relatively shallow waters of less than 100 m and hydrographically connected to SCS – LME
- Hundreds of small islands. The area approximately 577,000 km<sup>2</sup>. The islands are administratively within Riau Islands province as Indonesia's northern island groups.
- The water is one of productive fishing grounds with small pelagic and demersal fish species as main contributors of annual landing (DGCF, 2015).



## FMA - 571

- Malacca Strait is geographically located between north and east Sumatera with relatively shallow waters of less than 100 m in SE part and > 200 m in North eastern part and hydrographically connected to Andaman Sea
- The area approximately 133,500 km<sup>2</sup>. The coastal are administratively within North Sumatera and Aceh province.
- The water is one of productive fishing grounds for small pelagic fish resource in the country (DGCF, 2015).



## MANAGEMENT MEASURES

Baseline of Fisheries management in Indonesia referred to (in free translate):

- The 1945 Constitution of the Republic Indonesia, article 33, Para (2) states that all production sectors that are important for the state and affect the livelihood of people shall controlled by the state. Para (3) the land and water and the natural resources contained therein shall controlled by the state and shall used for the greatest prosperity of the people.
- Fisheries act No. 31/2004 jo 45/2009 which states that fisheries management should be carried out with the aim of :
  - improve the lives of fishermen and small fish;
  - increase revenue and foreign exchange;
  - encourage the expansion and employment opportunities;
  - increase the availability and consumption of fish protein;
  - optimize the management of fish resources;
  - improve the quality, productivity, value added and competitiveness;
  - increase the availability of raw material for fish processing industry;
  - achieve utilization of fish resources, fish farming land, and fish resources in an environmentally friendly; and
  - Ensure sustainable of fish, fish farming land and spatial planning.

6



## MANAGEMENT MEASURES (continued)

Management, utilization and conservation in Indonesia waters stipulated in various laws and regulations such as:

- Act No. 5 of 1983 on the Indonesian Exclusive Economic Zone;
- Law No. 32 Year 2004 on Regional Government;
- Act No. 6 of 1996 on Indonesian Waters;
- Law No. 21 Year 2009 on the ratification of Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
- Law No. 17 / 2008. On the voyage regulation;
- Government Regulation No. 54 /2002 on Fisheries Business;
- Government Regulation No. 60 of 2007 on Conservation of Fish Resources;
- Ministry Regulation No. 30/MEN/2012. On Fisheries Business.
- MR. 56/2014 on Foreign Building Fishing Vessels
- MR. 10/2015 on Moratorium Fishing Licenses

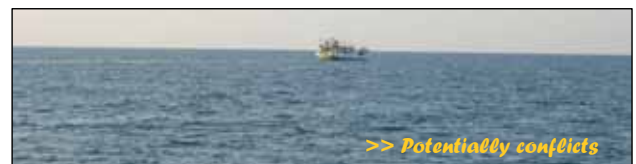
Technical management measures for purse seine fisheries as stated in MMAF Regulation no. 30/2012. An example of technical measures were as follows: mesh size should larger or equal to 1"; float line, the maximum light intensity should : The area of operation is composed of the zones, namely Zone I (between 1 – 4 nm) for fishing boat up to 5 GT is under license of district/city. Zone II, 4 to 12 nm for fishing boat up to 30GT and under license of provincial government. Zone III of > 12 nm for fishing vessel of > 30 GT authorized by central Government.

7



## Fishing Zone – Vessel - Authority

Capture Zone	Fishing Area (nm)	Vessel Specification (GT)	Management Otority
ZONE I	4 nm	5-10 GT	Prov. Gov.
ZONE II	12 nm	10-30 GT	
ZONE III	200 nm	> 30 GT	Central Gov.



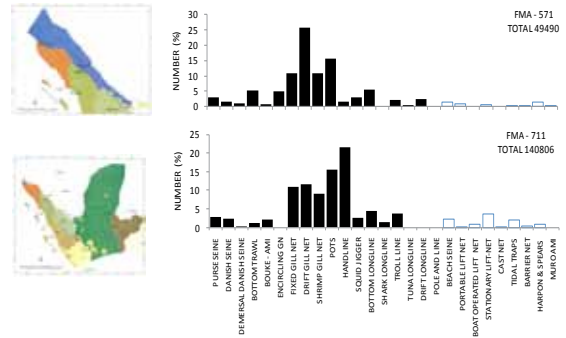


## MANAGEMENT MEASURES FOR PURSE SEINE FISHERY

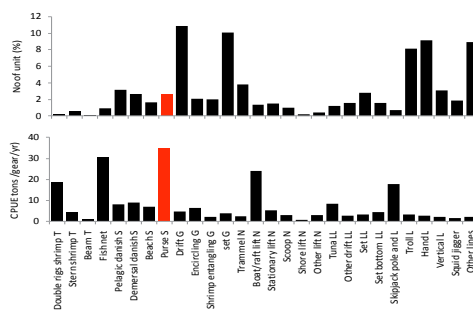
FLEET SIZE (GT)	< 10	10-30	30-100
Single boat purse seiner			
Mesh size (inch)	≥ 1	≥ 1	≥ 1
Length (m)	≤ 300	≤ 400	≤ 600
Light (watt)	≤ 4,000	≤ 8,000	≤ 16,000
Fishing lane	I, II & III	II & III	III
Two boat purse seiner			
Mesh size (inch)	-	≥ 1	≥ 1
Length (m)	-	≤ 600	≤ 800
Light (watt)	-	≤ 8,000	≤ 16,000
Fishing lane	-	II & III	III



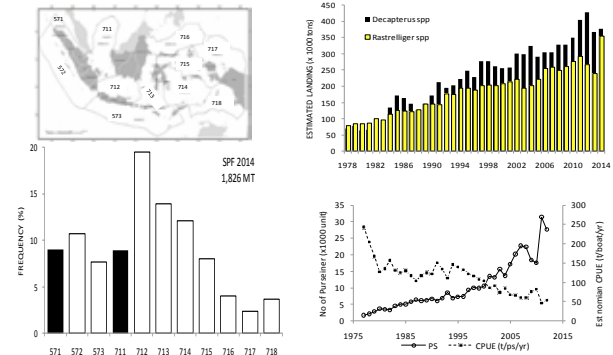
## NUMBER OF FISHING GEAR OPERATING IN IFMA – 571 AND 711



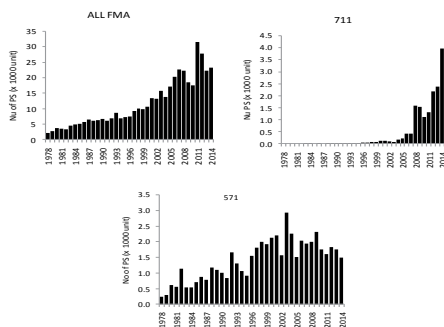
## NUMBER AND NOMINAL CPUE BY GEARS



## Landing by FMA & trend of Scads & Mackerel



## NUMBER OF PURSE SEINE by sub FMA MALACCA STRAIT– 571 & NATUNA SEA– 711



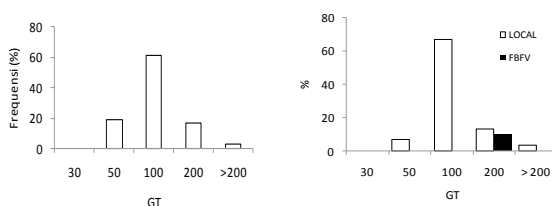
## Number of LICENSE (DGCF)

No.	Fishing gears	Period – Malacca Andaman				
		2011	2012	2013	2014	2015
1	Bouke Ami	1	1		1	1
2	Traps					
3	Bottom gill net					
4	Drift gill net	2				
5	Squid jiggers					
6	Bottom longline					
7	Danish seine					
8	Fish net	103	82		75	
9	Purse seine	49	63		64	64
10	Tuna long line	1				
Total		156	146	0	140	65

No.	Fishing gears	Period – Natuna sea				
		2011	2012	2013	2014	2015
1	Bouke Ami	249	404		502	433
2	Traps	1	-	-	-	-
3	Bottom gill net	88	124		120	128
4	Drift gill net	-	-	-	56	42
5	Squid jiggers	-	2		1	1
6	Bottom longline	10	5		3	6
7	Danish seine	5	3		-	-
8	Fish net	135	172		156	-
9	Purse seine	480	445		434	283
10	Tuna long line	-	2		-	-
Total		968	1191		2673	895



## DISTRIBUTION FV ISSUED BY DGCF BY GT IN FMA 571 AND 711



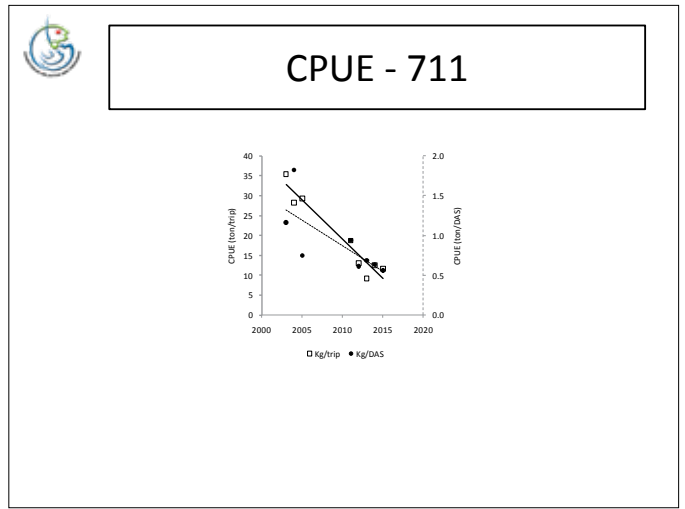
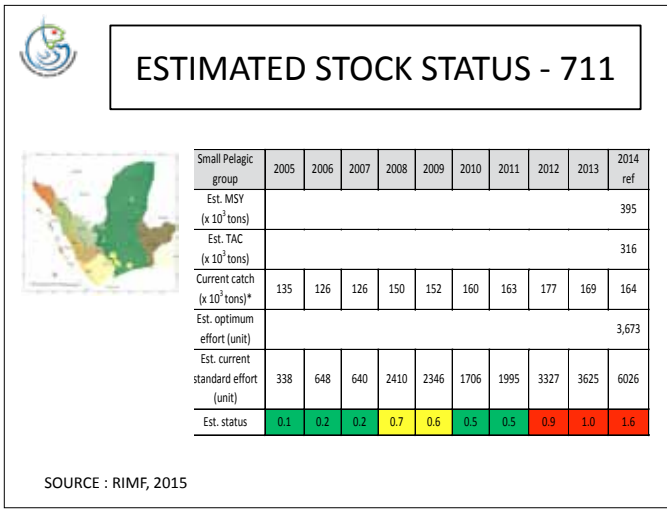
Source : DGCF 2015 & 2016  
Remarks : FBFV = Foreign Building Fishing Vessel



## ESTIMATED STOCK STATUS - 571



Small Pelagic group	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	ref
Est. MSY (x 10 <sup>3</sup> tons)											79
Est. TAC (x 10 <sup>3</sup> tons)											63
Current catch (x 10 <sup>3</sup> tons)*	109	115	1105	106	1106	105	178	186	176	165	
Est. optimum effort (unit)											2,017
Est. current standard effort (unit)	2166	2896	2761	2845	3300	2518	2297	2622	2514	2136	
Est. status	1.1	1.4	1.4	1.4	1.6	1.2	1.1	1.3	1.2	1.1	



## BIOLOGICAL INFORMATION

*Decapterus russelli*

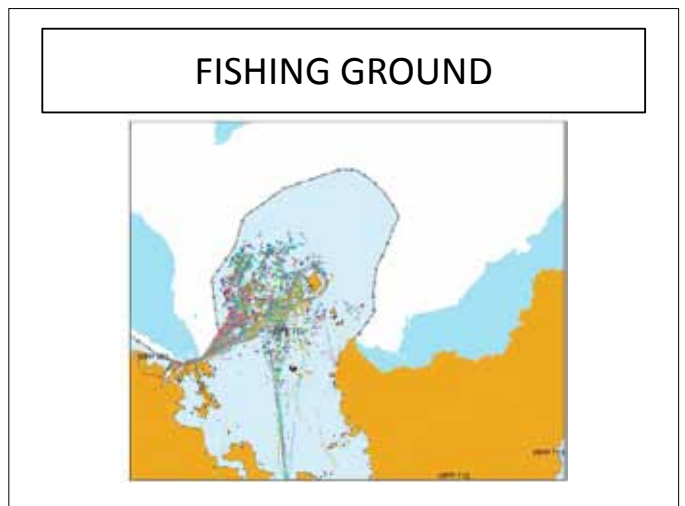
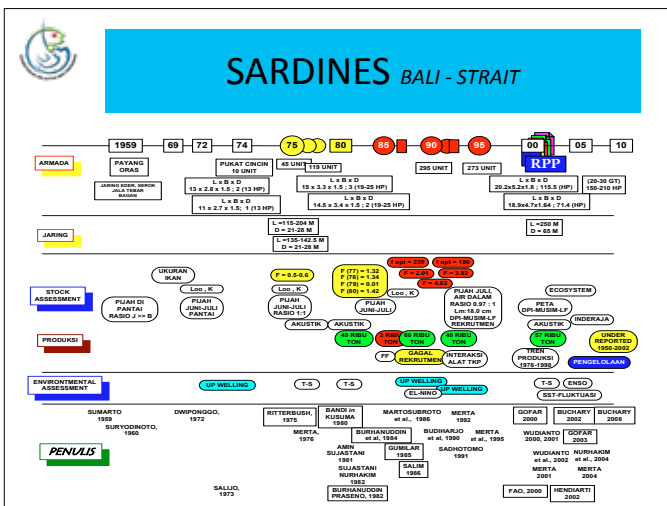
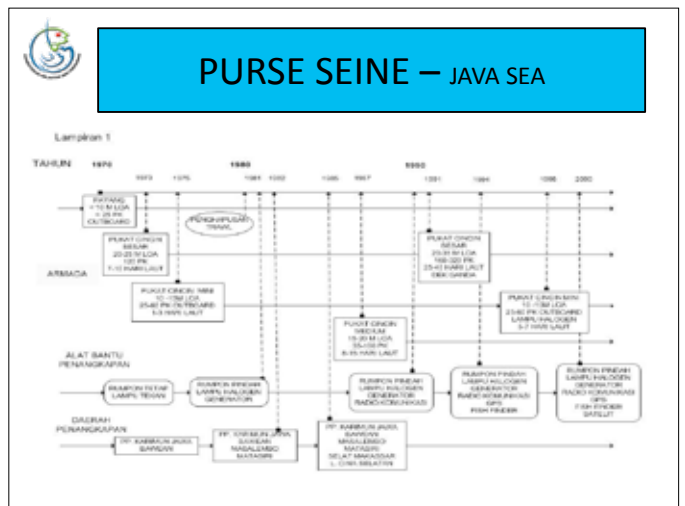
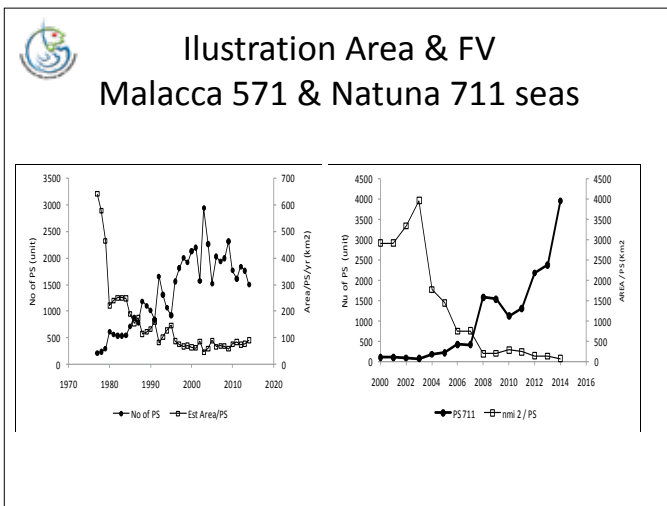
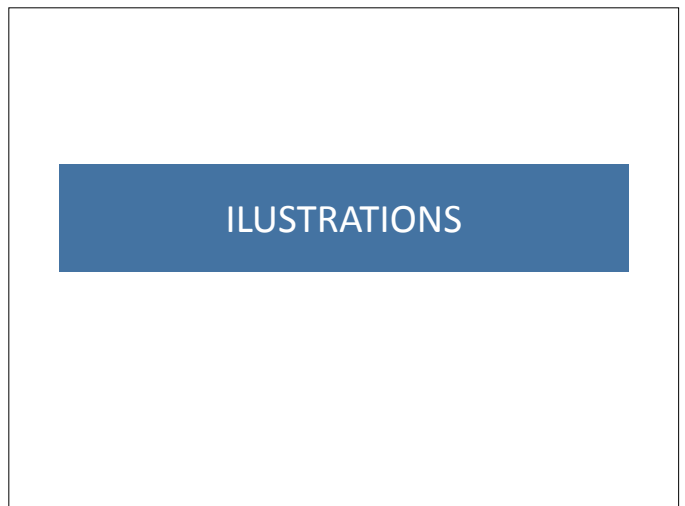
year	growth			mortalities			exploitation	
	L <sub>∞</sub>	K	Z	M	F	M/K	E=F/Z	
2003	24.21	1.2	4.74	2.17	2.57	1.8	0.54	
2004	26.21	1.2	4.78	2.12	2.66	1.8	0.56	
2005	22.6	1.2	4.94	2.21	2.73	1.8	0.55	
2014	23.9	1.03	4.41	2.00	2.11	1.9	0.48	
2015	22.9	0.83	2.8	1.76	1.04	2.1	0.37	

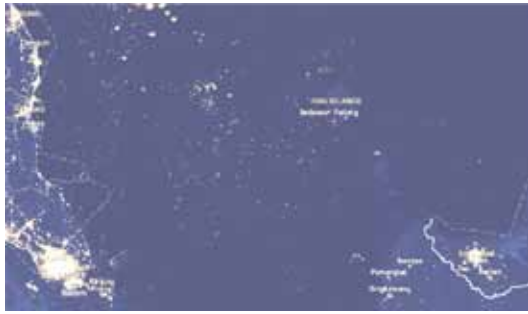
*Decapterus macrosoma*

year	growth			mortalities			exploitation	
	L <sub>∞</sub>	K	Z	M	F	M/K	E=F/Z	
2003	22.15	1.2	4.1	2.23	1.87	1.9	0.46	
2004	13.5	1.2	4.22	2.19	2.03	1.8	0.48	
2005	21.5	1.2	4.35	2.25	2.11	1.9	0.48	
2015	23.1	1.03	8.1	2.26	5.84	2.2	0.72	

*Selar crumenophthalmus*

year	growth			mortalities			exploitation	
	L <sub>∞</sub>	K	Z	M	F	M/K	E=F/Z	
2014	25.40	1.15	5.68	1.94	3.74	1.7	0.65	
2015	23.7	1.0	5.58	1.97	2.49	2.0	0.45	





## THANK YOU



Prepared by  
Duto Nugroho, M. Fauzi, Suwarso, Suryanto, Ria Faizah and S.B. Atmaja

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**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
PURSE SEINE FISHERIES IN THE SOUTHEAST ASIAN  
REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**Country Presentation  
MALAYSIA**

**The Report for the Purse Seine Fishery in the East Coast of Peninsular Malaysia**

by

**Mr. Sallehudin Jamon  
Senior Research Officer, FRI Kg. Aceh, Perak**





The Core Expert Meeting on Comparative Studies for Purse Seine Fisheries in the Southeast Asian Region  
9-11 Julai, Kuala Lumpur, Malaysia

## Country Report East Coast Peninsular Malaysia

SALLEHUDIN JAMON & ABD WAHAB ABDULLAH  
FISHERIES RESEARCH INSTITUTE  
KAMPUNG ACHEH  
SITIAWAN PERAK  
MALAYSIA

## Malaysia fisheries profile



- Marine fishing areas in Malaysia can be divided into several fishing sub-areas (the west (Malacca Straits) and east coast (South China Sea) of Pen Malaysia, Sarawak (South China Sea), and Sabah waters which include the South China Sea on the west coast and the Sulu and Celebes Seas in the east coast.
- The Malacca straits- west coast PM includes the state of Perlis, Kedah, Penang, Perak and Selangor.
- East coast PM (Kelantan, Terengganu, Pahang and Johor – South China Sea

## Overview of marine capture fisheries

- Total marine fish productions in Malaysia were not much different for 2013 (1,482,899 mt) and 2014 (1,440,109 mt).
- Inshore fisheries contributed 63.82% and 59.54% in terms of quantity and value to the national food fish sector while deep-sea fisheries contributed only 18.88% and 15.77% respectively in terms of quantity and value.

- Total marine landings In Malaysia, 40% or 596,240 tonnes are pelagic fish, 24.9% or 370,696 tonnes demersal fish while molluscs, crustacean and others contributed 34.93% or 519,113 tonnes.
- Landings from fish purse seiners recorded a increase of 32% in the East Coast from 130,100 tonnes in 2014 to 171,188 tonnes in 2015.

## Fishing Technique

- Five major fisheries in Malaysia defined according to the fishing technique:
  - Fish trawl fishery
  - Shrimp trawl fishery
  - Fish purse-seine fishery
  - Anchovy purse-seine fishery
  - Drift Net fishery

## Purse Seines



- Major commercial fishing gear – pelagic fish
- PS Vessel Categorized based on their gross tonnage
  - 25 – 39.9 GRT ( above 8 nm off shore)
  - 40 – 70 GRT ( 15 nm off shore) and
  - Above 70 GRT ( above 30 nm offshore)
- Two types-
  - the use of FADs
  - without FADs or free searching (Free School).

