

# SOP

Standard Operating Procedures

## Sharks, Rays and Skates

Data Collection  
in the Southeast Asian Waters



Southeast Asian Fisheries Development Center

## **PREPARATION AND DISTRIBUTION OF THIS DOCUMENT**

Standard Operating Procedures (SOP) Sharks, Rays and Skates Data Collection in the Southeast Asian Waters was prepared by the SEAFDEC Training Department (TD) in collaboration with SEAFDEC Marine Fishery Resources Development and Management Department (MFRDMD); Department of Fisheries Malaysia; Research Center for Fisheries Management and Conservation, Indonesia; Research Center for Oceanography, Indonesian Institute of Science; and Department of Fisheries Thailand. The Document is distributed to the SEAFDEC Member Countries, SEAFDEC Departments and concerned institutions.

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**Standard Operating Procedures**

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**Sharks, Rays and Skates**  
Data Collection  
in the Southeast Asian Waters

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# ABSTRACT

Over the past two decades, human exploitation of sharks has substantially increased worldwide. Worldwide increasingly concerns and attempts are on sharks conservation and management. The Southeast Asian region has richest elasmobranches in the world but the stock status of elasmobranches and their fisheries of this region are still largely unknown. Due to lack of available catch, landings and trade data as well as limited information on the biology parameters of many species and their identification, the necessary information are required for research, management and conservation of elasmobranches in this region. SEAFDEC in collaboration with its member countries developed “Standard Operating Procedures for Sharks, Rays and Skates Data Collection in the Southeast Asian Waters” (SOP-sharks) to serve as a guideline and reference for enumerators to regionalize sampling method for sharks, rays and skates data collections aiming to ensure that data recording, analysis, compilation, and reporting are be able to compile for the Southeast Asian countries.

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# SOP

## Standard Operating Procedures Sharks, Rays and Skates Data Collection in the Southeast Asian Waters

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### **1** Introduction

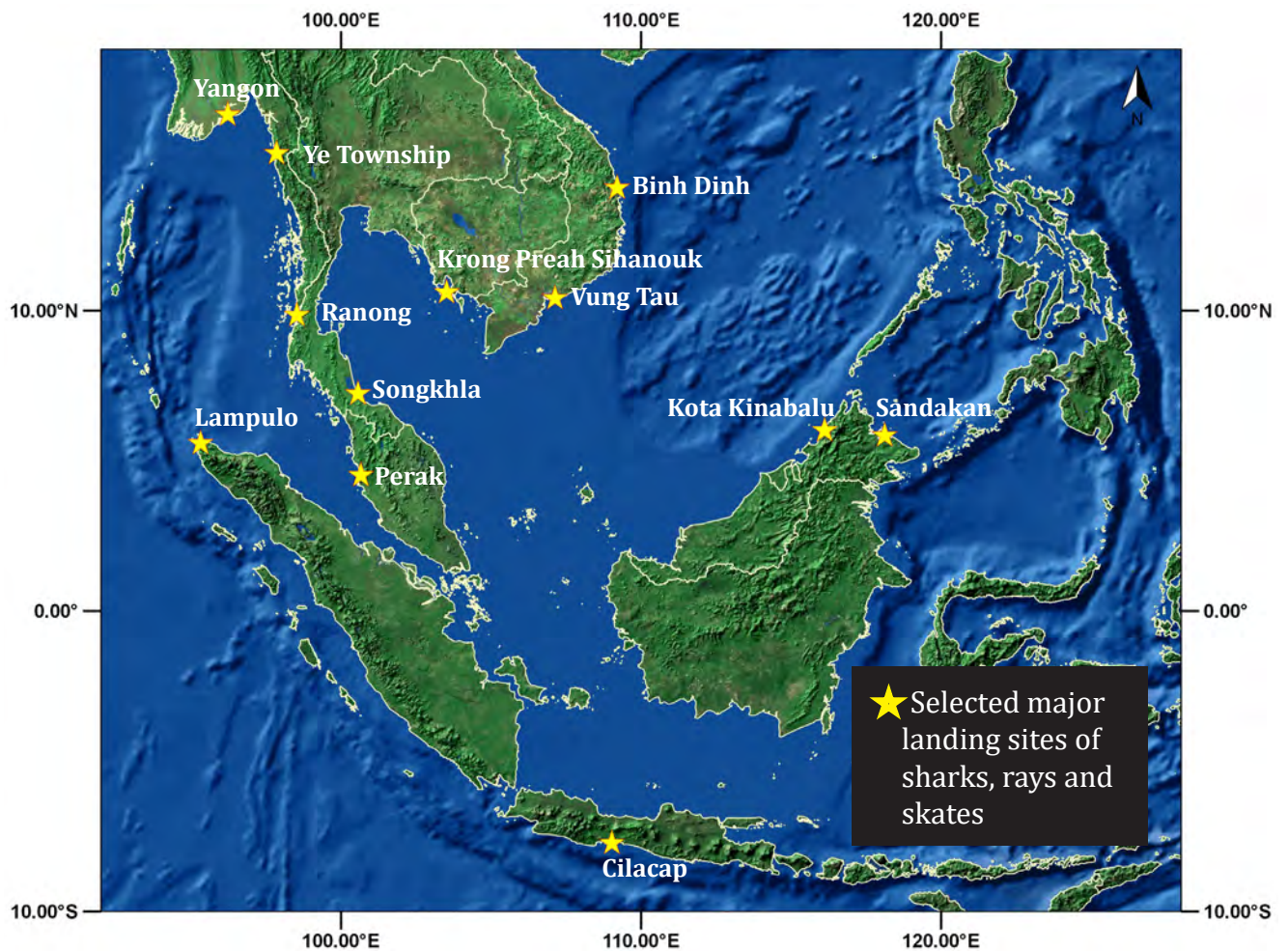
This SOP serves as a guideline and reference for enumerators during their sampling activities for sharks, rays and skates data collections in Cambodia, Indonesia, Malaysia, Myanmar, Thailand, Philippines and Viet Nam from 2015 to 2016. This project was undertaken to address the necessity to record landing of sharks, rays and skates data up to species level which could be used for development of the management of sharks, rays and skates in participating countries. High biodiversity of sharks, rays and skates in some of countries and multi gears are used to exploit these resources and make the project more challenging.