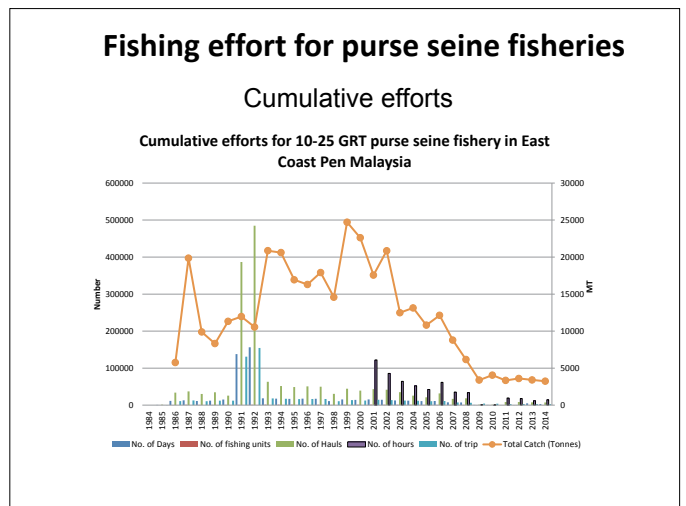
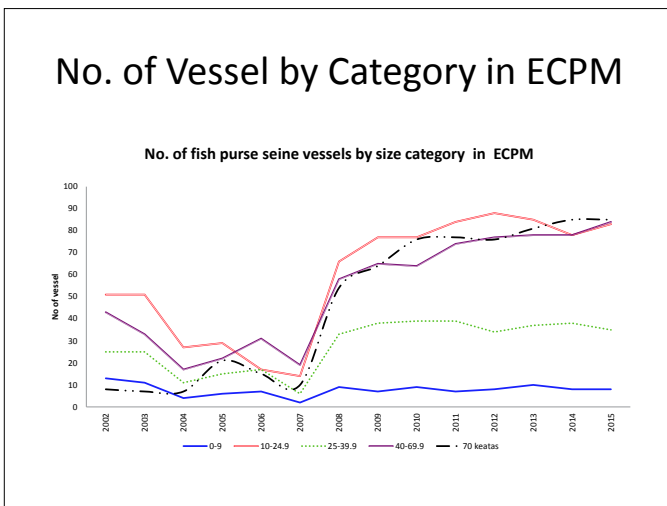
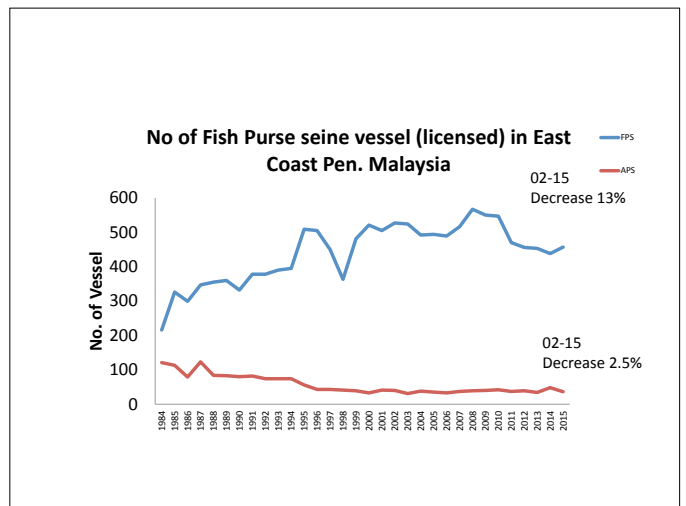
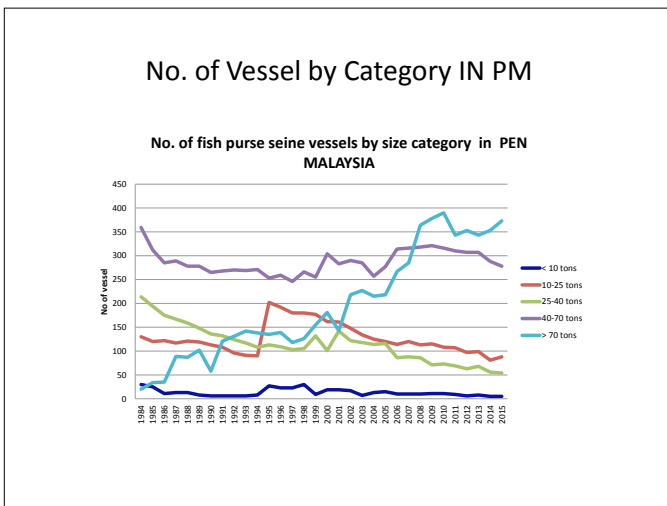
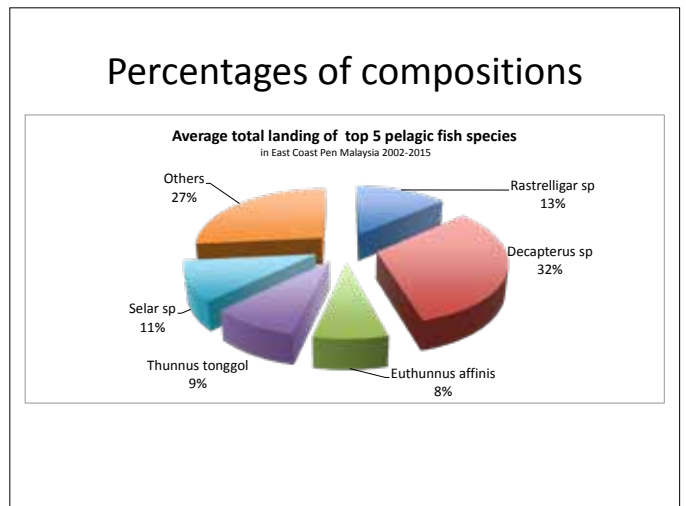
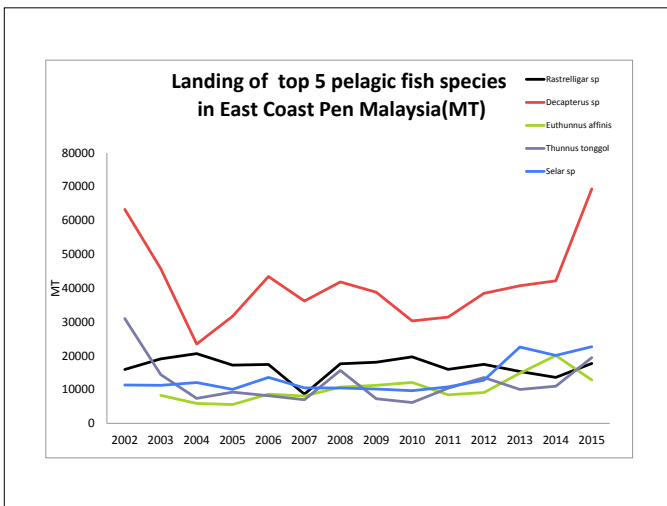
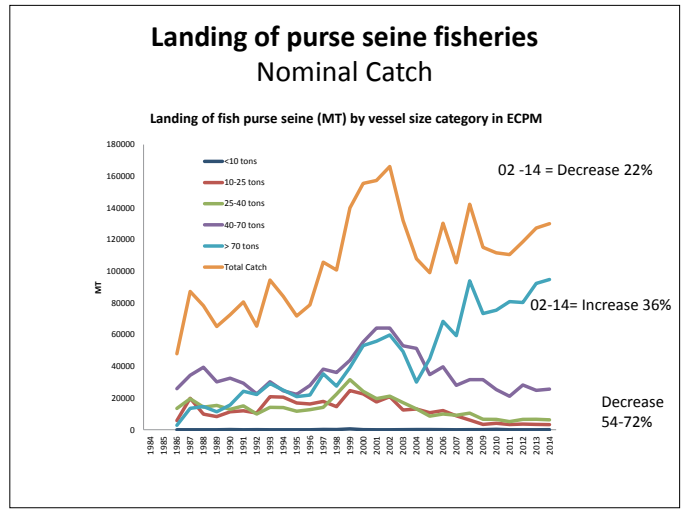
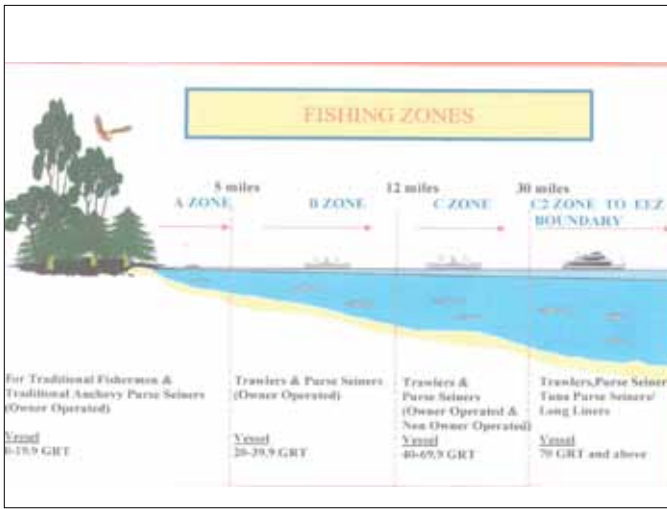
## Management measures

These measures were developed within the framework provided by the fisheries law, The Fisheries Act 1985 (Act 317). Among the main measures are:

- Fishing zones.
- Closed fishing area.
- Fishing effort controls
- Control of fishing units
- Controls in port and at sea
- Registration of fishermen
- Conservation of marine habitat
- The community-Based Fisheries Management

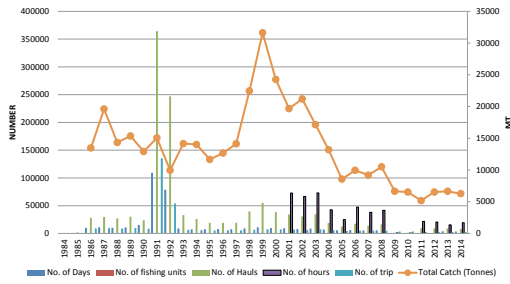
## NEW Fishing Zone





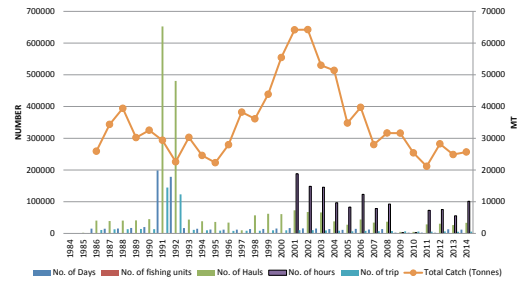
### Cumulative efforts

Cumulative efforts for 25-40 GRT purse seine fishery in East Coast Pen Malaysia



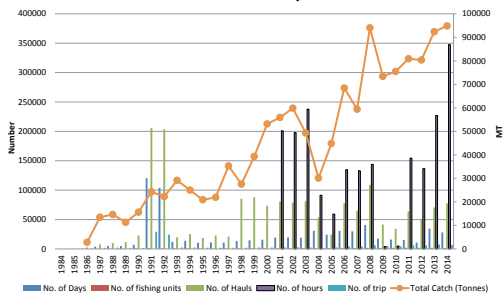
### Cumulative efforts

Cumulative efforts for 40-70 GRT purse seine fishery in East Coast Pen Malaysia

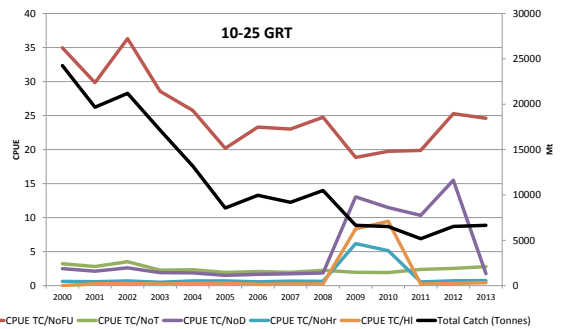


### Cumulative efforts

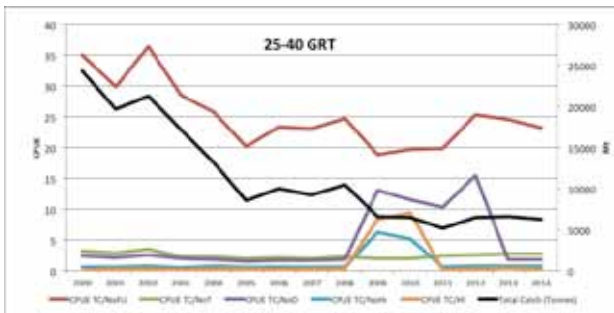
Cumulative efforts for >70 GRT purse seine fishery in East Coast Pen Malaysia



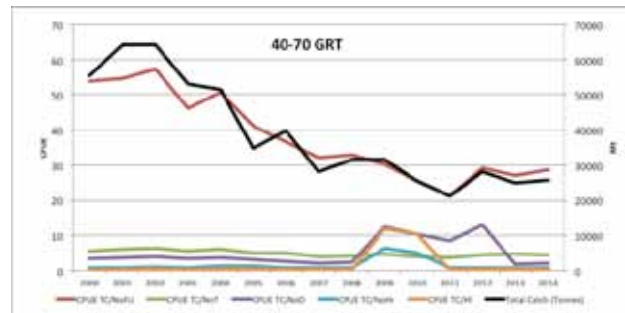
### CPUE



### CPUE



### CPUE



### CPUE



### Status of pelagic fish stock

- (based on existing information / survey)
- 1999 - Biomass (733,000 MT)  
- Potential Yield (366,50 MT)
- **Result of acoustic survey along the east coast of Peninsular Malaysia within EEZ Malaysia 2013 and 2014**
- 2013 Pre Monsoon  
- Biomass (**237,000 MT**)
- **2014 Post Monsoon**  
- Biomass (**202,000 MT**)

## The status of fishery resource exploitation in Malaysia

Resource	Peninsular Malaysia		Sarawak	Sabah
	West coast	East coast		
Demersal fish				
Inshore	Fully	Fully	Fully	Moderately
Offshore	Fully	Fully	Moderately	Moderately
Pelagic fish				
Inshore	Fully	Fully	Moderately	Approach Fully
Offshore	Fully	Approach Fully	Under	Moderately
Shrimp	Fully	Fully	Fully	Fully
Anchovy	Fully	Fully	-	Not certain

Note: Fully = Fully exploited, Moderately = Moderately exploited, Under = Under exploited, Approach Fully = Approaching fully exploited

### SOURCE:

OVERVIEW PAPER FISHERIES IN MALAYSIA  
Abu Talib Bin Ahmad, Abdul Razak Bin Latun,  
Mazalina Ali and Abdul Aziz Yusof

## Information for local knowledge

### Tagging

- Tagging Program for Economically Important Pelagic Species in the South China Sea and Andaman Sea under the Japanese Trust Fund II Program for four small pelagic species, including Japanese Scad, -(SEAFDEC/MFRDMD) since 2007 -2011.
- In the SCS, a total of 32,344 fishes (including 14,579 *Decapterus maruadsi*) were tagged and released. Unfortunately, the recovery of the tagged fishes from 2008 until 2011 was very poor, with only a total of 351 fishes including 108 *D. maruadsi*.

## Fish Aggregating Devices

### FADs materials in Peninsular Malaysia

Country	Area	Materials		
		Buoy / Float	Aggregating Materials	Sinker
Malaysia	Kuala	Bamboo	6 pieces of	20 kg sand b
East Coast	Terengganu		sago leaves /	Concrete / dru
Peninsular			coconut leaves	
(Malaysia)				
Malaysia				
Vest Coast				
Peninsular				
(Malaysia)				

## Fish Aggregating Devices



- FADs -depths > 40 mete
- Anchored
- 4 major structures,
  - Bamboo/pontoon/ Styrofoam
  - Main line,
  - Coconut fronds and
  - weight (concrete block).



## Spawning season

"Information Collection for Sustainable Pelagic Fisheries in the South China Sea" Project



- In general spawning season of *R. kanagurta* occurred twice a year in the South China Sea area but in the Southern sub-area spawning occurs only once in a year. In the Northern sub-area, spawning season occurred from **May to June and July to September**.
- *Decapterus maruadsi* spawned two times in a year at all sub-areas, The first spawning starts in **March and July**
- *Decapterus macrosoma* spawned twice a year in the South China Sea area. The first spawning season ended in **March and May**.

## Country existing management strategies for purse seine fisheries

### Closed Fishing Area

- Commercial fishing gear: (trawl and purse-seine) is prohibited from fishing in the area of < 5 (8) nm from the coastline (Zone A), except for anchovy purse-seine.
- Traditional fishing gear: fishing vessel operating traditional fishing gear (other than trawl and purse-seine) is prohibited from fishing in area of < 2 nm from any gazette marine park island and 0.5 nm from artificial reef site.

## Summary

- Scads (*Decapterus spp.*) or *Selayang* are among the most important small pelagic fishes in 2002-2014.
- In the South China Sea waters of the country, production of scads are much higher and reached 32% of the total small pelagic
- Most active FPS in ECPM is >70 GRT
- Total catch from >70 GRT show increasing
- CPUE from all size categories ( 10-70GRT) show the decreasing pattern untill 2014.



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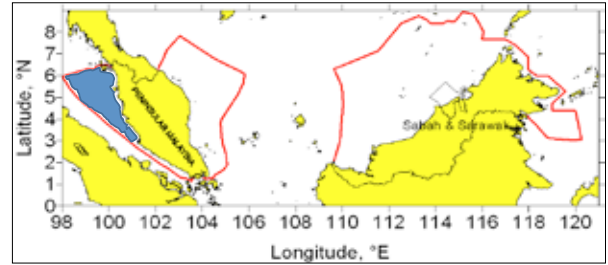
9 - 11 August 2016, Kuala Lumpur, Malaysia

## Country Report for The West Coast of Peninsular Malaysia (WCPM)



**ABDUL WAHAB ABDULLAH & SALLEHUDIN JAMON**  
FRI KG ACHEH, DEPARTMENT OF FISHERIES MALAYSIA

## Overview of PS fisheries in WCPM



- The sea area of WCPM which in The Straits of Malacca is about 28,000km<sup>2</sup>
- The PS fishing area for WCPM
- Involved only 5 states - Perlis, Kedah, Pulau Pinang, Perak & Selangor

## Overview of PS fisheries in WCPM



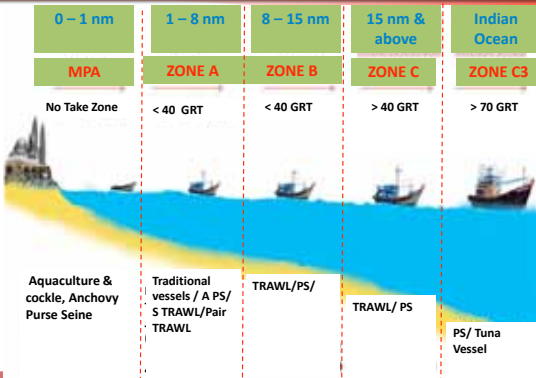
- 2 types of PS – Fish and Anchovy PS
- Purse seines are the second most efficient fishing gear in contributing to the fish landings after trawlers.
- Majority of FPS uses FADs. Only zone C, C2 and C3 are allowed to use support vessel
- All APS hunting schools of anchovies during daytime only

## Overview of PS fisheries in WCPM

- All purse seines vessels were categorized based on their gross tonnage (GRT(Gross Registered Tonnage)),
- For each tonnage, the vessel are allowed to operate within a specified fishing areas such as for the tonnage groups of
- Below 39.9 GRT (8 - 15nm),
- 40 – 70 GRT, (15 nm off shore) and
- above 70 GRT (above 30 nm off shore).
- Anchovy PS are allowed to operate within 1-8 nm (Zone A)



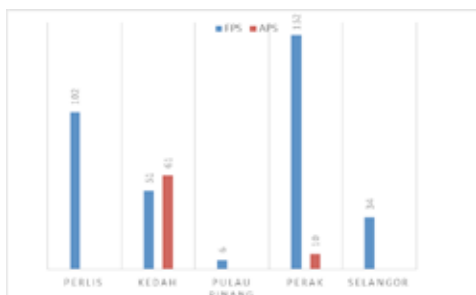
## NEW Fishing Zone for Kedah, P.Pinang, Perak & Selangor



## Existing Fishing Zone except for the 4 states

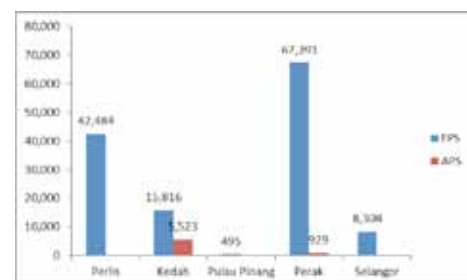


## Licensed PS vessel year 2014 by WCPM states



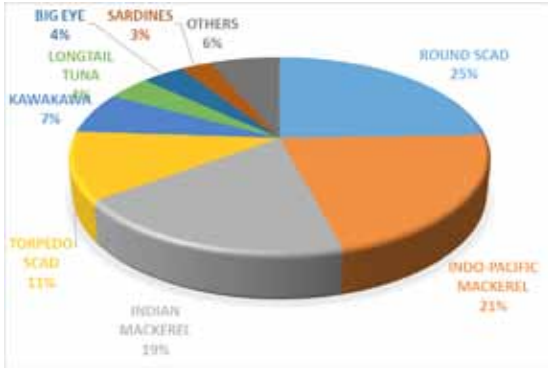
- Overall licensed PS vessels in WCPM (2014) 416 units– 345 Fish PS and 71 Anchovy PS

## Landing of marine fish by PS group, 2014 (tonnes)



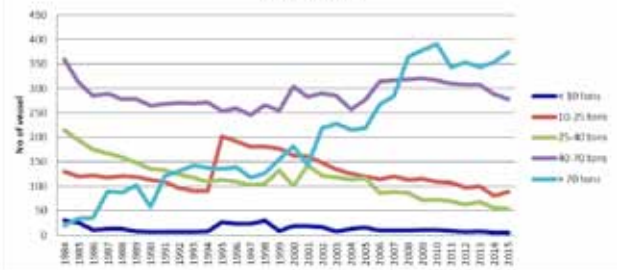
- Total marine fish landing contributed by PS in WCPM was 140,946 tonne (18.83% from the overall landings (all gears) in WCPM).