### **2** Objective

To provide standard guidelines for recording landing data of common sharks, rays and skates species at species level in participating countries.

# 3 Sampling at Landing Sites

## 3.1 Identify Landing Sites



- Easy to visit and not far from enumerators office

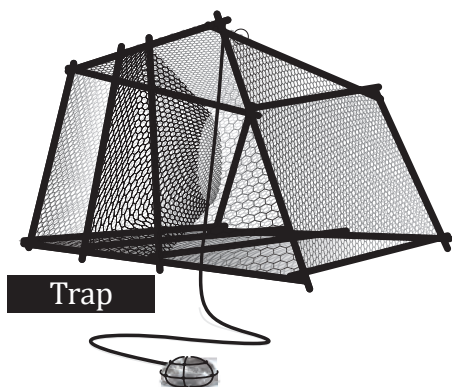
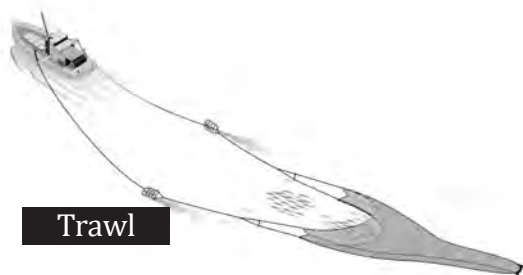
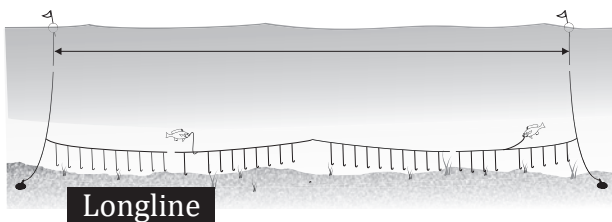
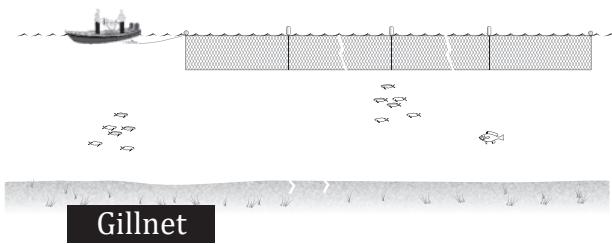


- Good working condition/space area to record length-weight of sharks, rays and skates specimens.



- Good cooperation and communications with local fishers, traders and boat owners

## 3.2 Compiling Fisheries Information at Selected Landing Sites



### Note

Information on fishery profile at study sites is important as a guidance to choose sampling boats.

How many jetties suitable for data collection?

What are main fishing gears landing their catch at the jetties:

- Gillnet
- Longline
- Trawl

What are main fishing gears used for catching sharks and rays at the jetties:

- Gillnet
- Longline
- Trawl

Other types of fishing gear used for catching sharks and rays:

- Bottom gillnet
- Trap
- Miscellaneous e.g. harpoon, spear

Which gears are dominant landing of sharks and rays:

- Gillnet
- Longline
- Trawl

Fishing operation:

- How many days per trip of each fishing operations
- How long is towing time (trawl)

When (what time) all catches were landed?