### Catch composition of all PS in WCPM in 2015



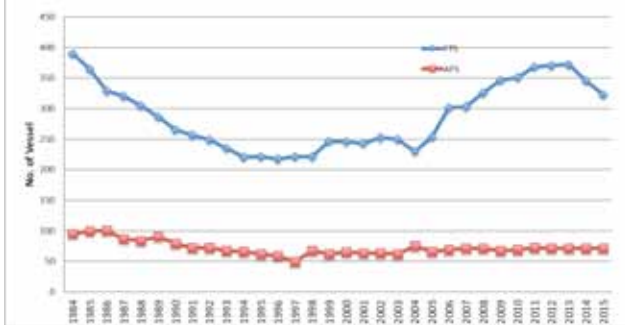
### Trends on number of PS vessels

No. of fish purse seine vessels by size category in PEN MALAYSIA



### Trends on the number of PS

No of Fish Purse seine vessel in West Coast Pen. Malaysia



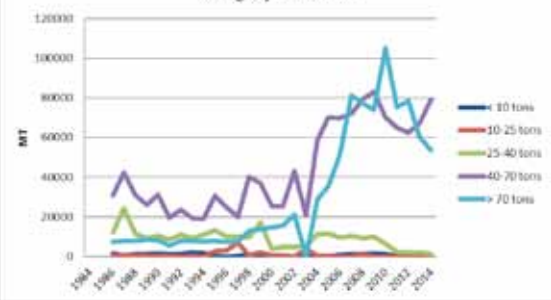
### Landing trends of PS

Total Landing of Pelagic fish (MT) by type of Purse seine in West Coast Pen Malaysia



### Nominal catch trend by size category

Landing of fish purse seine (MT) by vessel size category in WCPM



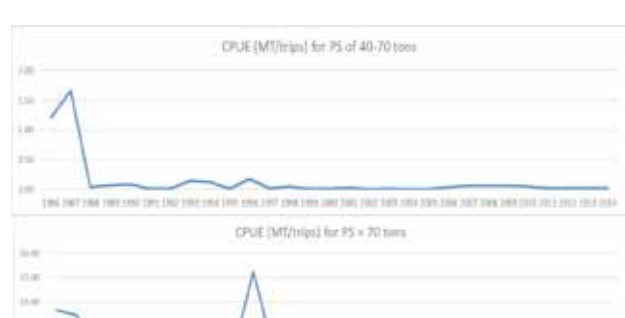
### Trends in CPUE(MT/trip) (2000,2008, 2014) by PS and zones for the assessed fisheries in WCPM

West Coast				CPUE (MT/trip)		
Fishery area	Vessel size (GRT)	Fishery area (nm)	Days/trip	2000	2008	2014
Fish purse seines	< 40	B Zone: 5-12	1	1.43	2.07	0.61
	40-69.9	C Zone: 12-30	1	1.52	3.60	0.02
	> 70	C2 Zone: >30	3-4	7.77	9.70	0.06

### CPUE trends



### CPUE trends



## Pelagic stock assessment surveys in WCPM (using acoustic survey)

Year	Tonne	
	Biomass	Potential Yield
1998	311,000	155,500
2013	235,438	112,683
% reduced	24.3%	27.5%

## Comparison of survey results on density of pelagic fish stock at WCPM

Year	Density (tonnes/km <sup>2</sup> )	References
1998	9.6	National fisheries survey report, 2000
2006	7.5	Raja Bidin <i>et al</i> , 2009 in Abu Talib Ahmad <i>et al</i> (Eds) 2009.
2013	7.45	Latest survey

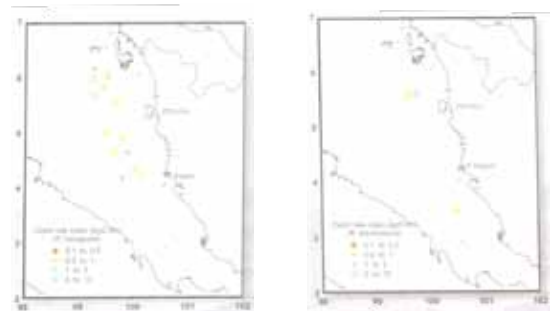
- The latest survey has the density of only 0.67% less than the survey in 2006, but 22.4% less than the 1998 survey.

## Spawning seasons: Indian mackerel

Month	Area	Reference
October and April	WCPM	Pathansali (1967)
May and February	PM	Chee (1977)
Sept to February	WCPM	BOBLME-SEAFDEC/MFRDMD (2015) Malaysia report - unpublished

The occurrence of mature fishes throughout the year indicates that this species maturation is a continuous process

## Distribution of the 2 dominant pelagic species caught by PS

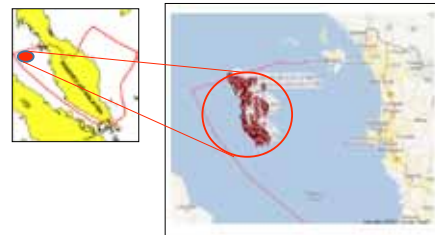


The catch distribution of *Rastrilliger kanagurta* and *Rastrilliger brachysoma* at the WCPM in 2006 (Abu Talib *et al*, (Eds) 2009)

## FISH AGGREGATING DEVICES (FADs)

- The FADs normally was set in areas with depths **exceeding 40 meters**. The FADs are made of coconut leaf and anchored by several concrete sacks.
- Most of the FADs are maintained and some of the owners employed fishermen to look after their FADs to prevent stealing or encroached by other fishermen.
- Most areas with sufficient depth were located in the **northern most of Malacca Strait**. The larger purse seiners (>70 GRT) can only operate in areas beyond 30nm from the shore as stated under the Zoning Regulation by the Fisheries Authority.

## The common fishing area of PS >70GRT in WCPM



\* Most FADs for the PS >70 GRT can be found at this area

## Protected area in WCPM

- The existing protected area, under Fisheries Act 1985 are:
  - State of Kedah **Marine Park islands** – Payar Archipelago (**48,058 ha of sea area**), consist of 4 islands; Payar, Kaca, Lembu and Segantang. The islands were gazetted under Marine Parks Malaysia Order 1989
  - Fisheries Prohibited Area (FPA)** – Tanjung Tuan & Pulau Besar, Melaka. Pulau Besar and Tanjung Tuan Melaka was gazetted as FPA under the Fisheries (Prohibited Areas) Regulation (Amendment)(1988).



Peninsular Malaysia & the Payar Archipelago

## Summary

- The important pelagic species are the mackerels, scads and neritic tuna.
- CPUE from all size categories show a decreasing pattern near 2012
- Total catch from >70GRT showed a clear increasing trend compare to the others size categories.
- Latest pelagic stock assessment survey showed the pelagic stocks are depleting. Although some of the pelagic species are highly fecund, the stock may be being overfished and more detail assessment is needed and should be on regular basis.





**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
PURSE SEINE FISHERIES IN THE SOUTHEAST ASIAN  
REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**Country Presentation  
MALAYSIA**

**The Report for the Purse Seine Fishery in the Sarawak, Malaysia  
(Latest Information on Purse Seine Fisheries in Sarawak)**

by

**Mr. Jamil Musel  
Senior Research Officer, FRI Bintawa, Sarawak**

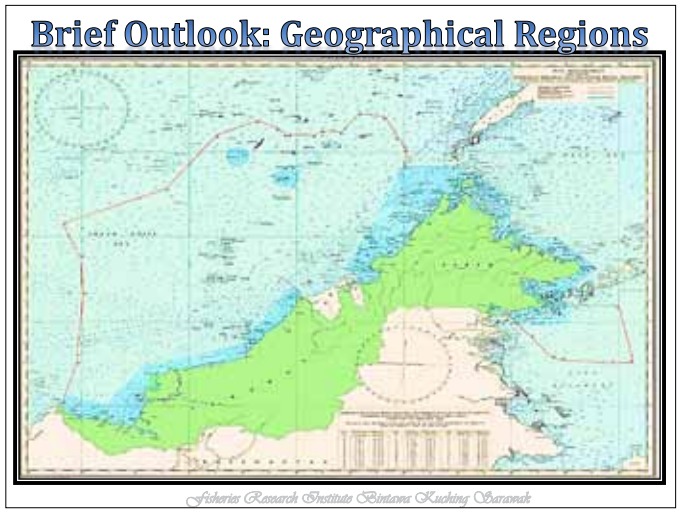
The Core Expert Meeting for Comparative Study on Purse Seine Fishery in the Southeast Asian Region Under SEAFDEC/MFRDMD JTF VI Program

9-11 August 2016  
Furama Hotel, Kuala Lumpur



Prepared By  
*Jamil Masud*

## LATEST INFORMATION ON PURSE SEINE FISHERIES IN SARAWAK



### Brief Outlook: Purse Seine Fishery

Fish purse seine : **Commercial gears** in Sarawak

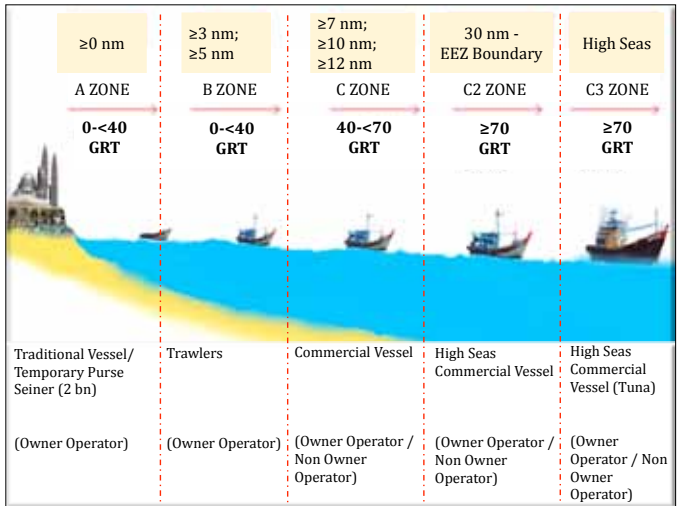
**Demersal fishes:** Largest part of marine catches  
**Pelagic fishes:** Low catch - Low numbers of purse seiners operating in Sarawak (Witter *et al.*, 2015; Gambang *et al.*, 2003)

**Fishing areas:** Offshore areas and productive fishing grounds (southern bays and in the north)

**Purse Seine Designed:** Fine mesh & Coarser mesh  
**Vessel Size:** 40 to 70 GRT    **Gear Size:** 240 - 450m

**Management measures for purse seine fishery:**  
Licensing and Regulations are provided and managed by the Head of Fisheries, located in Kuala Lumpur

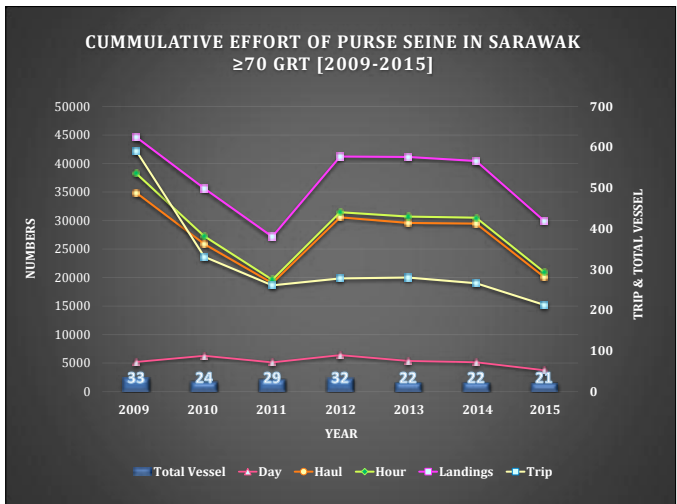
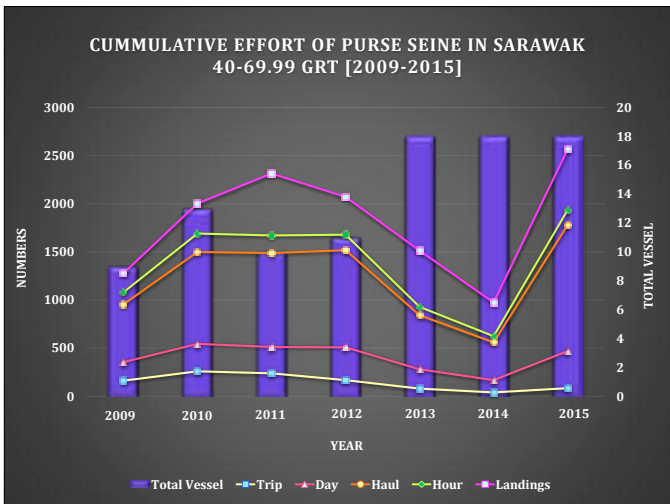
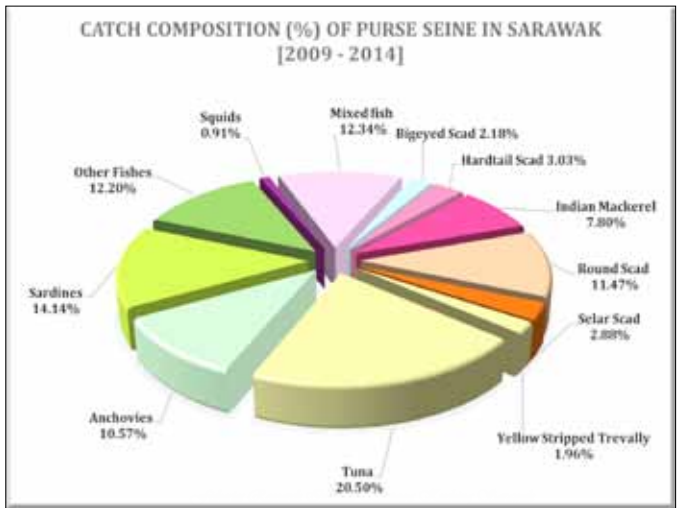
Fisheries Research Institute Bintaru Kuching Sarawak

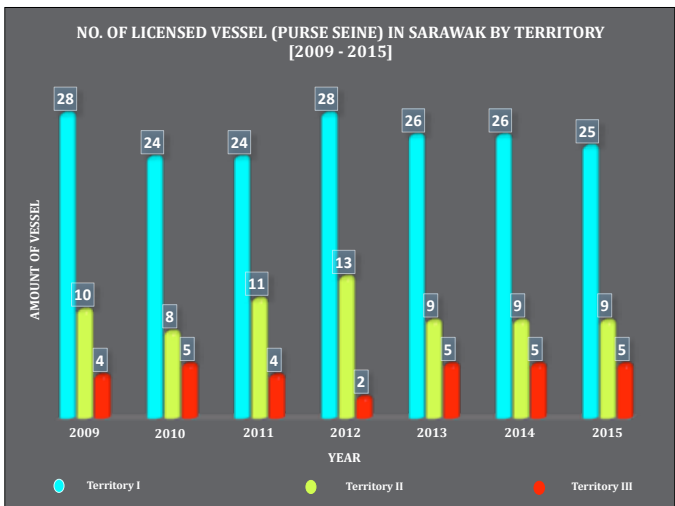
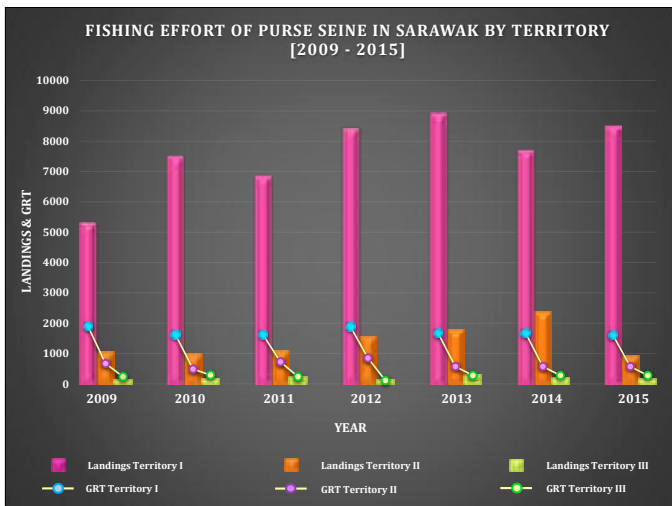
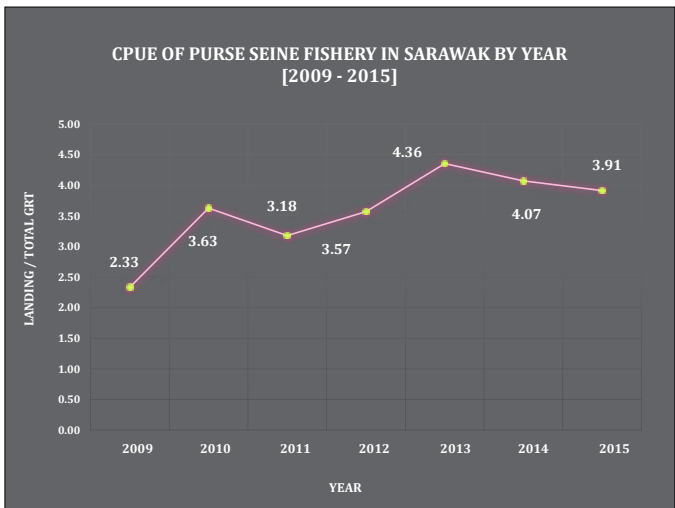
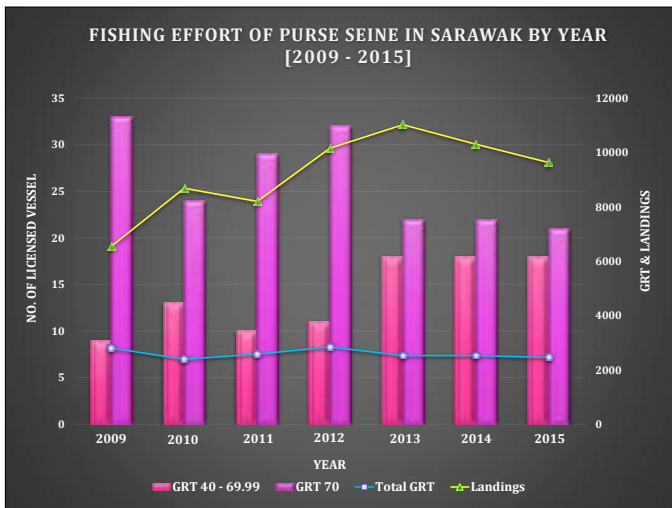


### Pelagic Fish of Sarawak

<i>Decapterus macronema</i> Shortfin scad Selayang TL 20.7 cm	<i>Decapterus russelli</i> Indian scad Selayang TL 21.4 cm	<i>Amblygaster leiogaster</i> Smoothbelly sardinella Tamban belau TL 21.2 cm	<i>Dussumieria acuta</i> Rainbow herring Tamban belau TL 16.1 cm
<i>Sardinella gibbosa</i> Goldstripe sardinella Tamban pipit TL 16.5 cm	<i>Megalops cordyla</i> Torpedo scad Cincaru TL 25.8 cm	<i>Salar boopis</i> Bigeye scad Salar kuning jantan TL 21.5 cm	<i>Salar crumenophthalmus</i> Bigeye scad Salar pacat TL 24.5 cm
<i>Sardinops tigris</i> Yellowstripe scad Jambak TL 12.5 cm	<i>Katsuwonus pelamis</i> Skipjack tuna Tongkol japon TL 51.5 cm	<i>Euthynnus affinis</i> Kawakawa Tongkol karik TL 29.2 cm	<i>Rastrelliger kanagurta</i> Indian mackerel Kambang hitam TL 23.0 cm
<i>Rastrelliger brachyoma</i> Short bodied mackerel Kembang putih TL 20.2 cm	<i>Scomberomorus commerson</i> Narrowbarred Spanish mackerel Tongkol batang TL 82.9 cm	<i>Scomberomorus guttatus</i> Indo-Pacific king mackerel Tongkol papen TL 37.5 cm	<i>Parastromateus niger</i> Black pomfret Bawal hitam TL 23.5 cm

Fisheries Research Institute Bintaru Kuching Sarawak





## Status of Pelagic Fish Stock (2013)

**Biomass = 273,852 tonnes\***

**MSY = 83,731 tonnes\***

\*Based on the research of Data management for offshore pelagic stock (beyond 30 nm) through acoustic approach in Sarawak water (04-05-04-5F0003)

*Fisheries Research Institute Bintawa Kuching Sarawak*

## Biological Information

\*Note: Research by Mr Hadil Rajali (2006) & Mr Jamil Musel (2013)

### Length at 1<sup>st</sup> Maturity

SPECIES	SEX	LENGTH [cm]
<i>Decapterus maruadsi</i>	Male	21.72
	Female	22.67
<i>Decapterus macrosoma</i>	Male	12.81
	Female	19.50
<i>Decapterus ruselli</i>	Male	12.98
	Female	11.44
<i>Rastrelliger brachysoma</i>	Male	22.46
	Female	22.46
<i>Rastrelliger kanagurta</i>	Male	21.20
	Female	18.50

*Fisheries Research Institute Bintawa Kuching Sarawak*

## Biological Information

### Spawning Season [2003-2005]

SPECIES	PERIOD
<i>Decapterus maruadsi</i>	May - June
<i>Decapterus macrosoma</i>	Sep - Oct
<i>Rastrelliger kanagurta</i>	July - Sep

### Estimation of Growth & Mortality [2003-2005]

SPECIES	SITE	L <sub>∞</sub>	K (year <sup>-1</sup> )	M	F	Z	Φ	E(F/Z)	Rn
<i>R. kanagurta</i>	2003	272.00	0.80	0.96	2.57	3.53	4.772	0.73	0.993
	2004	272.50	0.94	0.86	16.54	17.4	4.844	0.73	0.990
	2005	270.30	0.80	1.06	3.25	4.31	4.767	0.95	0.993
<i>R. brachysoma</i>	2003	259.00	0.90	0.95	3.13	4.07	4.774	0.77	0.978
	2004	261.00	0.70	0.80	6.41	7.2	4.678	0.89	0.999
	2005	260.00	0.90	0.94	4.21	5.15	4.784	0.82	0.999
<i>D. maruadsi</i>	2003	257.00	0.70	0.80	2.72	3.52	4.665	0.77	0.996
	2004	258.00	0.40	0.56	2.70	3.25	4.425	0.83	0.999
	2005	254.00	0.50	0.65	1.46	2.11	4.509	0.69	0.995

*Fisheries Research Institute Bintawa Kuching Sarawak*

## Information For Local Knowledge

### Research Area

Kuching, Tanjung Manis, Mukah, Bintulu, Miri

### FADs

Number : >30 units  
 Type : consists of a buoy, aggregating material and anchor  
 Area : Laut Patuh, Laut Igan, Laut Bayan (MAP)

*Fisheries Research Institute Bintawa Kuching Sarawak*

## Country Existing Management Strategies for Purse Seine Fisheries



Joint venture program which include chartered vessel arrangement available in Malaysia as a strategy to manage purse seine fisheries



Close season management is not yet applied

*Fisheries Research Institute Bintawa Kelantan, Sarawak*





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(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**Country Presentation  
MALAYSIA**

**The Report for the Purse Seine Fishery in the Sabah, Malaysia**

by

**Mr. Mohd Zamani Nayan  
Fisheries Officer, Department of Fisheries Sabah, Malaysia**

**The Core Expert Meeting on Comparative Studies For Management of Purse Seine Fisheries in the Southeast Asian Region 9 - 11 August, 2016**

**Kuala Lumpur, Malaysia**

**Department of Fisheries Sabah**

**Introduction**



Malaysia

**Introduction**



Sabah

**Introduction**



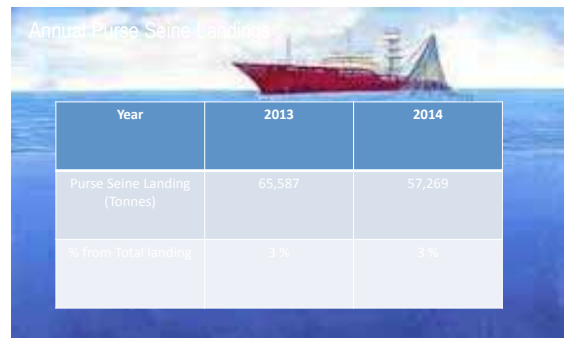
Sabah: 2<sup>nd</sup> largest state, longest coastline approximately 1,600km, territorial waters extend to 12 nautical mile to 200nm, EEZ cover around 55,805 sq km

**Fisheries Operational Zone for Sabah**



- Waters area in East Coast & Tawau is very narrow to border
- Number of purse Seine vessel are decreasing currently
- Many apply to change their operation to West Coast

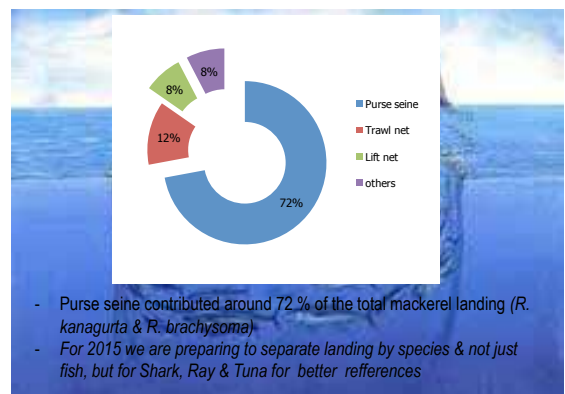
**Overview**



Number of Purse Seine vessels

2013			2014		
Fish PS	Anchovy PS	Others Seine	Fish PS	Anchovy PS	Others Seine
228	5	43	225	5	6

**Mackerel landing by Purse Seine 2014:**

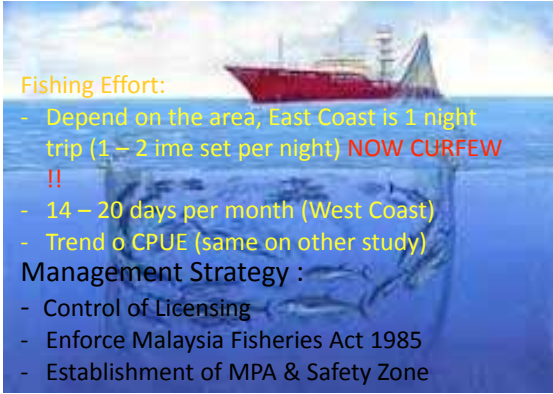


Fishing Effort:

- Depend on the area, East Coast is 1 night trip (1 – 2 ime set per night) **NOW CURFEW !!**
- 14 – 20 days per month (West Coast)
- Trend o CPUE (same on other study)

Management Strategy :

- Control of Licensing
- Enforce Malaysia Fisheries Act 1985
- Establishment of MPA & Safety Zone



Thank You Very Much  
For Your Kind Attention





**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
PURSE SEINE FISHERIES IN THE SOUTHEAST ASIAN  
REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**Country Presentation  
PHILIPPINES**

**Country Report for the Purse Seine Fishery in the Philippines**

by

**Mr. Napoleon Lamarca**



# Purse seine Fisheries in the Philippines

The Core Expert Meeting For Comparative Study On Purse Seine Fishery In the Southeast Asian Region  
9-11 August 2016  
Furama Hotel, Kuala Lumpur, MalaysiaO

## Classification of Fish Capture

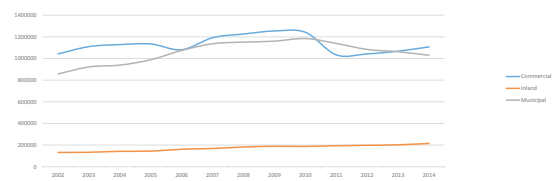
- Municipal fishing – refers to fishing within municipal waters using fishing vessels of 3 GT or less, or fishing not requiring the use of fishing vessels
- Commercial fishing – taking of fishery species by passive or active gear for trade, business or profit beyond subsistence or sports fishing, to be further classified as:
  1. Small scale commercial fishing – 3.1 GT up to 20 GT
  2. Medium scale commercial fishing – 20.1 GT up to 150 GT
  3. Large scale commercial – more than 150 GT

## Purse seine and Ring net

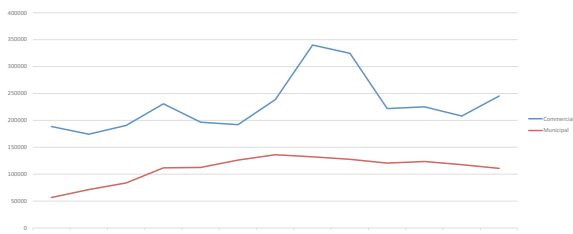
- Purse seine
  - Bunt on one side
  - Mechanically hauled by power block or improvised hauling device
  - Active
  - Minimum mesh size requirement (Tuna Purse seine: 3.5 inches, Sardine Purse seine: 1.9 cm)
- Ring net
  - Bunt at the center
  - Manually hauled on both sides
  - No power block or hauling device
  - Active
  - 1.9 cm



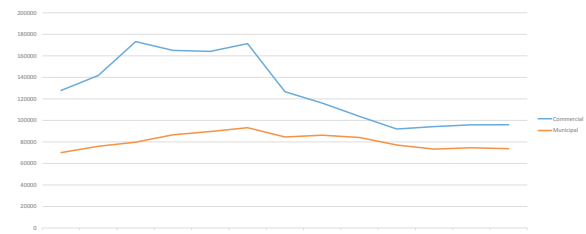
## Production all sector 2002-2014



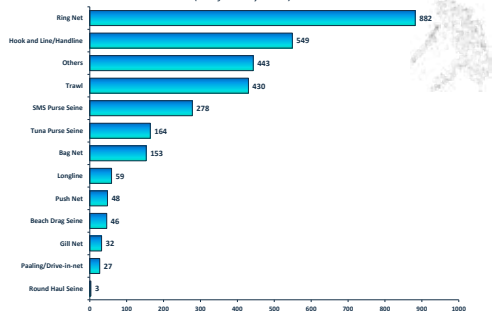
## Sardine production



## Small tuna



Number of Commercial Fishing Vessels, by fishing gear type (as of 04 July 2016)



## Number of Tuna Purse seine, Sardine Purse seine and Ring net by Gross tonnage (2016)

Fishing vessel	Small scale (3.01-20GT)	Medium scale (20.01-150GT)	Large scale (150.01-750GT)	>750GT	Total
Ring net	414	348	1	0	763
Sardine Purse seine	14	220	57	2	293
Tuna Purse seine	2	64	56	30	152

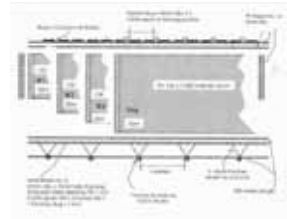
## Ring net for small pelagics in Sindangan and Dipolog, Zamboanga

- TL 12.19m x TB 2.44m x TD 1.83m (17.90GT)
- 1 operation per night (hours lighting) 10 @an average of 16.6 nights per month @ 12 months per year



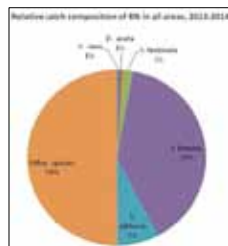
## Typical Ring net for small pelagics (small commercial)

- A typical Ring net gear has a length of around 300m and a net depth of 100m consisting of polyamide (PA) braided materials with mesh sizes of 27-mm and 23-mm in the bunt.



## Catch composition of Ring net for small pelagics in Sindangan and Dipolog, Zamboanga

- Ringnet catches was relatively composed of 50% sardines and herrings while the remaining 50% was composed of other small-pelagic species



## Catch-per-unit of effort (kg/day/boat) of Ring net Sindangan and Dipolog, Zamboanga del Norte

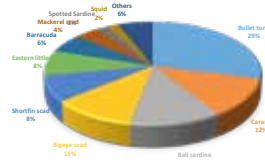
Fishing area	Year		Average
	2013	2014	
Sindangan Bay	217.60	609.50	413.55
Dipolog Bay	86.50	130.82	217.32

## Production estimates of Ring net in Sindangan and Dipolog, Zamboang del Norte

Year	Average CPUE (kg/day)	Number of trips/year	Estimated no. of fishing boat	Estimated annual production (kg)
2013	152.05	200	47	1,429,270
2014	370.16	200	47	3,479,504

## Relative abundance on the catch composition of Purse seine F/V Alfonso (185GT) and F/V Cristina V (186GT), June 17-23, 2015 in Sulu Sea

- 16 fishing operation
- Of the total catch of 16,000kg, Bullet tuna contributed 4,640kg or 29%, Caranx and Bali sardine had 1,920kg (12%) each, Bigeye scad 1,760kg (11%), Shortfin scad and Eastern little tuna had 1,280kg (8%) each, Barracuda 960kg, Mackerel scad 640kg (4%), Goldstripe sardine and Squid 320kg (2%) each, and others 960kg (6%)

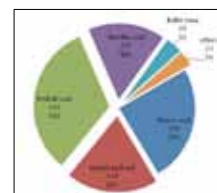


## Areas of operation F/V Alfonso and F/V Cristina



## Catch composition of (F/B Leonida (Purse seine, 29GT) and F/B Alren (Ring net, 14GT) in Camotes Sea and Tañon Strait

- 10 species were identified
- Estimated total catch of 471 kgs.
- Redtail scad contributed 232kg (33%), Bigeye scad: 176kg (25%), Indian mackerel 20%, Shortfin scad 16%, bullet tuna 3%.
- Other species that comprise the remaining 3% are the black-barred half beak, eastern little tuna, flying fish, oldstripe sardinella and indian mackerel.



## Area of operations of F/B Leonida and F/B Alren



## Catch composition of Tuna Purse seine (150GT) in Celebes Sea, July 23-August 8, 2010

- Four (4) fishing operations were observed.
- The total catch was estimated at about 78.5 tonnes.
- In terms of composition yellowfin tuna yielded 5.43 tons, Skipjack 22.002 tons, Bigeye 8.7 tonnes. Mackerel scad yielded a total of 9.56 tons for four operations. Other catch comprised of rainbow runner, kawa-kawa, bigeye scad, bullet tuna, frigate tuna, and oxeve scad.

Species	1st Set	2nd Set	3rd Set	4th Set	TOTAL
YFT	1,762.11	1,027.91	1,747.48	893.33	5,430.82
SKJ	1,891.24	2,018.21	3,279.88	1,550.82	8,740.15
BSL	1,867.03	10,065.99	8,347.58	1,722.34	22,002.93
MSC	3,274.02	1,842.72	2,795.97	1,643.79	9,556.43
BRL	161.41	-	-	-	161.41
KAW	107.61	225.64	-	586.02	919.27
BES	-	-	134.42	-	134.42
RLI	489.62	8,962.87	10,377.34	1,415.03	21,244.86
FRS	887.78	2,231.32	1,317.33	5,631.55	10,067.98
OCX	59.19	125.35	-	57.17	241.71
TOTAL	10,500.00	26,500.00	28,000.00	13,500.00	78,500.00

## Catch composition of Tuna Purse seine (150GT) in Celebes Sea, August 8-25, 2010

- Eight (8) fishing operations were observed.
- The total catch was estimated at about 82.05 metric tonnes.
- In terms of composition yellowfin tuna yielded 3.05 tons, Skipjack 45.5 tons, Bigeye 0.75 tonnes. Mackerel scad yielded a total of 25.3 tons for four operations. Other catch comprised of rainbow runner, kawa-kawa, bigeye scad, bullet tuna, frigate tuna, and oxeve scad

## Catch composition of Tuna Purse seine (150) in Celebes Sea, August 25-September 9, 2010

- Eight (8) fishing operations were observed.
- The total was estimated at about 64.1 metric tonnes.
- Yellowfin tuna yielded 6.1 tons, Skipjack 45.4 tons, Bigeye 0.54 tonnes
- Mackerel scad yielded a total of 7.1 tons.
- Other catch comprised of rainbow runner, kawa-kawa, bigeye scad, bullet tuna, frigate tuna, and oxeve scad

## Purse seine and Ring net Fishing Grounds



## Regulations relevant to Purse seine and Ring net

- Fisheries Administrative Order No. 155-1: Regulating the use of fine meshed net (1.9 cm)
- Fisheries Administrative Order No. 198: Rules and Regulations on Commercial Fishing (No person shall operate a commercial fishing vessel in Philippine waters without a license duly granted by the BFAR)
- R.A. 10654: Commercial Purse seine and Ring net prohibited in municipal waters, however, small and medium commercial Purse seine and Ring net may be allowed to operate within 10.1 to 15 kilometres with depth of 7 fathoms deeper
- FAO No. 236: Rules and Regulations of Purse seine and Ring net Vessels Using Fish Aggregating Devices (FADs) during the FAD closure Period as Compatible Measures to WCPFC CMM 2008-01 (depth limit to 115 fathoms and onboard fisheries observers)
- Fisheries Administrative Order No. 244: National Fish Aggregating Device (FAD) Management Policy (BFAR may allocate to individual fishing companies to deploy up to 40 FADs for each licensed purse seine or ring net catcher)

## Management Measures (HIGH SEAS)

- FAO 245 "Regulation on Group Tuna Purse Seine Operation in High Seas Pocket Number 1 as a Special Management Area"
  - Member Western and Central Pacific Fisheries Commission (WCPFC)
  - Limited access to High Seas Pocket 1 as a conservation measures to reduce effort in the Philippine waters.



## Fishing Vessel Registration and Licensing System

- Registration of commercial fishing vessels is the mandate of the Maritime Industry Authority (MARINA) while registration of municipal fishing vessels is delegated to the Local Government Units (LGUs)
- Licensing of commercial fishing vessels is the mandate of the Bureau of Fisheries and Aquatic Resources while licensing of municipal fishing vessels is the authority of the Local Government Units (LGUs) or the municipality/city

## COMMERCIAL FISHING

- Authorizes the fishing vessel and owner to conduct commercial fishing in waters beyond fifteen (15) kilometers from the shoreline.
- Issued by the Bureau of Fisheries and Aquatic Resources
- New licenses are issued in BFAR Central Office while renewal of licenses are done in BFAR Regional Field Offices
- Fishing vessel and gear license is issued separately pursuant to the IRR of R.A. 10654.
- Only Filipino citizens are qualified
- If a corporation, must have at least 60% of capital stock owned by Filipinos
- Support vessels such as carriers, lightboats, etc. are also required to be issued with CFVL

- Joint DA-DILG Administrative Order No. 01: Establishment of a Closed Season for the Management of *Galanggang (Decapterus spp.)* in Northern Palawan (November 01, 2015 to January 31, 2016, at least 3 years from the effective date)
- BFAR Administrative Circular No. 255: Establishing a Closed Season for the Conservation of Sardines in East Sulu Sea, Basilan Strait and Sibuguey (December 1 to March 1, 2015 and every such period thereafter)
- Joint DA-DILG Administrative Order No. 02: Establishing a Closed Season for the Conservation of Small Pelagic Fishes in Davao Gulf (June 01 to August 31, commencing 2014 and or thereafter)
- Fisheries Administrative Order No. 167-3: Establishing a closed season for the conservation of sardines and herrings and mackerels in the Visayan Sea, November 15 to February 15, inclusive, of every year



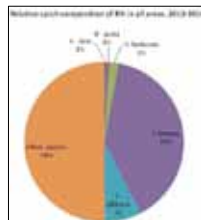
### Summarized catch-per-unit of effort (kg/day) of the different fishing gears sampled operating in Dipolog and Sindangan Bay, Zamboanga Del Norte.

Area	Fishing Gear			
	Ringnet	Bagnet	Drift Gillnet	Scoop net
<b>Sindangan Bay</b>				
2013	217.6	316.67		14.85
2014	609.5	248.23		
Average	413.55	282.45		14.85
<b>Dipolog Bay</b>				
2013	86.5		18.86	20
2014	130.82		9.86	20
Average	217.32		14.36	
All	315.43	282.45	14.36	17.42

### Annual production estimates by fishing gear types.

Fishing Gear	Ave CPUE (kg/day)	Ave Number of Fishing trip/year	Estimated Number of Fishing gear	Estimated production (kg)
Ringnet	315.43	200	47	2,965,042
Bagnet	282.45	120	17	576,198
Drift Gillnet	14.36	220	300	947,760
Scoop net	17.42	60	125	130,650

### Relative catch composition in all areas, 2013-2014



Thank you



**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
PURSE SEINE FISHERIES IN THE SOUTHEAST ASIAN  
REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**Country Presentation  
PHILIPPINES**

**The Report on National Production of Small Pelagics in the Philippines**

by

**Mr. Francisco Torres Jr.  
National Fisheries Research and Development Institute (NFRDI)**

# Country Report



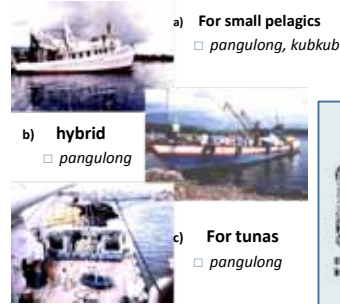
## Core Expert Meeting on Comparative Studies for Purse Seine Fisheries in the Southeast Asian Region

Francisco Torres Jr.

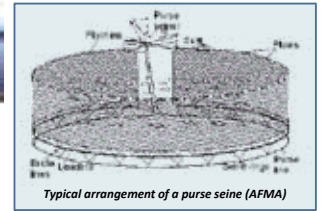
National Fisheries Research and Development Institute - Bureau of Fisheries and Aquatic Resources  
09-11 August 2016, Kuala Lumpur, Malaysia

### Surrounding nets

#### (1) Purse seine



- bunt on one side
- mechanically hauled by power block or improvised hauling devise



### Data Sources

Bureau of Agricultural Statistics  
-Total catch statistics

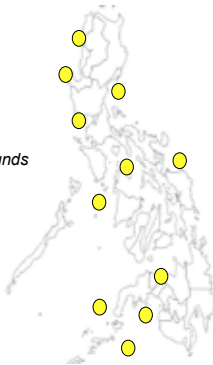
BFAR-National Stock Assessment Program  
- Specific landed catch data

- 34 recorded Fishing grounds

PS fishing grounds



BFAR-NFRDI. NSAP Database



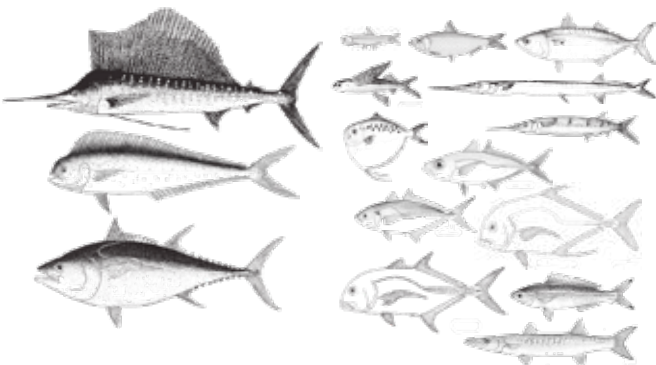
### Data / Sample Collection



### Pelagic fishes: Two main classifications

Large pelagics

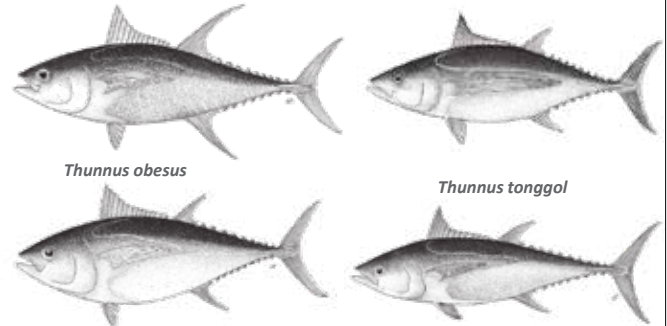
Small pelagics



### Family Scombridae – *Thunnus* spp.

*Thunnus albacares*

*Thunnus alalunga*



*Thunnus obesus*

*Thunnus tonggol*

### Family Carangidae

6 Common *Decapterus* species, Roundscads (local: galonggong) caught in Philippine waters

Dusky brown tail

*Decapterus macrosoma*  
Shortfin scad



*Decapterus russelli*  
Indian scad



Yellowish tail

*Decapterus macarellus*  
Mackerel scad



*Decapterus maruadsi*  
Japanese scad



Reddish tail

*Decapterus tabl*  
Roughear scad



*Decapterus kurroides*  
Redtail scad



### Family Clupeidae

*Sardinella gibbosa*

Goldstripe sardinella (tamban)



*Amblygaster sirm*

Spotted sardinella (tunsoy)



*Sardinella fimbriata*

Fringescale sardinella (tamban, lapad)



*Sardinella lemuru*

Bali sardinella (tunsoy)



Pelagic fishes: Small pelagics

NSAP has listed 174 different species (fish & invertebrates)



NSAP recorded top 15 fish species caught by Purse Seine 2013-2015

- Decapterus macrosoma*
- Sardinella lemuru*
- Katgsuwonus pelamis*
- Selar crumenophthalmus*
- Auxis rochei*
- Euthynnus affinis*
- Thunnus albacares*
- Amblygaster sirm*
- Auxis thazard*
- Decapterus macarellus*
- Rastrelliger faughni*
- Rastrelliger kanagurta*
- Sardinella gibbosa*
- Thunnus obesus*
- Coryphaena hippurus*

NSAP recorded top 15 Purse Seine fishing grounds 2013-2015

- Sulu Sea*
- Tayabas Bay*
- Sulade*
- Jolo*
- International Water*
- West Philippines Sea*
- Mati*
- Moro Gulf*
- Ragay Gulf*
- Pamunuan*
- Camotes Sea*
- Kantipayan*
- Balok balok*
- Visayan Sea*
- South Sulu Sea*
- Labuan, Zamboanga*

A sample of growth and maturity information from previous studies.