## Example of Fishery Profile in Manjung District, Malaysia

<b>Gear Type</b>	<b>Fishing Zone</b>	<b>Fishing operation (from coastline)</b>	<b>No. of Fishing Boat</b>	<b>No. of Crew</b>
Trawl				
10 - 24.9 GRT	B	> 5 miles	7	21
25 - 39.9 GRT	B	> 5 miles	28	112
40 - 69.9 GRT	B	> 12 miles	17	85
<b>Total</b>			<b>52</b>	<b>218</b>
Purse Seine				
40 - 69.9 GRT	C	> 12 miles	45	730
> 70 GRT	C2	> 30 miles	6	108
<b>Total</b>			<b>51</b>	<b>838</b>
Purse Seine (Anchovy)	A	All areas	10	180
Gillnet	A	All areas	531	575
Longline	A	All areas	60	127
Trap	A	All areas	5	10
Bottom Gillnet	A	All areas	14	42
<b>Grand Total</b>			<b>723</b>	<b>1,990</b>

### Note

Each participating country should compile this information at their selected study sites and include in their final reports

### 3.3 Sampling Techniques

#### Sample Size



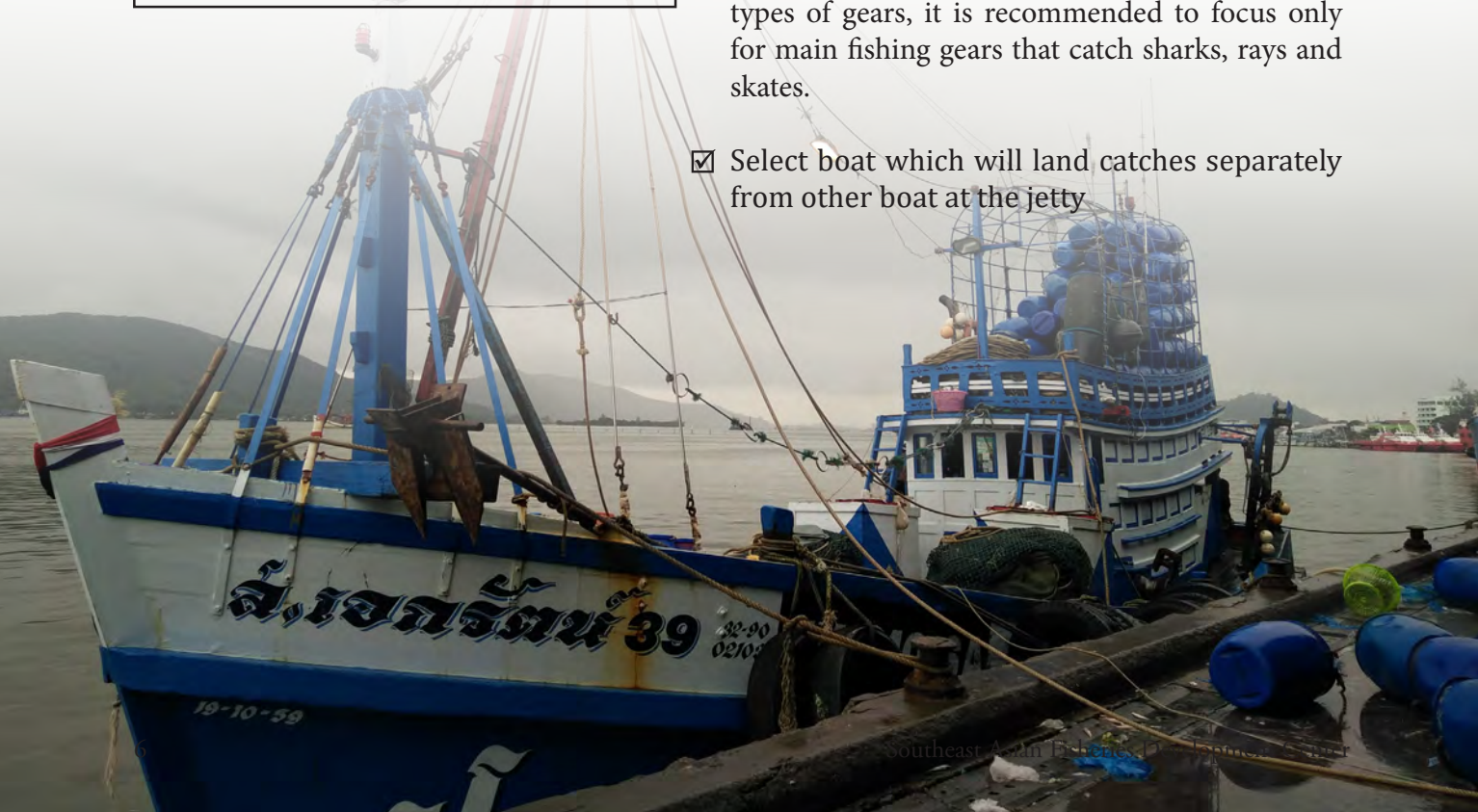
- ☑ Target between 1 - 3 fishing boats per day