Species	Stages of maturity				
	Juvenile	I	II	III	IV
1 <i>Atule mate</i>	55	16	19	8	2
2 <i>Alepes melanoptera</i>	75	8	17	0	0
3 <i>Caranx dinema</i>	86	14	0	0	0
4 <i>Caranx malabaricus</i>	92	8	0	0	0
5 <i>Leiognathus bindus</i>	34	22	23	20	1
6 <i>Lutjanus lineolatus</i>	51	0	38	11	0
7 <i>Parupeneus cinnabarinus</i>	57	31	10	1	0
8 <i>Sardinella fimbriata</i>	23	11	8	52	6
9 <i>Saurida tumbii</i>	59	29	12	0	0
10 <i>Sphyraena forsteri</i>	95	5	0	0	0
11 <i>Trichiurus haumela</i>	54	22	12	10	2
12 <i>Upeneus sulphureus</i>	62	19	19	0	0

2003-2004	L <sub>∞</sub>	K	Z	M	F	E
Rastrelliger brachysoma	32.0	0.56	5.96	1.20	4.76	0.80
Rastrelliger kanagurta	35.6	0.52	6.72	1.11	5.61	0.83
Decapterus macrosoma	32.8	0.69	8.03	1.37	6.66	0.83
Decapterus maruadsi	38.3	0.51	6.88	1.07	5.81	0.84
Decapterus russelli	25.5	0.97	8.66	1.83	6.83	0.79
Rastrelliger brachysoma	30.8	1.90	7.61	2.70	4.91	0.65
Rastrelliger kanagurta	29.9	0.71	3.76	1.43	2.33	0.62
Decapterus macrosoma	33.1	0.41	4.38	1.00	3.38	0.77
Decapterus maruadsi	24.4	0.49	3.97	1.19	2.78	0.70
Rastrelliger brachysoma	27.6	0.57	3.59	1.27	2.32	0.65
Rastrelliger kanagurta	34.3	0.54	5.21	1.15	4.06	0.78
Decapterus macrosoma	26.0	0.56	3.02	1.27	1.75	0.58
Decapterus maruadsi	27.5	0.51	5.62	1.18	4.44	0.79



National Fisheries Research and Development Institute  
 101 Bldg. Mother Ignacia Street, South Triangle, Quezon City  
 Tel. 352 3596  
 Website: www.nfrdi.da.gov.ph

**Thank you very much!**



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**Country Presentation  
THAILAND**

**The Report for the Purse Seine Fishery in the Thailand**

by

**Ms. Sampan Panjarat  
Senior Fisheries Biologist, Andaman Sea  
Fisheries Research & Development Center, Thailand**



## Purse Seines Fishery in Thailand

Core Expert Meeting on Purse Seine Fishery in the Southeast Asian Region  
9<sup>th</sup>-11<sup>th</sup> Aug, 2016



**Sampan Panjarat**  
senior fisheries biologist  
&  
**Nuntachai Boonjohn**  
fisheries biologist

Marine Fisheries Research and Development Bureau



### Marine Fisheries Research & Development Centers

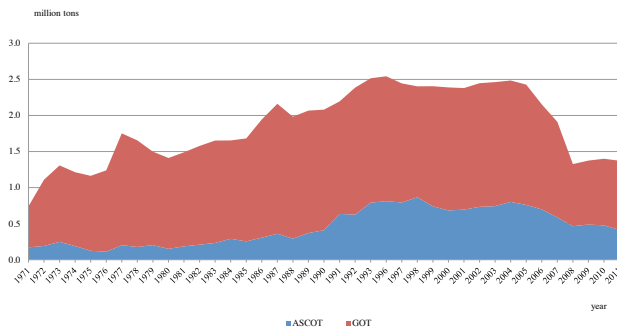
- ❖ 1 Center in ASCoT
- ❖ 4 Centers in GoT



### Fishing and Statistical Areas



### marine capture fisheries production



### Contents

- ❖ **AN OVERVIEW OF THE TRANSITION TOWARDS THE NEW MANAGEMENT REGIME**
  - Legal Framework
  - Fishing Vessels and Licenses
  - Fisheries Management Plan (FMP)
- ❖ **MANAGEMENT MEASURES FOR PELAGIC FISHERIES**
  - Management measure for pelagic fisheries, excluding anchovy fisheries
  - Management measure for anchovy fisheries
- ❖ **HISTORICAL DATA ON FISHING EFFORT OF PURSE SEINES**

### ❖ AN OVERVIEW OF THE TRANSITION TOWARDS THE NEW MANAGEMENT REGIME

#### Legal Framework

❖ **Royal Ordinance on Fisheries B.E. 2558 (2015) : 10 chapters of 175 sections**

- 1) General provision
- 2) Fisheries management
- 3) Fishing Operation in Thai Water
- 4) Fishing Operation Outside the Thai Water
- 5) Conservation and Management Measure
- 6) Aquaculture Promotion
- 7) Control, surveillance, traceability & inspection
- 8) Hygiene Standards of Aquatic animals or aquatic products
- 9) Competent Official
- 10) Administrative Measure: sanctions

❖ **Subordinate legislations: 92**

- Majority of those 92 subordinate legislations are the IUU-related laws

## Fishing Vessels and Licenses

Table 1 Number of Thai fishing vessels in 2016 (as of 30 March 2016)

Types of Vessel	Vessel Size (GT)	Fishing Areas		Total
		Andaman Sea	Gulf of Thailand	
Small scale	<10			27,413
	10 - <20	470	2,478	2,948
	20 - <30	421	1,907	2,328
	30 - <60	555	2,625	3,180
	60 - <150	636	2,003	2,639
	>150	32	90	122
Sub total		7,095	9,103	11,217
<b>Grand Total</b>				<b>38,630</b>

Source: DOF E-licensing database, 2016

## Fisheries Management Plan (FMP)

1. Reducing fishing capacity and effort;
2. Rebuilding fish resources through artificial reefs and restocking programs;
3. Minimising IUU fishing of the marine resources through effective compliance and enforcement;
4. Reducing the catch of juveniles of the larger commercial species;
5. Resolving conflicts between artisanal and commercial fishers;
6. Restoring and maintaining critical habitats;
7. Improving fisheries data and information; and
8. Strengthening fisheries management capacity

## MSY & Maximum Allowable Catch

GoT					
Species	MSY (mt)	Max. Allowable Catch (mt)	% MAC/MSY	Estimate catch (mt)	Balance (mt)
1. Demersal	794,772	715,294	90	715,164	130
2. Pelagic	248,176	230,803	93	230,774	29
3. Anchovy	191,785	172,607	90	171,675	932
<b>Total</b>	<b>1,234,733</b>	<b>1,118,704</b>		<b>1,117,613</b>	<b>1,091</b>

ASCoT					
Species	MSY (mt)	Max. Allowance Catch (mt)	% MAC/MSY	Estimate catch (mt)	Balance (mt)
1. Demersal	240,519	216,467	90	214,169	2,298
2. Pelagic	118,477	110,184	93	110,012	172
3. Anchovy	32,944	29,650	90	29,609	41
<b>Total</b>	<b>391,940</b>	<b>356,301</b>		<b>353,790</b>	<b>2,511</b>

## Fishing Day Scheme

Type of Fishing gears		Fishing period per year	
		Gulf of Thailand	Andaman sea
1. Trawl nets	Pair Trawls net	220	250
	Otter board trawls	220	250
	Beam Trawls	220	Not applicable
2. Surrounding nets	Anchovy Surrounding	235	205
	Surrounding nets	220	235
3. Falling nets	Anchovy Falling nets	235	205
4. Others	-	Not defined	Not defined

## Designated Fishing Ground

- Each of fishing vessel has only one fishing ground in a cycle years of licensing whether in GoT or ASCoT
- The Vessel Marking indicates the vessel's GT size (s=10<20GT; m=20<60GT; l=60<150GT; x=>150GT) fishing gear and designated fishing area (T=GoT; A=ASCoT; and H=High sea)
- The port-in port-out controlling Center, VMS and the inspection at sea are employed to monitor, control and surveillance the activities of the vessels.

## ❖ MANAGEMENT MEASURES FOR PELAGIC FISHERIES

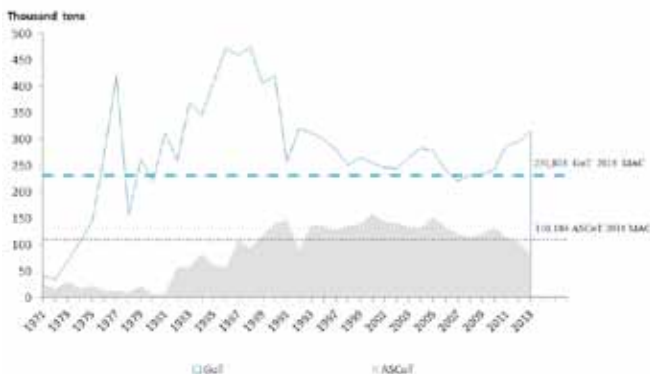


Table 5 Capacity & controlled effort for pelagic resources, excluding anchovy resource, in GoT, 2016

GoT: 248,176 tons MSY/230,803 tons MAC			
Fishing gears	No. of vessel	Designated fishing day	estimated catch
1. Purse seine	748	220	202,430
2. gillnets	621	220	17,640
3. SSF	1,122	NA	10,704
<b>Total</b>	<b>2541</b>	<b>-</b>	<b>230,774</b>

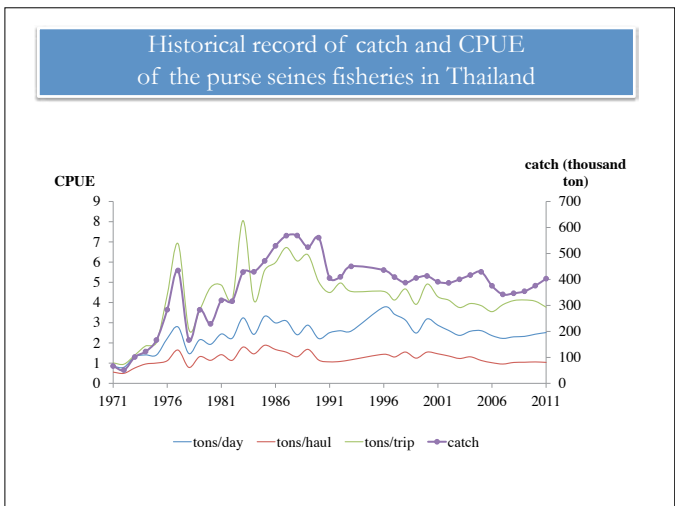
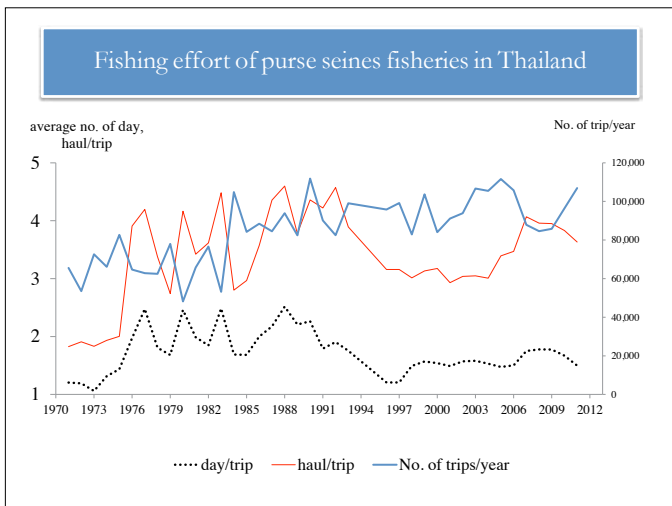
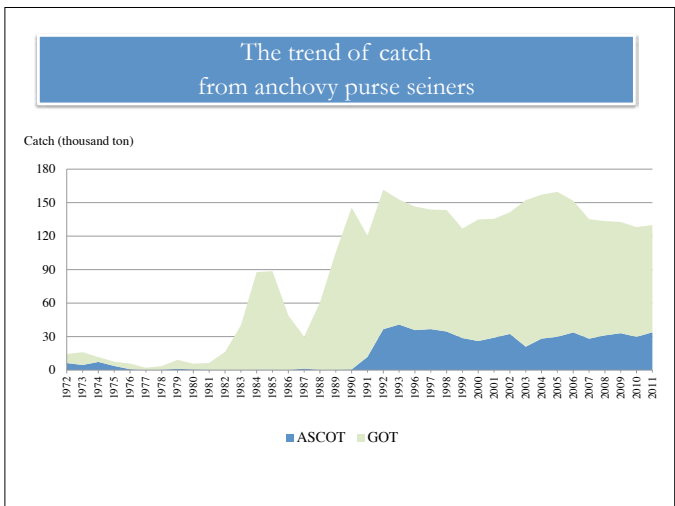
ASCoT: 118,477 tons MSY/110,184 tons MAC			
Area	No. of pr	Designated fishing day	estimated catch
1. purse seines	281	235	99,053
2. gillnets	10	235	252
3. SSF	575	240	10,707
Total	866	-	110,012

Table \* Capacity and controlling effort for anchovy resource, in GoT, 2016

GoT: 191,785 ton MSY/172,607 tons MAC			
Fishing gears	No. of vessel	Allowable Fishing days/yr.	estimated catch
1. PS	207	250	69,675
2. lifting-falling nets	497	250	91,730
3. SSF	82	235	10,270
total	786	-	171,675

Table 8 Capacity and controlling effort for anchovy resource, in ASCoT, 2016

ASCoT: 32,944 ton MSY/29,650 tons MAC			
Fishing gears	No. of vessel	Allowable Fishing days/yr.	estimated catch
1. PS	82	205	11,583
2. falling nets	132	205	17,158
3. SSF	12	205	868
total	226	-	29,609



- ### Challenges & way forward
- Multidisciplinary approach
  - Scientific & Participatory base: monitoring
  - Traceability: PIPO, logbook, marine catch purchasing document (MCPD), port observation, observer onboard of fishing vessel
  - Adaptive management

- ### Thailand Fisheries Data Statistic
- Fisheries Statistic Authority
    - Systematic survey
    - National Statistic Purpose
    - Reference Data Base
  - Marine Fisheries Research and Development Division
    - Random port sampling
    - Stock assessment purpose



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VIET NAM**

**The Report for the Purse Seine Fishery in the Viet Nam**

by

**Mr. Phan Dang Liem  
Research Institute for Marine Fisheries (RIMF), Viet Nam**

## The Purse Seine Fisheries in Viet Nam

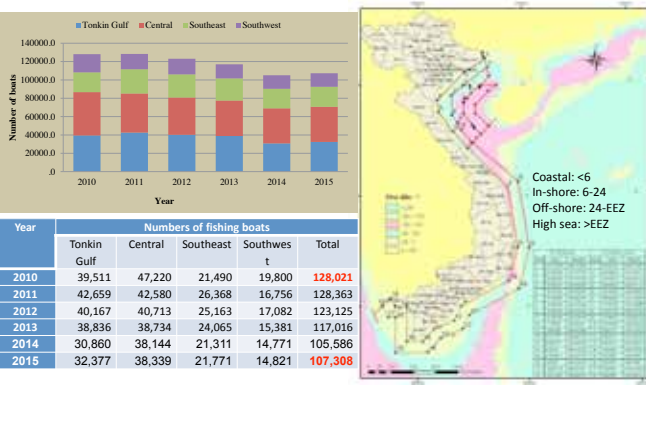
Phan Dang Liem  
Research Institute for Marine Fisheries, Viet Nam

## OVERVIEW OF MARINE CAPTURE FISHERIES

- ❖ Viet Nam has a long coastline of 3,260 km; and a large Exclusive Economic Zone of more than 1 million km<sup>2</sup>;
- ❖ Marine Capture Fisheries plays an important role in the social and economic development of Vietnam;
- ❖ The sector is estimated to contribute about 3.0% GDP;
- ❖ The numbers of boats has increased rapidly from about 79,996 units (2007) up to 107,308 units (2015); A number of boats with engine of over 90 hp increased from 14,000 fishing boats in 2007 up to 30,583 fishing boats in 2015;
- ❖ Fishing yield were increased during past decade but fishing productivity decreased;
- ❖ The marine waters are divided into 4 management areas, including: Tonkin Gulf, Central, Southeast and Southwest.



## FISHING VESSELS & ZONES

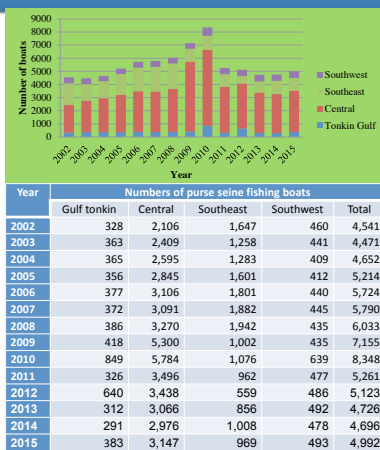


## CATCH, FISHING PRODUCTIVITY, FISHING LABOUR



## NUMBERS OF PURSE SEINE

- The purse seine were well developed in the Central and the Southeast.
- The purse seine in the Gulf Tonkin, Central waters and the Southwest were increased from 2002 - 2015;
- In the Southeast were decreased.



## PURSE SEINE FISHERIES

### TYPE OF PURSE SEINE

#### Luring Purse Seine

- ❖ Anchovy purse seine: target on anchovy
- ❖ Luring purse seine: for small pelagics fishes;

#### Searching Purse Seine

- ❖ Small pelagic fish purse seines;
- ❖ Tuna purse seine;



## PURSE SEINE FISHERIES

### ❖ The luring purse seine:

- This is very popular throughout the whole country.
- The length of the net is about 500 - 900 m and the depth of the net is about 60 - 140 m.
- The mesh size is about 18 -25mm.
- The purse seine have generators a capacity 30 - 60kW are used for the lure lights; about 30 - 60 fishing attraction light, each bulb have capacity 500 - 1.000w



Area	Length (m)	Depth (m)	Mesh size (mm)		
			Wing	Body of net	Bunt
Gulf Tonkin	600 - 800	80 - 125	24 - 25	24 - 25	20 - 22
Central waters	650 - 900	80 - 130	20 - 25	20 - 25	20 - 24
Southeast	500 - 800	100 - 140	24 - 25	20 - 25	20 - 24
Southwest	500 - 650	60 - 80	20 - 25	20 - 22	18 - 20

## PURSE SEINE FISHERIES

### ❖ Anchovy purse seiner:

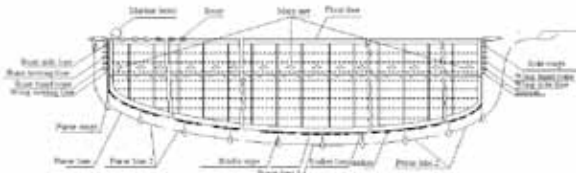
- The net is 200-450 m long and 40-60 m deep.
- Mesh sizes is from 6-10 mm
- The materials used for the net are 210D/6-210D/ 12.
- The boat are about 11 - 21m long with engines of 60 - 350Hp and have generators with a capacity of 10-20 kW that are used for luring anchovy and other fish schools.



## PURSE SEINE FISHERIES

### ❖ The searching purse seiner:

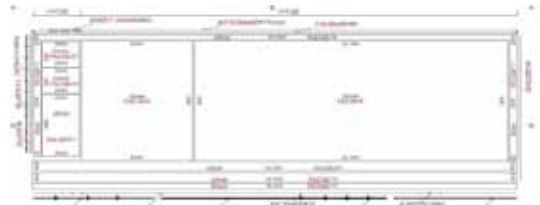
- Have two groups: searching purse seine for catching small pelagic fish and for catching tuna.
- Small pelagic fish purse seiners:
  - + The purse seiners must have powerful engines, of a size suitable for operating in the offshore fishing grounds.
  - + The boats often use engines of more than 90 up to 450Hp.
  - + The sizes of the nets are 500 - 900m long and 60 - 140m deep. Mesh sizes are the same as for the luring method.
  - + Fishing operations are conducted during the day or at nighttime.



## PURSE SEINE FISHERIES

### - Tuna purse seine:

- + The purse seines have a length of 600-1500m and a depth of 70-120 m.
- + In the bunt: mesh size: 30-35mm; the materials: 210D/27; 210D/24; 210D/21;
- + In the body net: mesh size: 25 - 60mm; the materials: 210D/9.
- + In the Wing: mesh size: 30 - 90 mm; the materials: 210D/6.
- + At present, there are many new types of equipment used including: radar, GPS, fish finders, winches and power-blocks, scanning sonar,...



## PURSE SEINE FISHERIES

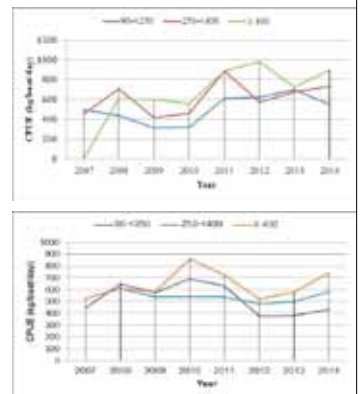
❖ **Fishing yield of purse seine in Vietnam during 2007 – 2014:** In the Gulf tonkin and in the southeast were decreased, while the Central waters and southwest were increased.

Area	Fishing yield of purse seine (1,000 tones)							
	2007	2008	2009	2010	2011	2012	2013	2014
Gulf Tonkin	31.0	17.4	12.8	11.3	12.0	15.7	16.7	17.0
Central waters	29.0	43.9	50.9	68.3	94.4	82.5	91.0	111.7
Southeast	65.8	59.4	63.0	68.5	66.2	61.6	52.9	60.9
Southwest	23.3	58.0	64.6	63.9	64.4	55.4	66.3	66.6

## PURSE SEINE FISHERIES

### ❖ Trend of CPUE by graph

In the Gulf Tonkin: the fishing productivity was increased during 2007-2014.



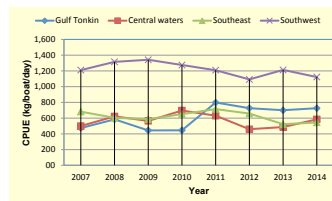
## PURSE SEINE FISHERIES

In the Gulf Tonkin: the fishing productivity was increased during 2007-2014.

- In the Central waters: the fishing productivity was increased from 2007-2014.

- In the Southeast: the fishing productivity was decreased from 2007 - 2014.

- In the Southwest: the fishing productivity was decreased from 2007 - 2014.



Area	2007	2008	2009	2010	2011	2012	2013	2014
Gulf Tonkin	473.9	583.6	443.6	445.1	798.0	726.4	700.0	725.6
Central waters	499.0	621.7	564.8	696.2	630.5	458.4	486.1	584.1
Southeast	682.2	603.4	586.5	650.8	715.1	658.2	522.4	544.6
Southwest	1,210.0	1,315.1	1,341.3	1,275.1	1,208.8	1,091.7	1,212.1	1,122.2

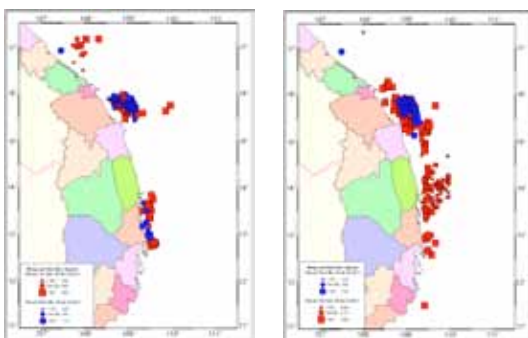
## FISHING GROUND PURSE SEINE

Fishing ground of purse seine fisheries in Gulf tonkin



## FISHING GROUND PURSE SEINE

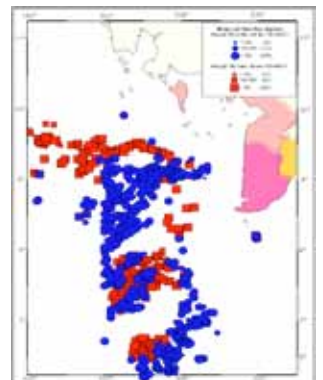
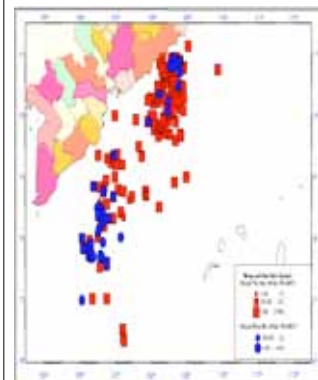
Fishing ground of purse seine fisheries in the Central waters (Blue: NE; Red: SW)



## FISHING GROUND PURSE SEINE

Fishing ground of purse seine fisheries in the Southeast waters

Fishing ground of purse seine fisheries in the Southwest waters



## DOMINANT SPECIES – P/S

17

No	Common name (EN)	Scientific name
1	Yellowtail scad	Atule mate
2	Wolf-herring	Chirocentrus dorab
3	Dolphin fish	Coryphaena spp.
4	Shortfin Scad	Decapterus macrosoma
5	Japanese scad	Decapterus maruadsi
6	Torpedo scad	Megalaspis cordyla
7	Black Pomfret	Parastromateus niger
8	brachysoma	Rastrelliger brachysoma
9	Indian Mackerel	Rastrelliger kanagurta
10	Herring	Sardinella spp.
11	Japanese mackerel	Scomber spp.
12	Scomberoides	Scomberoides spp.
13	Bigeye scad	Selar spp.
14	yellowstripe scad	Selaroides leptolepis
15	Barracuda	Sphyrna spp.
16	Anchovy	Stolephorus spp.
17	Japanese horse mackerel	Trachurus japonicus
18	Mairtail	Trichurus spp.

## MANAGEMENTS – P/S

19

### Fishing closure:

- ❖ Season: There is no season fishing closure;
- ❖ Area close: it was identified the areas for protection (spawning, nursering grounds), but not yet implemented;
- ❖ MPA, Fisheries Refugium;



## STANDING BIOMASS

18

The estimated standing biomass of the biomass of the fishery resources in Vietnam 2011-2013

Sea area	Area	Group	Biomass (x1,000 t)	(%)	Fishing potential (x1,000t)	(%)
Coastal seawater	Gulf Tonkin	Pelagic fishes	391.90	9.22	156.80	8.97
		Bottom fishes	82.90	1.95	40.20	2.30
	Central water	Pelagic fishes	162.10	3.81	64.90	3.71
		Bottom fishes	67.30	1.58	33.60	1.92
	Southeast	Pelagic fishes	277.30	6.53	110.90	6.34
		Bottom fishes	101.10	2.38	47.20	2.70
	Southwest	Pelagic fishes	201.50	4.74	80.60	4.61
		Bottom fishes	58.90	1.39	26.20	1.50
<b>Total</b>			<b>1,343.00</b>	<b>31.61</b>	<b>560.40</b>	<b>32.05</b>
offshore	Gulf Tonkin	Pelagic fishes	234.20	5.51	93.70	5.36
		Bottom fishes	41.10	0.97	20.50	1.17
	Central water	Pelagic fishes	454.30	10.69	181.72	10.39
		Bottom fishes	28.40	0.67	14.20	0.81
	Southeast	Pelagic fishes	614.20	14.45	245.70	14.05
		Bottom fishes	148.50	3.49	74.20	4.24
	Southwest	Pelagic fishes	309.00	7.27	123.60	7.07
		Bottom fishes	40.60	0.96	20.30	1.16
	Central of BienDong	Pelagic fishes	1,035.90	24.38	414.40	23.70
	<b>Total</b>			<b>2,906.20</b>	<b>68.39</b>	<b>1,188.32</b>
<b>Total all areas</b>			<b>4,249.20</b>	<b>100.0</b>	<b>1,748.72</b>	<b>100.0</b>

## REMARKS

### ISSUES

- ❑ Decrease of the fishery resources in almost all waters of Viet Nam;
  - ❑ CPUE of purse seine decreased but Fishing yield increased;
  - ❑ Lack of information, which need for managements;
  - ❑ Fishing technique backward;
  - ❑ May share-stock with neighbouring contries;
  - ❑ No effective management tools for purse seines;
- => Need to be improved!**

### FUTURE WORKS

- ❑ Strengthening capacity for various stakeholders (scientists, managers, policy makers, fishermen, etc.);
- study to serve the basis for managemlicaion of EBFM, AFM, CBM, etc as the tools for managements

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT  
RESEARCH INSTITUTE FOR MARINE FISHERIES

**Thank you!**



**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
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REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**REGIONAL SYNTHESIS**

**ANDAMAN SEA**

by

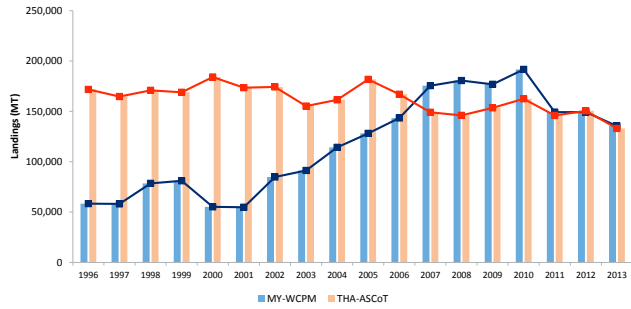
**Mr. Mohammad Faisal Md Saleh  
Senior Researcher  
SEAFDEC/MFRDMD**



# REGIONAL SYNTHESIS FOR CURRENT STATUS OF PURSE SEINE FISHERIES IN ANDAMAN SEA

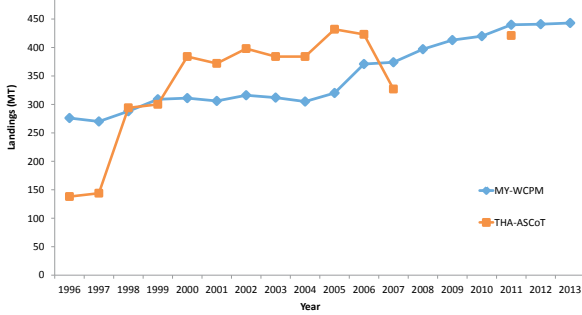
Mohammad Faisal bin Md. Saleh & Raja Bidin bin Raja Hassan  
SEAFDEC/MFRDMD, Kuala Terengganu

Trend of landings in WCPM & ASCoT (1996-2013)

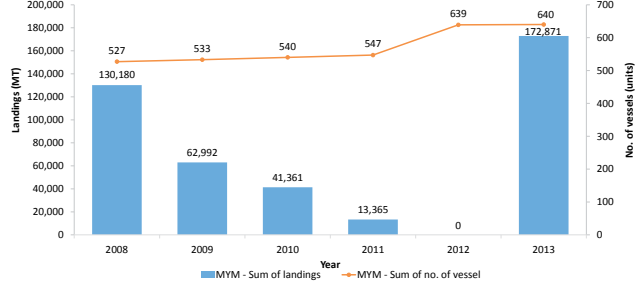


Resources: 1. WCPM : Annual Fisheries Statistics 2000-2007  
2. ASCoT : Statistic provided by the country 2000-2007

Trend of no. of vessels in WCPM & ASCoT (1996-2013)

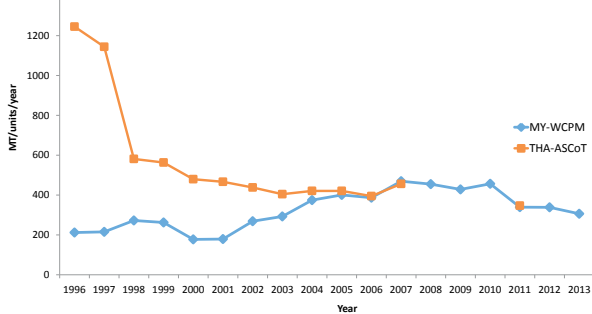


Trend of landings of and no. of vessel in Myanmar (2008-2013)

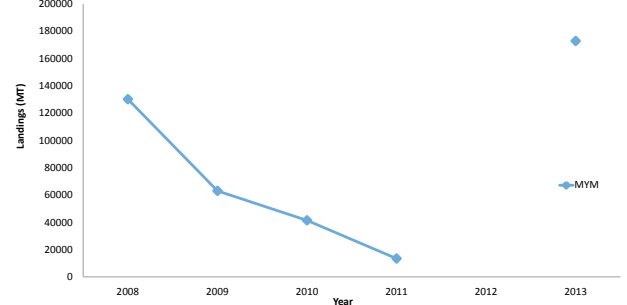


Resources : Fishery Statistical Bulletin of Southeast Asia (2008-2011, 2013)

Trend of CPUE in WCPM & ASCoT (1996-2013)

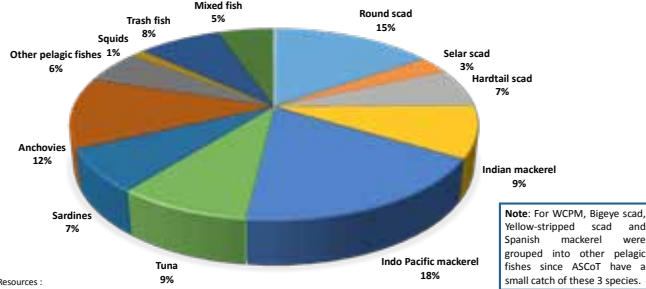


Trend of CPUE in Myanmar (2008-2013)



Resources : Fishery Statistical Bulletin of Southeast Asia (2008-2011, 2013)

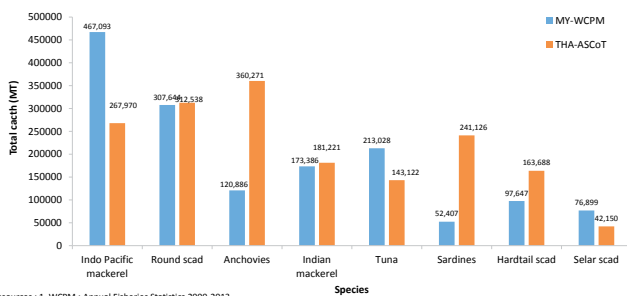
Composition Of Small Pelagic Fishes In Andaman Sea (WCPM & Thailand, 2010-2013)



Note: For WCPM, Bigeye scad, Yellow-striped scad and Spanish mackerel were grouped into other pelagic fishes since ASCoT have a small catch of these 3 species.

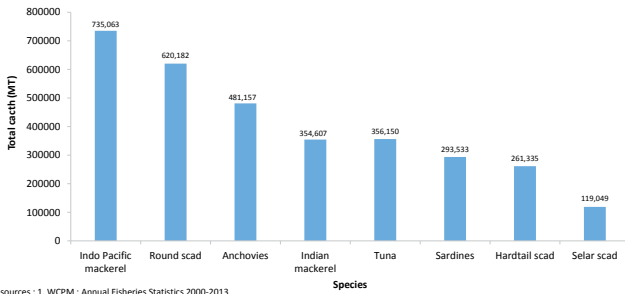
Resources : 1. WCPM : Annual Fisheries Statistics 2000-2013  
2. ASCoT : Statistic provided by the country 2000-2013.

Total catch of 8 major small pelagic fishes in Andaman Sea (WCPM & ASCoT, 2000-2013)



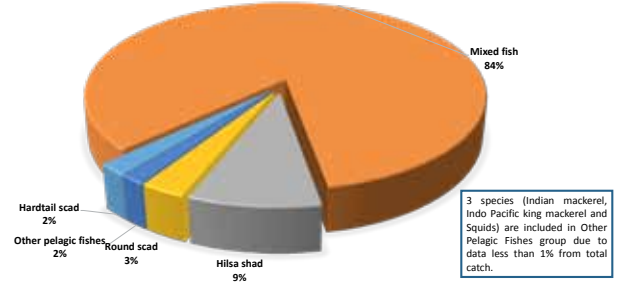
Resources: 1. WCPM : Annual Fisheries Statistics 2000-2013  
2. ASCoT : Statistic provided by the country 2000-2013.

**Total catch of 8 major small pelagic fishes in Andaman Sea (2000-2013)**



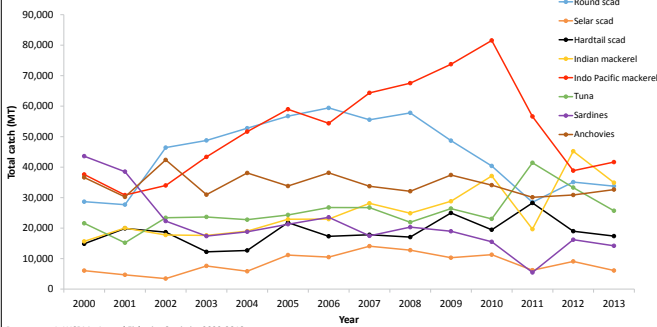
Resources : 1. WCPM : Annual Fisheries Statistics 2000-2013  
2. ASCoT : Statistic provided by the country 2000-2013.

**Composition of Small Pelagic Fishes in Myanmar (2008-2013)**



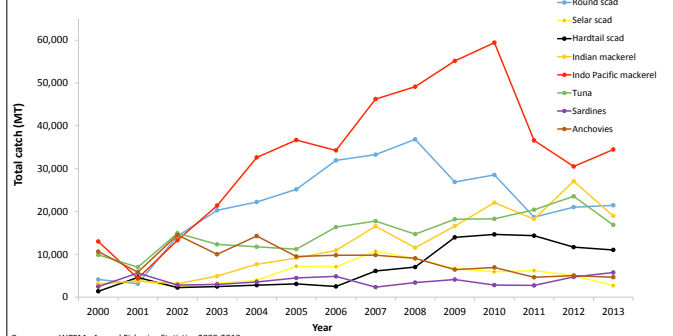
Resources: Fishery Statistical Bulletin of Southeast Asia (2008-2011, 2013)

**Trend of species in WCPM and ASCoT (2000-2013)**



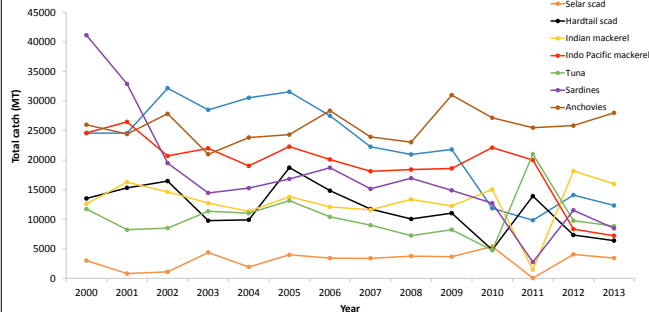
Resources : 1. WCPM : Annual Fisheries Statistics 2000-2013  
2. ASCoT : Statistic provided by the country 2000-2013.

**Trend of species in WCPM (2000-2013)**



Resources : WCPM : Annual Fisheries Statistics 2000-2013

**Trend of species in ASCoT (2000-2013)**



Resources : ASCoT : Statistic provided by the country (2000-2013)

**High catch season of mackerels and scads in Andaman Sea based on local knowledge, 2012**

Species	Country	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
<i>R. kanagurta</i>	Malaysia												
	Thailand												
	Indonesia												
	Myanmar												
<i>R. brachysoma</i>	Malaysia												
	Thailand												
	Indonesia												
	Myanmar												
<i>D. macrossoma</i>	Malaysia												
	Thailand												
	Indonesia												
	Myanmar												
<i>D. maruadsi</i>	Malaysia												
	Thailand												

Resource: Abu-Taliba, Katoh M., Abdul Razak L. & Raja Bidin R. H. (Eds). (2013). Tagging Program for Economically Important Small Pelagic Species in the South China Sea and Andaman Sea.

**High composition of spawner/ big size fish for mackerels and scads in Andaman Sea based on local knowledge, 2012**

Species	Country	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
<i>R. kanagurta</i>	Malaysia												
	Thailand												
	Indonesia												
	Myanmar												
<i>R. brachysoma</i>	Malaysia												
	Thailand												
	Indonesia												
	Myanmar												
<i>D. macrossoma</i>	Malaysia												
	Thailand												
	Indonesia												
	Myanmar												
<i>D. maruadsi</i>	Malaysia												

Resource: Abu-Taliba, Katoh M., Abdul Razak L. & Raja Bidin R. H. (Eds). (2013). Tagging Program for Economically Important Small Pelagic Species in the South China Sea and Andaman Sea.

**Maximum Sustainable Yield (MSY) of small pelagic fishes in the Andaman Sea**

Country	Area	Year	Targeted Species	Total Catch (MT)	MSY (MT)
Malaysia	West Coast of Peninsular Malaysia	1997-1999	<i>Rastrelliger brachysoma</i>	60935 (ave. per year)	129,945
		2013	<i>Rastrelliger brachysoma</i>	127734	112,684
			<i>Rastrelliger kanagurta</i> <i>Encrasicholina heteroloba</i>	29316	
Thailand	Andaman Sea Coast of Thailand	N/A	<i>Rastrelliger kanagurta</i>	-	136,602
			<i>Rastrelliger brachysoma</i>	-	
			<i>Scomberomorus guttatus</i>	-	
Indonesia	West Sumatra Malacca Strait	2013	N/A	-	118477
			<i>Rastrelliger kanagurta</i>	-	241,000
			<i>Rastrelliger brachysoma</i>	-	117,000
Myanmar	Myanmar	2013	N/A	-	110,000

Note: N/A = Data not available

Resource:

1. Pelagic Fish Stock Assessment in the EEZ of the West Coast of Peninsular Malaysia (DOFM, 2013).
2. Country Report of Purse Seine Fisheries in Natuna Sea, Malacca Strait and Western Part of Sumatra, Indonesia (Research Institute for Marine Fisheries, 2013).
3. Country Report Thailand, Report Purse Seine Fisheries in Thailand (SEAFDEC/MFRDMD, 2016).

## Issues and Challenges

- 1) Commitment from member countries to send related data to MFRDMD.
- 2) Data have been sent are not follow requirements or format.
- 3) No data available from the countries itself.

**THANK YOU**



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**REGIONAL SYNTHESIS**

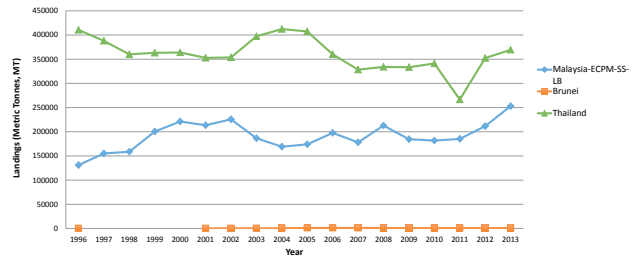
**SOUTH CHINA SEA**

by

**Mr. Raja Bidin Raja Hassan  
Special Departmental Coordinator  
SEAFDEC/MFRDMD**

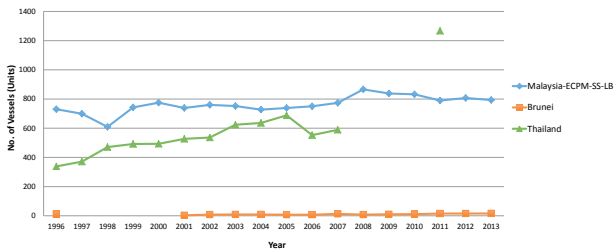
# Regional Synthesis for Current Status of Purse Seine Fisheries in the South China Sea

**Trend of Landings of Small Pelagic Fishes in the South China Sea (Brunei Darussalam, Malaysia and Thailand, 1996-2013)**



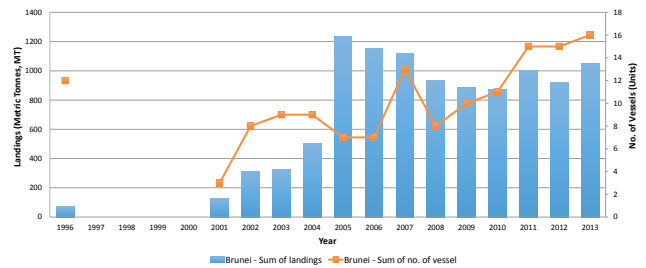
Resources : a. MAL : Annual Fisheries Statistics 1996-2013.  
b. GoT : Statistic provided by the country 1996-2013.  
c. BRU : Current Status of Purse Seine Fisheries in the South East Asia 2015

**Trend of Fishing Effort (No. of Vessels) in the South China Sea (Brunei Darussalam, Malaysia and Thailand, 1996 – 2013)**



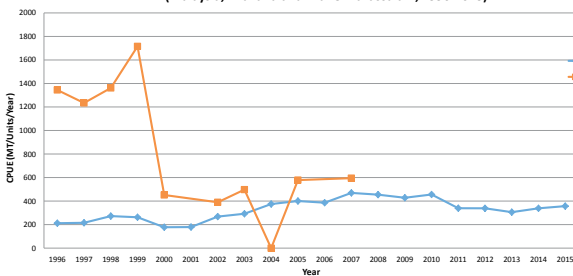
Resources : a. MAL : Annual Fisheries Statistics 1996-2013.  
b. GoT : Statistic provided by the country 1996-2013.  
c. BRU : Current Status of Purse Seine Fisheries in the South East Asia 2015

**Trend of Landings of Small Pelagic Fishes and Fishing Effort (No. of Vessels) in the Brunei Darussalam (1996-2013)**



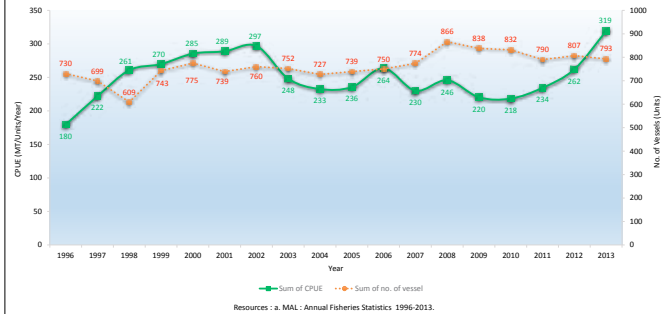
Resources : a. MAL : Annual Fisheries Statistics 1996-2013.  
b. GoT : Statistic provided by the country 1996-2013.  
c. BRU : Current Status of Purse Seine Fisheries in the South East Asia 2015

**Trend of CPUE (MT/Units/Year) in The South China Sea (Malaysia, Thailand and Brunei Darussalam, 1996-2013)**



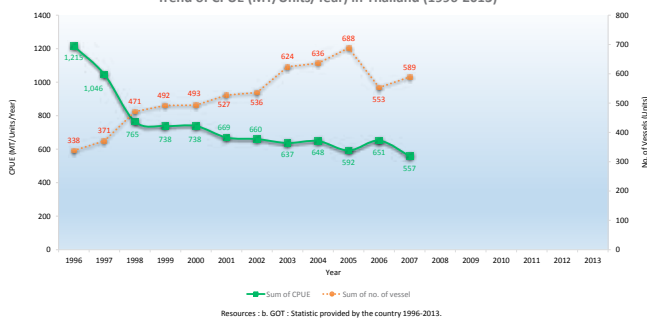
Resources : a. MAL : Annual Fisheries Statistics 1996-2013.  
b. GoT : Statistic provided by the country 1996-2013.  
c. BRU : Current Status of Purse Seine Fisheries in the South East Asia 2015

**Trend of CPUE (MT/Units/Year) in Malaysia (1996-2013)**



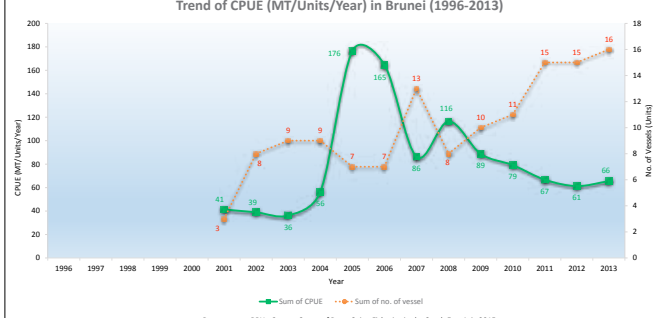
Resources : a. MAL : Annual Fisheries Statistics 1996-2013.