#### Sample Day

July						
Mo	Tu	We	Th	Fr	Sa	Su
						1
②	③	④	⑤	⑥	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					



- ☑ Sampling days: Five days per month (Reccomended by SEAFDEC), countries are encouraged to collect landing data more than 5 days/month using national budget.
- ☑ Sampling should be done at least 12 fishing boats/month.
- ☑ In some case, sampling the same boat every day or week is acceptable.
- ☑ Landing data must be collected from multi gear (trawl nets, longlines, gillnets) but if too many types of gears, it is recommended to focus only for main fishing gears that catch sharks, rays and skates.
- ☑ Select boat which will land catches separately from other boat at the jetty





- ☑ If fishing boat without registration number, please record owner's name in the field form.



- ☑ Do not select landing site where boat owner mix together catches of sharks, rays and skates from other boats.

AVOID –Choosing jetty with less cooperation among middlemen and jetty



### 3.4 Sampling of Sharks, Rays and Skates for Recording Landing Data



**Step 1 :** Separate sharks, rays and skates by group (sharks, rays and skates)

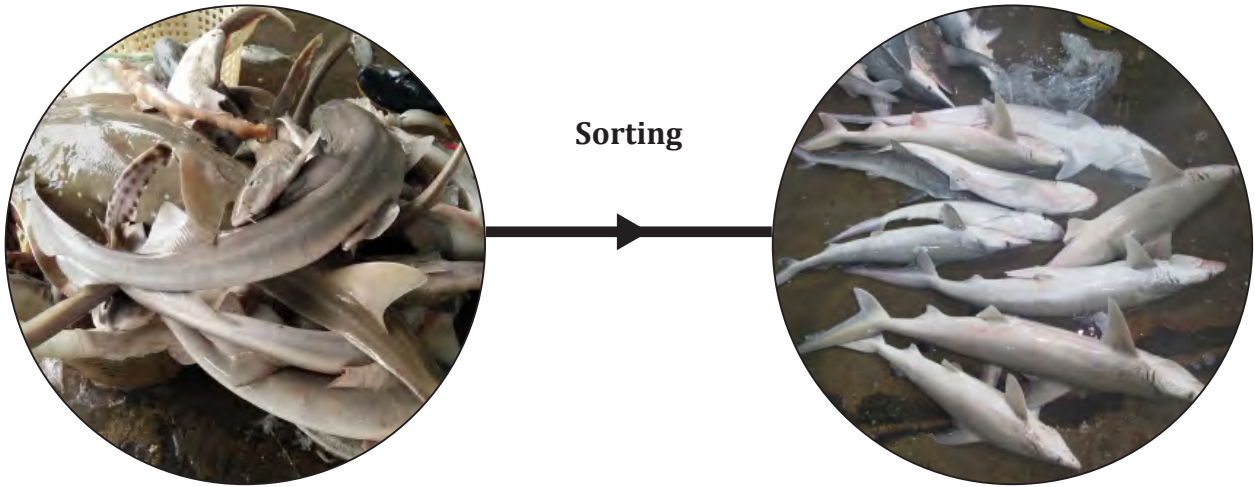


**Step 2 :** Separate sharks, rays and skates by species

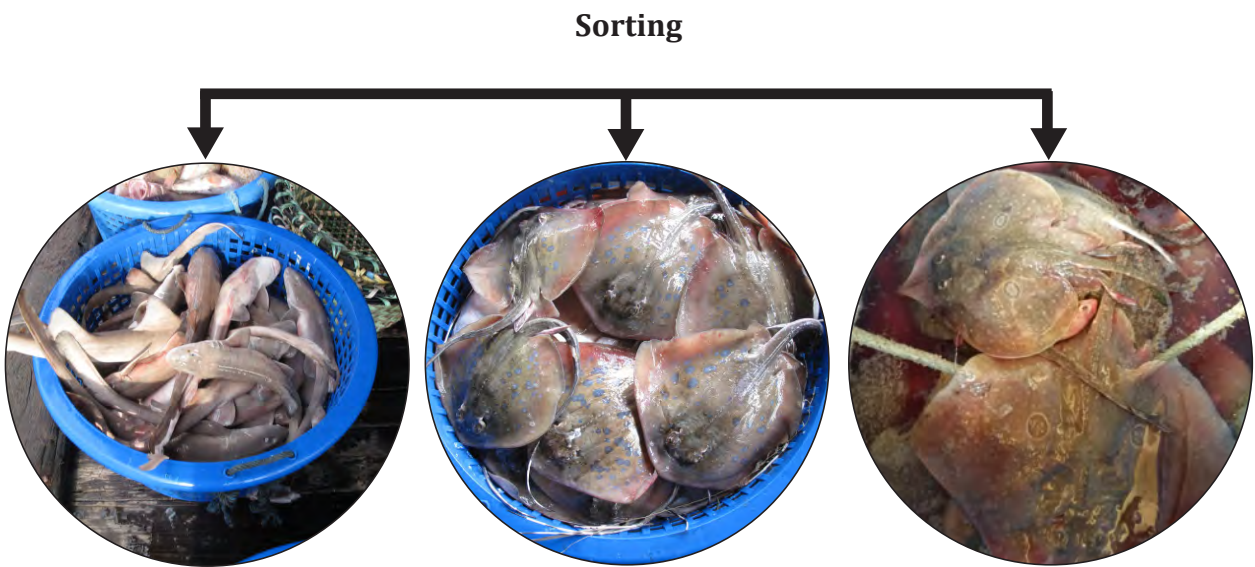


**Step 3 :** Separate sharks, rays and skates by sex (male and female)





Catch from trawl nets: many species and age categories (juvenile/young /adult)



# Data Record at Landing Sites

Recording length-weight at landing sites



Same species of sharks in one basket  
(easy to record total weight)



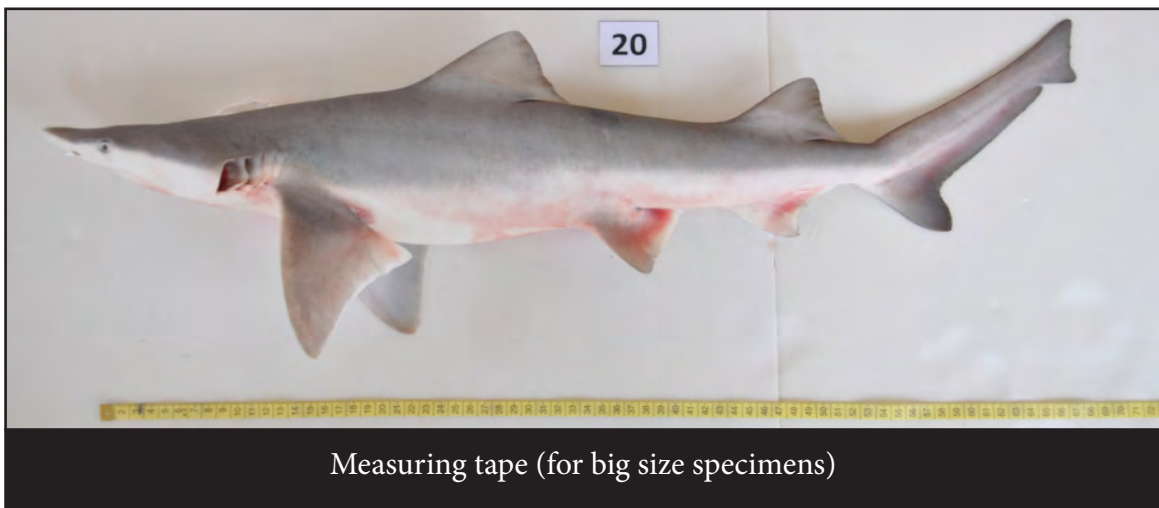
Same species of rays in one basket  
(easy to record total weight)



Same species of skates in one basket  
(easy to record total weight)