**Trend of CPUE (MT/Units/Year) in Thailand (1996-2013)**



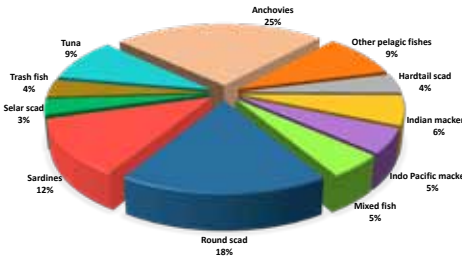
Resources : b. GoT : Statistic provided by the country 1996-2013.

**Trend of CPUE (MT/Units/Year) in Brunei (1996-2013)**



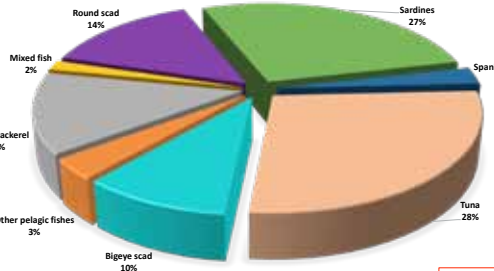
Resources : c. BRU : Current Status of Purse Seine Fisheries in the South East Asia 2015

**Composition of Small Pelagic Fishes in the South China Sea (Malaysia & Thailand, 1996-2013)**



Note:  
 1. Malaysia : Bigeye scad, Yellowtail scad, Spanish mackerel are grouped into other pelagic fishes as the species are not available in the GoT.  
 2. Malaysia & GoT: Crustaceans and squids are grouped into other pelagic fishes due to catch data less than <1% from total.  
 Resources: a. MAL : Annual Fisheries Statistics 1996-2013.  
 b. GoT : Statistic provided by the country 1996-2013.

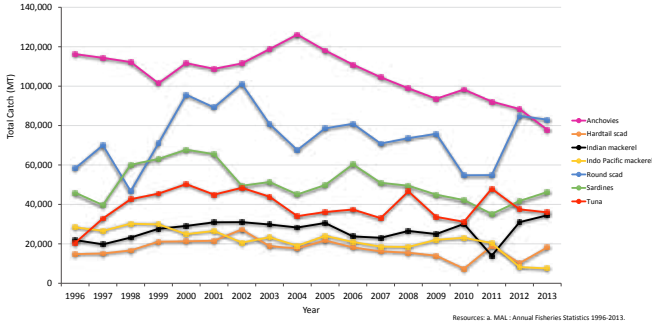
**Composition of Small Pelagic Fishes in Brunei Darussalam (2009-2013)**



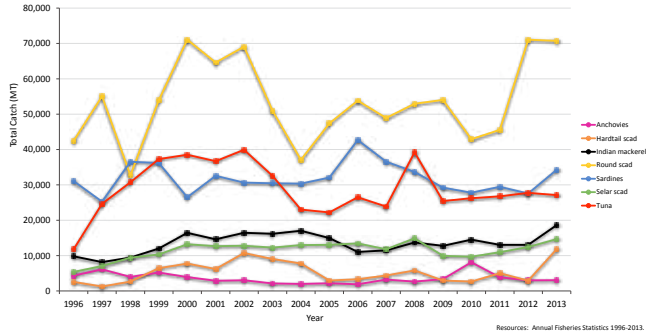
Resources : Fisheries Statistical Bulletin of Southeast Asia 2009-2013.

Selar scad, squids, Indo Pacific mackerel and hardtail scad are grouped into other pelagic fishes due to catch data less than <1% from total.

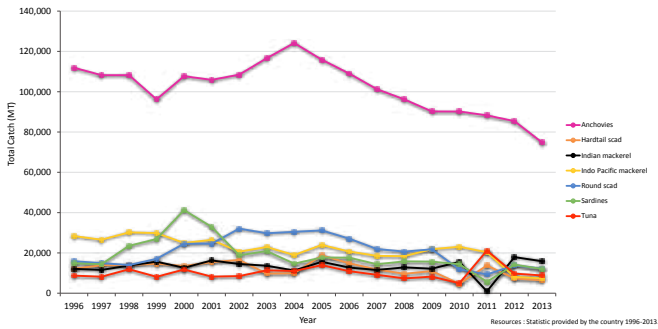
**Trend of Species for 7 major small pelagic fishes in the South China Sea (Malaysia & Thailand, 1996-2013)**



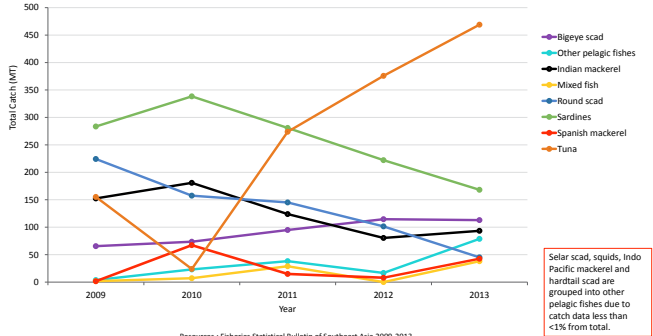
**Trend of Species for 7 major small pelagic fishes in Malaysia (1996-2013)**



**Trend of Species for 7 major small pelagic fishes in Thailand (1996-2013)**

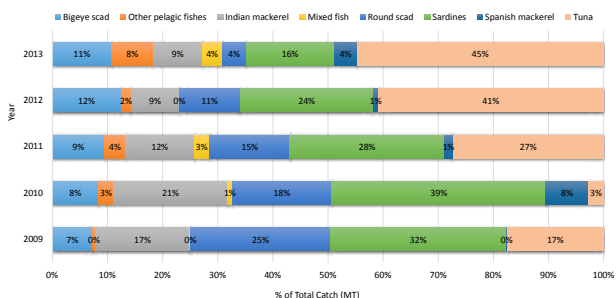


**Trend of Species for 8 major small pelagic fishes in Brunei Darussalam (2009-2013)**

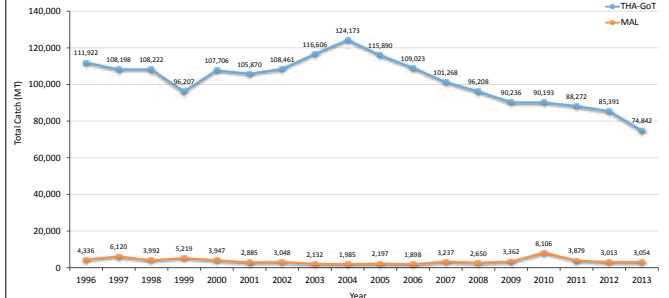


Selar scad, squids, Indo Pacific mackerel and hardtail scad are grouped into other pelagic fishes due to catch data less than <1% from total.

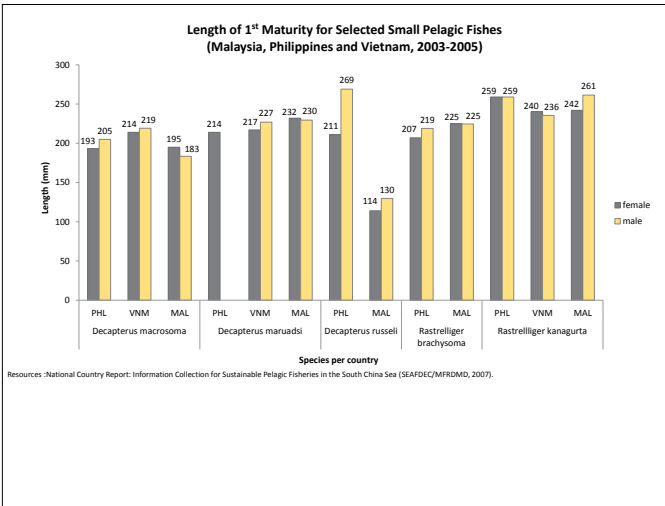
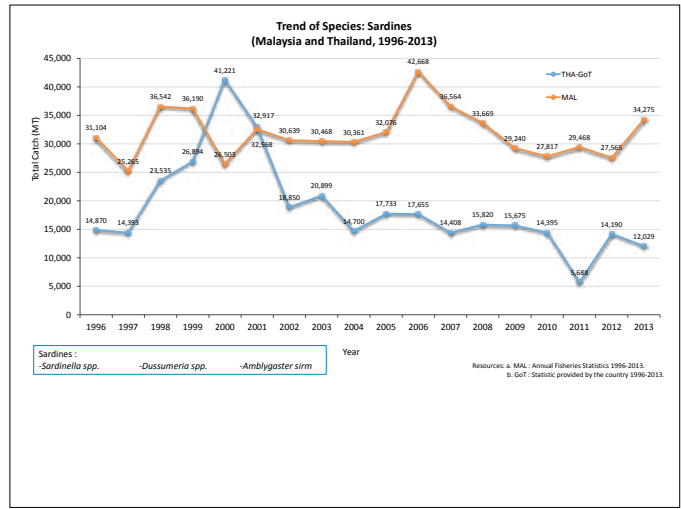
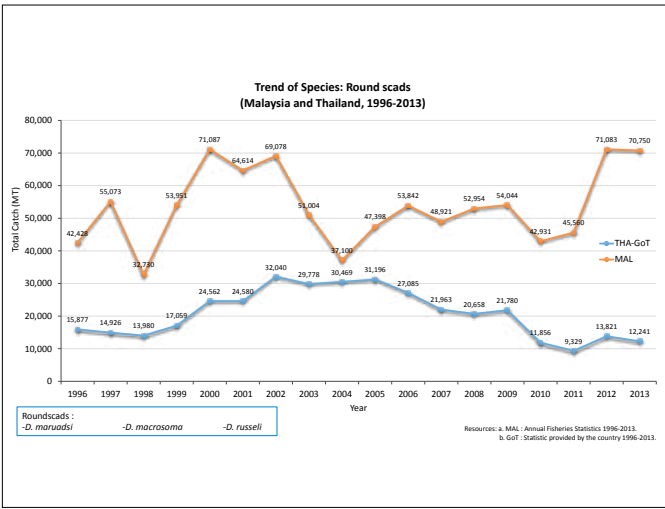
**Trend of Species for 8 major small pelagic fishes in Brunei Darussalam (2009-2013)**



**Trend of Species: Anchovies (Malaysia and Thailand, 1996-2013)**



Anchovies : *Stolephorus* spp.



### ESTIMATION OF THE SMALL PELAGIC FISHES SPAWNING SEASON (2003-2011)

Species	Year	Country	Area	Month												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Rastrelliger kanagurta	2008-2011	Brunei														
	2008-2011	Cambodia														
	2003-2005, 2008-2011	Indonesia														
	2008-2011	Malaysia	ECPM, Sabah, Sarawak													
	2003-2005, 2008-2011	Thailand														
	2008-2011	Vietnam														
Rastrelliger brachyoma	2008-2011	Malaysia	ECPM													
	2003-2005, 2008-2011	Thailand														
	2008-2011	Vietnam														
	2008-2011	Brunei														
	2008-2011	Malaysia	ECPM, Sabah, Sarawak													
	2003-2005, 2008-2011	Thailand														
Decapterus maruadsi	2008-2011	Malaysia	ECPM, Sabah, Sarawak													
	2003-2005, 2008-2011	Thailand														
	2008-2011	The Philippines														
	2008-2011	Vietnam														
	2008-2011	Brunei														
	2003-2005, 2008-2011	Indonesia														
Decapterus macrostoma	2003-2005, 2008-2011	Indonesia	ECPM, Sabah, Sarawak													
	2008-2011	Malaysia														
	2007	Thailand														
	2008-2011	Vietnam														
	2003-2005, 2008-2011	Indonesia														
	2008-2011	The Philippines														
Selar crumenophthalmus	2008-2011	The Philippines														
	2007	Thailand														
Eulimnas affinis	2007	Thailand														
	2007	Thailand														
Thunnus tonggol	2007	Thailand														
	2007	Thailand														

Note: ■ Contribution between CSI indices with local knowledge retrieved from national country report. ■ Local knowledge retrieved from national country report.

Resources: National Country Report: Information Collection for Sustainable Pelagic Fisheries in the South China Sea (SEAFDEC/MFRDMD, 2007); National Report: Tuna Species and Fisheries in the South China Sea and Indian Ocean (SEAFDEC/MFRDMD, 2011); National Report: Fish Stocks and Habitat of Regional and Tuna Subarea Significance in the South China Sea (I-NEP, 2007).

### Maximum Sustainable Yield (MSY) of Small Pelagic Fishes (Metric Tonnes)

The South China Sea					
Country	Area	Year	Targeted Species	Yield, Y (MT)	MSY (MT)
Brunei	Brunei	2002-2006	Rastrelliger kanagurta	N/A	889
Cambodia	Kampot, Sihanoukville	1992-2006	Decapterus maruadsi	N/A	15,467
		1992-2006	Modotus spp.	N/A	5,876
Malaysia	East Coast of Peninsular	1997-1999	Selar crumenophthalmus	113,243	733,000
			Rastrelliger kanagurta		
			Decapterus maruadsi	151,633	518,209
		2013	Selar crumenophthalmus		
			Decapterus maruadsi	189,507	405,332
			Rastrelliger kanagurta		
	Sabah and Sarawak	1997-1999	Decapterus macrostoma	115,990	1,705,000
			Rastrelliger kanagurta		456,940
		2015	Decapterus macrostoma	107,580	799,613
			Decapterus maruadsi		159,771
Sarawak	2013	Rastrelliger kanagurta	24,308	271,852	
		Selar crumenophthalmus		83,731	
Thailand	Gulf of Thailand	2016	N/A	230,774	248,176
Viet Nam	Viet Nam	2011-2013	Small pelagics	N/A	2,649,500
Indonesia	Natuna Sea	2013	Rastrelliger kanagurta	184,000	N/A
			Rastrelliger brachyoma		363,000

Note: N/A = Data not available.

Resources: 1. Eastern Resources Survey in the EEZ of Malaysia 1987-1989: The Status of Demersal and Pelagic Resources (DQNA, 2000). 2. Pelagic Fish Stock Assessment in the EEZ of the East Coast of Peninsular Malaysia (DQNA, 2016). 3. Current Status of Small Pelagic Fisheries in Natuna Sea, Malaysia Strait and Western Gulf of Thailand, Indonesia (Research Institute for Marine Studies, 2016). 4. The Southeast Pelagic Fish Stock Assessment in the EEZ of the East Coast of Peninsular Malaysia (DQNA, 2016). 5. Current Status of Small Pelagic Fisheries in the Eastern Andaman Region (SEAFDEC/MFRDMD, 2012). 6. Pelagic Resources Survey in the EEZ of Malaysia, Sabah and Sarawak Waters (DQNA, 2012). 7. Current Report of Small Pelagic Fisheries in Thailand (SEAFDEC/MFRDMD, 2016).



**THE REGIONAL CORE EXPERT MEETING ON  
“COMPARATIVE STUDIES FOR MANAGEMENT OF  
PURSE SEINE FISHERIES IN THE SOUTHEAST ASIAN  
REGION”  
(JAPANESE TRUST FUND VI)**

**Kuala Lumpur, Malaysia  
09 – 11 August 2016**

**REGIONAL SYNTHESIS**

**Genetic Population on Spotted Sardine (*Amblygaster sirm*) in Southeast Asian  
Region**

by

**Ms. Wahidah Mohd Arshaad  
Senior Researcher  
SEAFDEC/MFRDMD**



**Genetic population of Spotted sardinella (*Amblygaster sirm*) in Southeast Asian region**

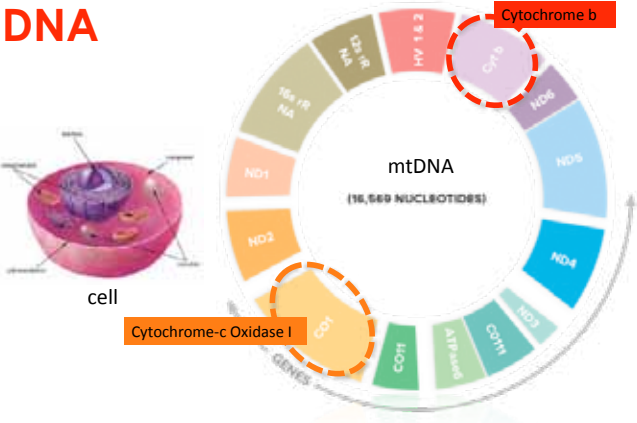
WAHIDAH Mohd Arshaad

**Objectives**

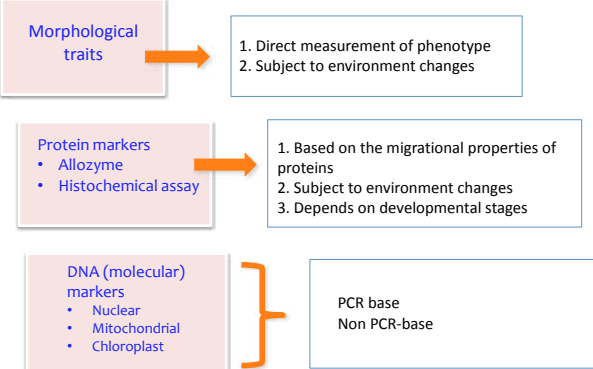
- 1) To identify the level of genetic diversity of Spotted sardinella (*Amblygaster sirm*) in the South China Sea and Andaman Sea.
- 1) To identify the genetic structure of Spotted sardinella (*Amblygaster sirm*) in the South China Sea and Andaman Sea waters by using mitochondrial DNA (mtDNA) cytochrom b (cyt b) marker.

**Introduction**

**Mitochondrial DNA**

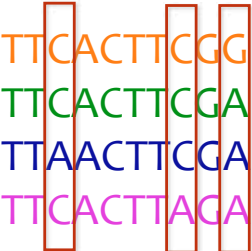


**Genetic Marker**



**Molecular Markers**

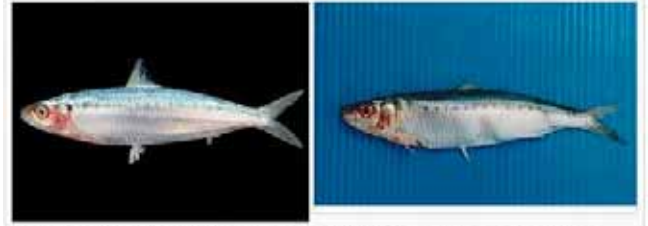
- Proteins**
- **Allozymes** = variations of proteins; population structure
- DNA**
- **mtDNA** = often used in systematics; in general, no recombination = uniparental inheritance
  - **Microsatellites** = tandem repeats; genotyping & population structure
  - **RAPDs** = short segments of arbitrary sequences; genotyping
  - **RFLPs** = variants in DNA exposed by cutting with restriction enzymes; genotyping, population structure
  - **AFLPs** = after digest with restriction enzymes, a subset of DNA fragments are selected for PCR amplification; genotyping



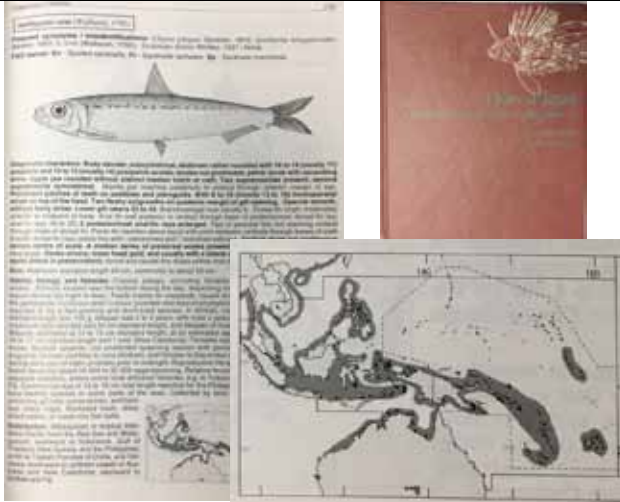
- *Sardinella* is socioeconomically and commercially valuable, particularly in developing countries where they serve as a cheap source of animal protein for millions of people (FAO, 2011).
- Sardines in the region are composed of various genera of clupeoids but the fishery has depended mostly on the two genera, *Sardinella* and *Amblygaster*.

## Amblygaster sirm

**Scientific classification**  
 Kingdom: Animalia  
 Phylum: Chordata  
 Class: Actinopterygii  
 Order: Clupeiformes  
 Family: Clupeidae  
 Genus: *Amblygaster*  
 Species: *A. sirm*  
**Binomial name**  
*Amblygaster sirm*  
 (Vahlbaum, 1792)



Live specimen with golden spots (left), spots becomes black after dead (right).