## 4 Equipment and Techniques Used to Measure Sharks, Rays and Skates

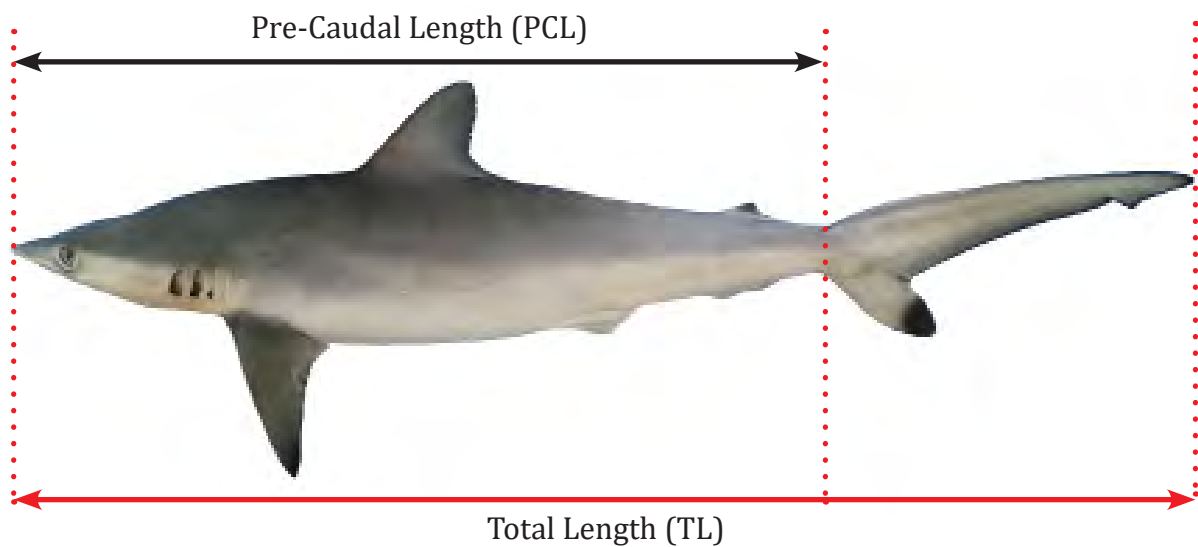




## 4.1 Measuring of Sharks

Measurement of Total Length: all shark species (measure Pre-Caudal Length if tail already cut or damage *e.g. Alopias spp.*).

- ☑ Measuring tape or ruler must put straight.
- ☑ Shark tail must be in horizontal position.
- ☑ Easy to measure if enumerators using big caliper.
- ☒ **Do not** put measuring tape on the dorsal surface or ventral surface of fish because both areas are not flat.

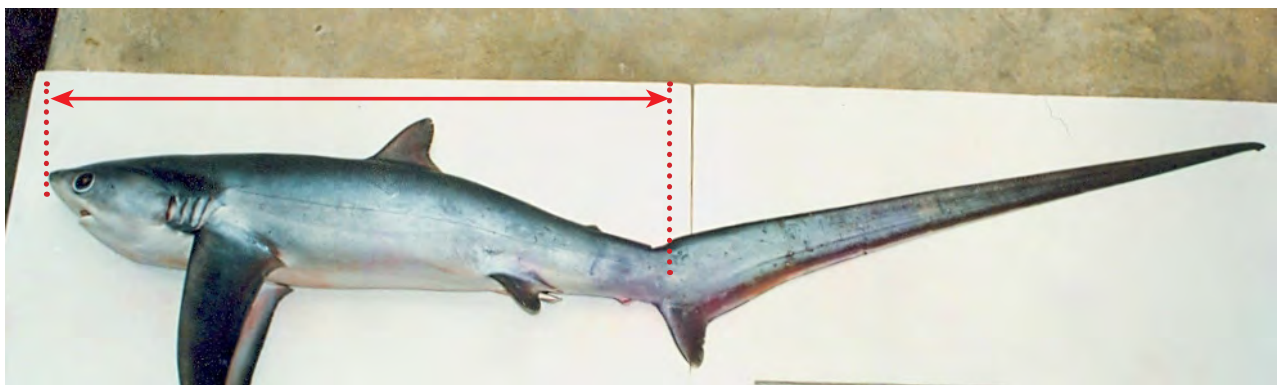


Measuring Total Length for shark. Tail must be horizontal.



**Note** Tail that not in horizontal position is **not recommended**

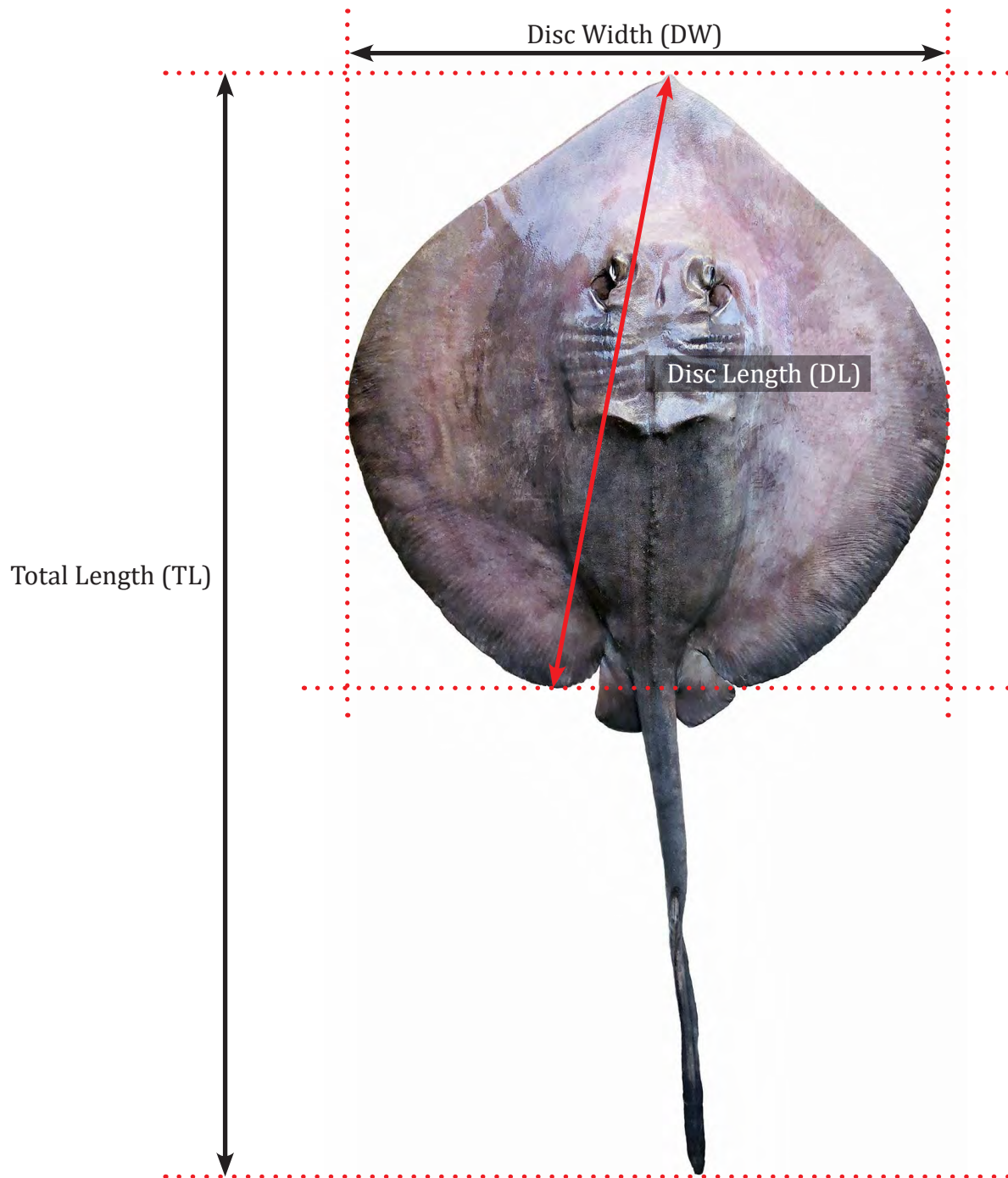
Measuring **Pre-Caudal Length** for *Alopias* spp. and other sharks species without or damage tail