# Materials & Methods

## Sampling Progress

No.	Country	Site	No. of specimen
1)	Brunei	1) Muara	35
2)	Cambodia	2) Sihanouk Ville	35
3)	Indonesia	3) Banda Aceh	-
		4) Pekalongan	-
4)	Malaysia	5) Kuantan	35
		6) Kuching	35
		7) Kudat	35
		8) Pangkor	-
5)	Myanmar	9) Yangon	35
6)	Philippine	10) Bataan (Zambales)	25
		11) Palawan	23
7)	Thailand	12) Ranong	35
		13) Songkla	35
8)	Viet Nam	14) Khanh Hoa	-
		15) Nghe An	-

## Samples Analysis

- Species confirmation, using mtDNA cytochrome b and DNA barcoding primers.
- mtDNA cytochrome b Primer :  
 F: ASirm15 5' ACC GTT GTA ATT CAA CTA TAG AAA C 3' (Wahidah)  
 R: Trucytb\_R 5' CCG ACT TCC GGA TTA CAA GAC CG 3' (Bautista, unpublished)
- The PCR products were sequence with two direction, forward and reverse
- Sequence analysis

# Result & Discussion

## mtDNA Cytochrome b



srg: Ranong, Thailand  
 ssl: Songkla, Thailand  
 skt: Kuantan, Malaysia  
 skd: Kudat, Malaysia  
 ssv: Sihanouk Ville, Cambodia  
 sbr: Muara, Brunei



*Dussemieria elopsoides*, KALUM I. 17201, 13.8 cm SL, off Terengganu (KTL) 10 Jan. 2009

Morfology: *Dussemieria elopsoides* / *Amblygaster leigaster*  
 DNA Barcode: No data on *Amblygaster leigaster*  
 Close to *Dussemieria elopsoides* (601/655, 92%)

## Ranong, Thailand

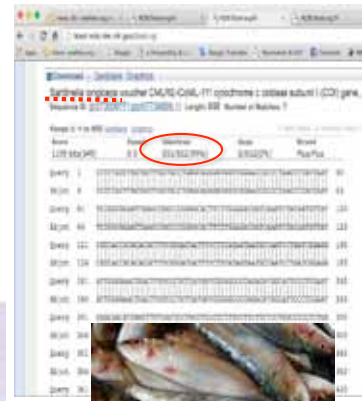


Image copyrights: Mya Than Tun



## 2) Population Structure

Table of genetic variability showing nucleotide diversity, no. of haplotype, haplotype diversity, number of polymorphic sites for 4 locations of *A. sirm*.

Sampling site	No of specimen (n)	No. of haplotype	Haplotype diversity (h)	Nucleotide diversity ( $\pi$ )	No. of polymorphic site
Muara	35	30	0.988	0.0034	43
Kudat	35	25	0.931	0.0024	28

High haplotype with low nucleotide diversities suggest that there has been rapid population growth from a small population.

- Total haplotypes, h: 86
- Haplotypes diversity, Hd: 0.9609
- No. of sharing haplotypes: 8
- Population pairwise (FST) value from Arlequin analysis

	Kudat	Kuantan	Muara	Songkla
Kudat	0.00000			
Kuantan	-0.01282	0.00000		
Muara	-0.00597	-0.00517	0.00000	
Songkla	-0.01400	-0.00821	-0.00260	0.00000

## Conclusion

### Finding so far,

- MtDNA cyt b, showed no significant genetic structure of *Amblygaster sirm* among 4 locations of South China Sea.
- *Amblygaster sirm* is a single evolutionary unit and therefore can be regarded as a single conservation unit for the management of sustainable fisheries.

## Issues and Challenges

- 1) Different legal procedure to export specimen to MFRDMD.
- 2) Available of fish samples (seasonal).
- 3) Different species (cause no specimen from selected sampling sites).
- 4) Until today, no specimen from Andaman Sea.
- 5) Potential to collect a cryptic species of *Amblygaster sirm*. The cryptic species only can be identify after run the genetic analysis.





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**Kuala Lumpur, Malaysia  
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**REGIONAL SYNTHESIS**

**Case Studies and Some Application of Catch and Fishing Effort Management  
Strategies for Purse Seine Fisheries**

by

**Dr. Takashi Matsuishi  
Resource person  
Hokkaido University**

## Case Studies and some Application of Catch and Fishing Effort Management Strategies for Purse Seine Fisheries

MATSUISHI Takashi, Fritz  
Hokkaido Univ.

1

## Agenda of the mini workshop

- ▶ **Additional Explanation (Lecture)**
  - ▶ Validity of Japanese Fishery Management
  - ▶ Maximum Exploitation Rate
  - ▶ Effort Standardization
  - ▶ Calculation of Production Model
  - ▶ Mix species Data
- ▶ **Calculation of ABE (Demonstration)**
- ▶ **Making Table (Workshop)**
  - ▶ Information
  - ▶ Data Collection
  - ▶ Input Control (Implemented / Potentials )
  - ▶ Output Control (Implemented / Potentials )

▶ 2

## Validity of Japanese ABC Rule

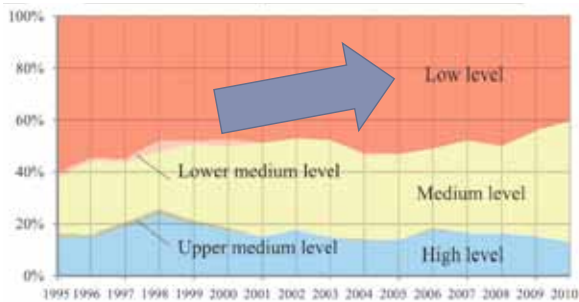
3

## ABC Rule and Required Data

Rule	1-1	1-2	1-3	2-1	2-2
Catch(C)	○	○	○	○	○
Biomass(B)	○	○	○		
Effort		○			
Stock Index		○		○	
S-R Relation(Blimit)	○	△			
Biological Reference Point (BRP)	○		○		
Stock Level(SL)			○	○	○
Trends(TR)			○	○	○

▶ 4

## Stock level of stocks for ABC



▶ 5

## Maximum Exploitation Rate

6

## Conserve 30% of Initial Stock

- ▶ Mace, P.M. (1994). Relationships between common biological reference points used as thresholds and targets of fisheries management strategies. *Canadian Journal of Fisheries and Aquatic Sciences*, 51(1), 110-122.

▶ 7

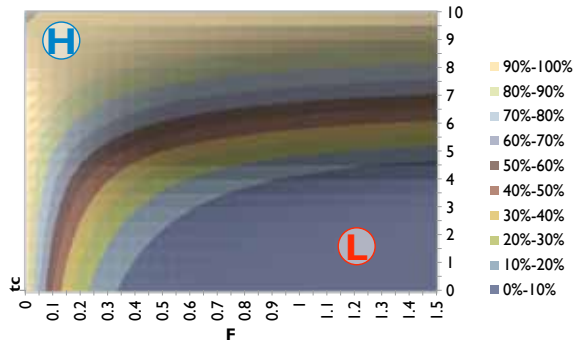
## SPR

### Spawning stock Per Recruitment / SPR

- ▶ Controllable by Fishing Effort and Age at first capture
- ▶ F is Large then the SPR become small
- ▶  $SSB \times RPS = R$ 
  - ▶ SSB=Spawning Stock Biomass
  - ▶ RPS: Recruit per stock affected by Environment not controllable
- ▶ If  $SPR \times RPS = 1$  then the stock will stable
- ▶  $\%SPR = SPRF = F_{current} / SPRF = 0$
- ▶ 30%SPR is recommended through the meta analysis
- ▶ The percentage will be different between the nature of species and ideally identified by species

▶ 8

## %SPR



▶ 9

## Effort Standardisation

▶ 10

## Fishing Effort

- ▶ Quantity of the activity of removal
- ▶ Unit of Effort
  - ▶ Haul
  - ▶ Operation hour
  - ▶ Operation days
  - ▶ Number of gear
  - ▶ Number of vessel
  - ▶ Number of Fisher
- ▶ Standardization is important to compare and aggregate the information

▶ 11

## Standardization

- ▶ Convert Fishing Effort B, C to Fishing Effort A
- ▶ If the Fishing is operated at same site, the CPUE (Stock Index) should be same

$$K_B = \frac{(Y_B/X_B)}{(Y_A/X_A)}, \quad K_C = \frac{(Y_C/X_C)}{(Y_A/X_A)}$$

$$X_T = X_A + K_B X_B + K_C X_C$$

▶ 12

## Example

Fishery	Catch $Y_j$	Effort $X_j$	CPUE $u_j$	Coeff. $K_j = u_j / u_j A_j$	Stand. Effort $K_j X_j$
A	20	10	2.0	1	10
B	48	20	2.4	1.2	24
C	30	10	3.0	1.5	15
Total	98	40			49

▶ 13

## Problems on Production Model

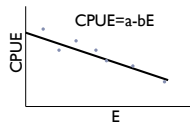
▶ 14

## MSY from Effort and CPUE

$$CPUE = a - bE$$

$$qK = a \quad SY = qKE - \frac{q^2 K}{r} E^2$$

$$q^2 K / r = b \quad CPUE = qK - \frac{q^2 K}{r} E$$



$$MSY = \frac{rK}{4} = \frac{(qK)^2}{4(q^2 K / r)} = \frac{a^2}{4b}$$

$$E_{MSY} = \frac{r}{2q} = \frac{1}{2} (qK) \left( \frac{r}{q^2 K} \right) = \frac{a}{2b}$$

$$MSY = \frac{a^2}{4b}$$

$$E_{MSY} = \frac{a}{2b}$$

▶ 15

## 適用例

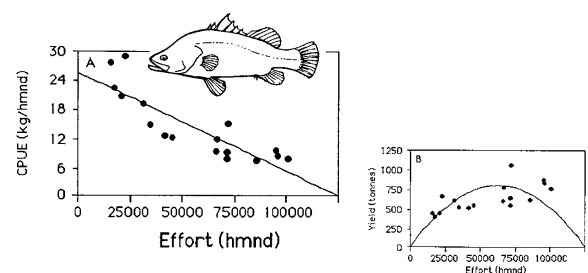
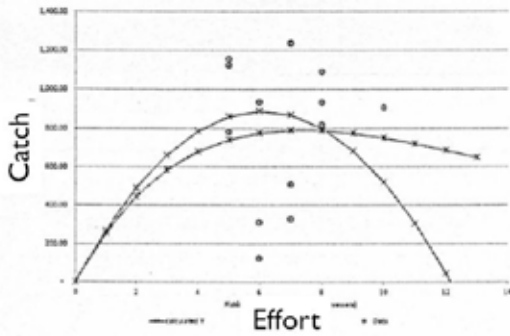


Figure 4.4 Surplus yield analyses of data for the barramundi fishery showing A) catch per unit effort (kg per 100m of net per day) against fishing effort (in 100m net used per day), and B) yield (t) against fishing effort.

King 1995

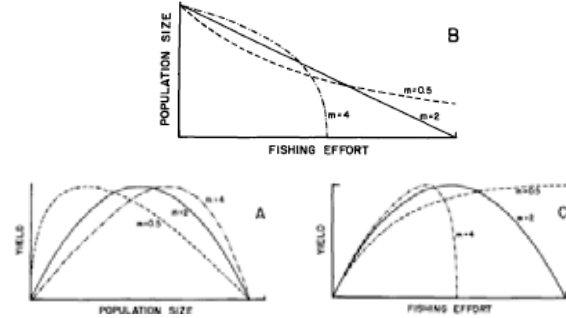
▶ 16

## Example of Production Model Fitting



▶ 17

## Fox Model Fitting



▶ 18

## ASPIC

▶ <http://www.mhprager.com/aspic.html>



▶ 19

## Command Based Interface

```

C:\Users\rod>
C:\rod> ASPIC7
C:\ASPIC7>dir
ドライブ C のボリューム ラベルがありません。
ボリューム シリアル番号は 9422-00B5 です

C:\ASPIC7 のディレクトリ
2016/08/10 12:16 <DIR>
2016/08/10 12:10 <DIR>
508 asplic.sum
1,261 ASPIC7 Suit Ink
2,366 BFT-MAP_aTimp
104,745 BFT-MAP_bip
11,027 BFT-MAP_bot
13,535 BFT-MAP_det
26,127 BFT-MAP_fit
3,289 BFT-MAP_rsdftb
20,091 West Atlantic Bluefin Tuna Result.docx
3 個のファイル 190,059 バイト
2 個のディレクトリ 27,247,349,760 バイトの置き領域
C:\ASPIC7>ASPIC7 BFT-MAP_aTimp
    
```

▶ 20

## Result of Bootstrap

ESTIMATES FROM BOOTSTRAP ANALYSIS		Bias-corrected approximate confidence limits				Inter-quartile range		Relative IQ range	
Param name	Point estimate	80% lower	80% upper	50% lower	50% upper	lower	upper	IQ range	Relative IQ range
B1/K	5.028E-01	5.011E-01	5.102E-01	5.011E-01	5.034E-01	2.270E-03	0.005		
MSY	7.180E-03	6.900E-03	7.781E-03	6.755E-03	7.408E-03	7.534E-02	0.105		
Fmsy	2.311E-01	1.394E-01	2.905E-01	1.867E-01	2.613E-01	7.468E-02	0.323		
q(1)	3.414E-05	2.090E-05	4.143E-05	2.660E-05	3.774E-05	1.113E-05	0.326		
Yc(1991)	1.078E-03	5.422E-02	1.724E-03	8.562E-02	1.371E-03	5.152E-02	0.479		
Yc(Fmsy)	6.234E-02	3.074E-02	1.012E-03	4.731E-02	7.904E-02	3.173E-02	0.509		
Bmsy	3.107E-04	2.742E-04	4.528E-04	2.891E-04	3.760E-04	8.688E-03	0.280		
fmsy(1)	6.768E-03	5.635E-03	7.277E-03	6.021E-03	6.972E-03	9.910E-02	0.140		
Bc/Bmsy	7.789E-02	3.496E-02	1.262E-01	5.425E-02	9.811E-02	4.388E-02	0.563		
Fc/Fmsy	3.914E-00	2.782E-00	5.858E-00	3.345E-00	4.724E-00	1.379E+00	0.352		
Yc/MSY	1.498E-01	6.871E-02	2.385E-01	1.058E-01	1.868E-01	8.102E-02	0.541		

INFORMATION FOR REPEAT (Prager, Porch, Shertzer, & Caddy, 2003, NAJFM 23: 349-361)

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## MSY Result

- ▶ 80% Upper Confidence Limits **7781**
- ▶ 50% Upper Confidence Limits **7488**
- ▶ Point Estimates **7180**
- ▶ 50% Lower Confidence Limits **6735**
- ▶ 80% Lower Confidence Limits **6060**
  
- ▶ Inter quartile range **753**
- ▶ Relative IQ range **0.105**

▶ 22

## PM for Mixed Species Data

## Mixed Species Problem

- ▶ In tropical countries, it is often the case that
  - Fishery information is limited
  - Catch statistics is not available by species
  - Fisheries Management should be applied for multi species gear (purse seine etc)
  - Single species population assessment and fisheries management model are not applicable.

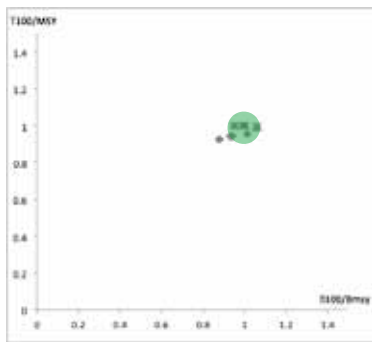
## Surplus production model for Single Species

- Data needed is time series of effort and yield
- It estimates
  - Current Biomass and Productivities :
    - Bt: current biomass
    - r: intrinsic growth rate
    - K: carrying capacity
  - Biological Reference Points (BRP):
    - MSY: Maximum sustainable Yield
    - Emsy: Effort for MSY
    - Bmsy: Biomass for MSY
- Evaluation comparing BRPs and current fishery
- Assumed for closed single population

## objective of this study:

- Conduct stock assessment for fishery with mixed data made by a simulation
- Analyze the result by using BRP to see the production model is applicable for the mixed model
- Give some advise to the fishery if we apply this model

## scenarios 1: three similar species



r is similar among 3 SP

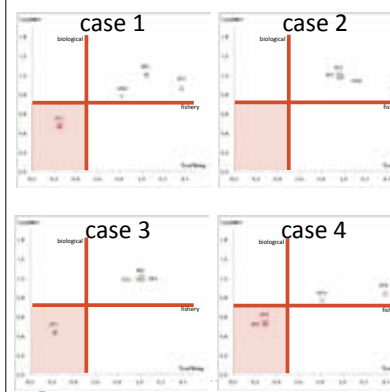
Biological:

$B_{100}$  of every species is almost equal to  $B_{msy}$

Fishery:

total  $Y_{100}$  almost equal to MSY

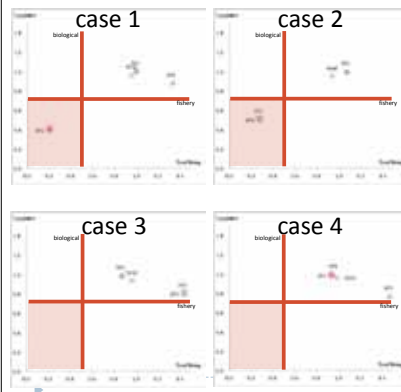
## scenarios 2: one minor species and two major species



r is different among 3 species  
 r-L: r is large  
 r-S: r is small  
 (L is twice than S)

		SP1	SP2	SP3
case	K	minor	major	major
1	r	L	S	L
2		L	S	S
3		S	L	L
4		S	S	L

## scenarios 3: one major species and two minor species



r is different among 3 species  
 r-L: r is large  
 r-S: r is small  
 (L is twice than S)

		SP1	SP2	SP3
case	K	major	minor	minor
1	r	L	S	L
2		L	S	S
3		S	L	L
4		S	S	L

## the similar species :

- looks like single species
- applying the mixed data to surplus production model is valid:
  - fishery aspect: total yield can reach to the sum of MSY
  - biological aspect: the biomass of every species can reach to  $B_{msy}$

## Not Similar Species/ fishery aspect:

	SP1	SP2	SP3	Total Y/MSY
K	minor	Major	Major	
r	L	S	L	0.8
r	L	S	S	1.0
r	S	L	L	1.0
r	S	S	L	0.8

total yield is more than 80% of the total MSY of every species

## Not Similar Species / Biological aspect:

	SP1	SP2	SP3
K	minor	Major	Major
r	L	S	L
r	L	S	S
r	S	L	L
r	S	S	L

- mind the species with small growth rate
- especially in the minor species
- Check Fish Base and find growth rate in literature

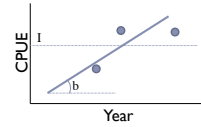


## Calculation of ABC/ ABE An Example

33

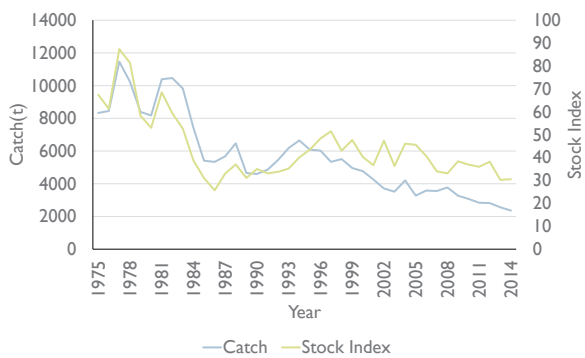
## Rule 2-1 (Feedback Control)

- ▶ Data: C, SL, Stock Index
- ▶  $ABC = \delta_1 \times Ct \times \gamma_1$
- ▶  $\delta_1 = 1.0$  (High)  
0.9 (Middle)  
0.8 (Low)
- ▶  $\gamma_1 = 1 + b / I$ 
  - ▶ b: tangent of the CPUE for recent 5 years (3 years)
  - ▶ I: Average of the CPUE for recent 5 years (3 years)



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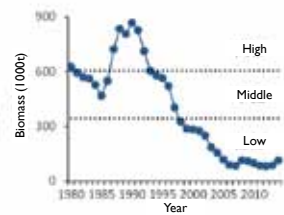
## Data



▶ 35

## Stock Level (SL)

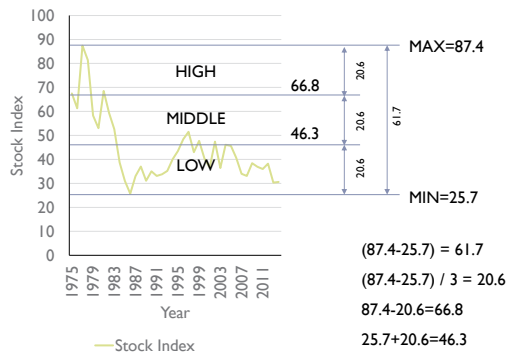
- ▶ Level of the current stock.
- ▶ Categorized as High / Middle / Low.
- ▶ Ideally the thresholds should be decided from long (over 20 years) data series of Biomass,
- ▶ but sometimes by catch or CPUE.
- ▶ Sometimes decided as 33% and 67% of the range or maximum.
- ▶ Sometimes decided as the consensus of stakeholders.



An example of the stock level (Walleye Pollock J-stock). The threshold was decided as the 33% and 67% of the range.

▶ 36

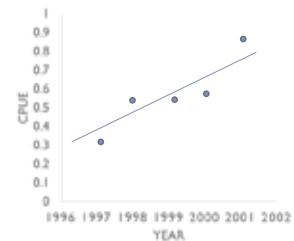
## Stock Level Threshold



▶ 37

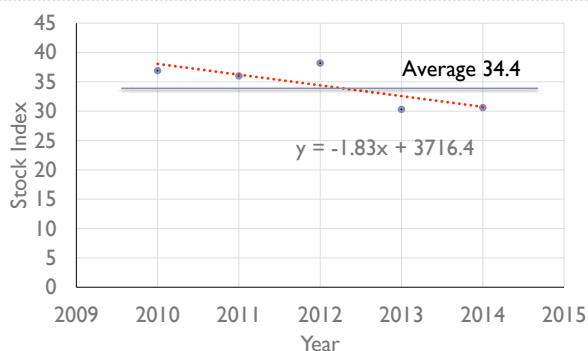
## Trend (TR)

- ▶ Trend of the current biomass.
- ▶ Categorized into Increasing / Flat / Decreasing.
- ▶ Basically decided from 5 years trends of Biomass, Stock Index (CPUE), or Catch
- ▶ Do not need to use statistical test of regression.



▶ 38

## Trends for 5 year



▶ 39

## ABC / ABE Calculation Table 2-1, 3-1

Stock Level	Low
$\delta_1$ [1.0, 0.9, 0.8]	0.8
b	-1.83
I	34.4
$\gamma_1 = 1 + b / I$	$1 - 1.83 / 34.4 = 0.95$
C2014	2,366
$ABC = \delta_1 \times Ct \times \gamma_1$	$0.8 \times 2366 \times 0.95 = 1,792$
E2014	77,873
$ABE = \delta_1 \times Et \times \gamma_1$	$0.8 \times 77873 \times 0.95 = 58,984$

▶ 40

## Work Sheet is Available

- ▶ No Guaranteed



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## DEMONSTRATION

- ▶ EXCEL

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Applicability of MC purse seine data

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## ABC / ABE Rule and Required Data

Rule	1-1	1-2	1-3	2-1	2-2	3-1	3-2
Catch(C)	○	○	○	○	○		
Biomass(B)	○	○	○				
Effort		○				○	○
Stock Index		○		○		○	
Blimit	○	△					
BRP	○		○				
Stock Level(SL)			○	○	○	○	○
Trends(TR)			○	○	○	○	○

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