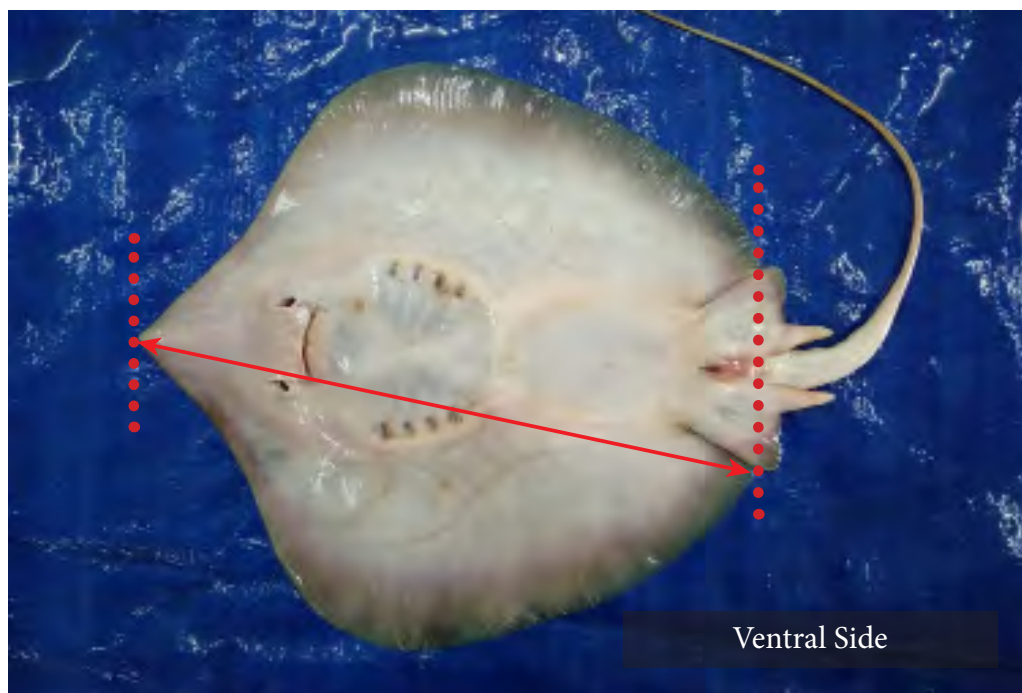
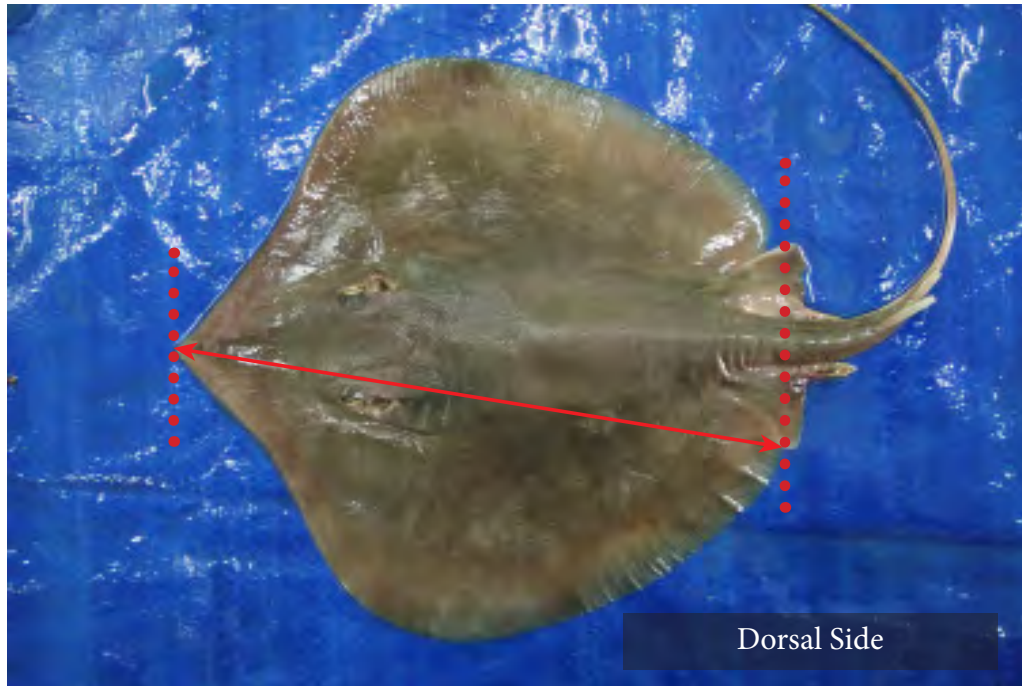
## 4.2 Measuring of Rays and Skates

Measurement of Disc Length (DL): all rays and skates species (measure Total Length from order Pristiformes, Rhinobatiformes, Rhiniformes and Torpediniformes)

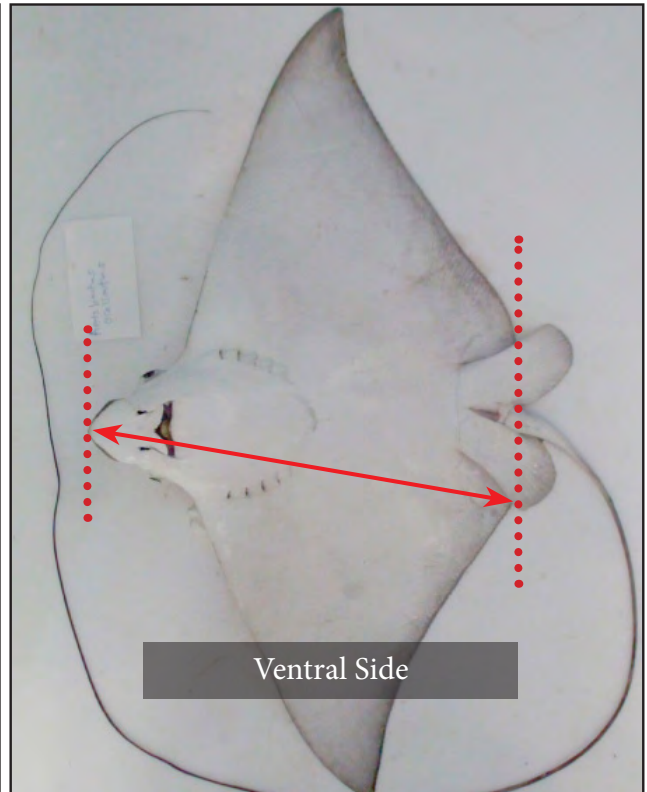
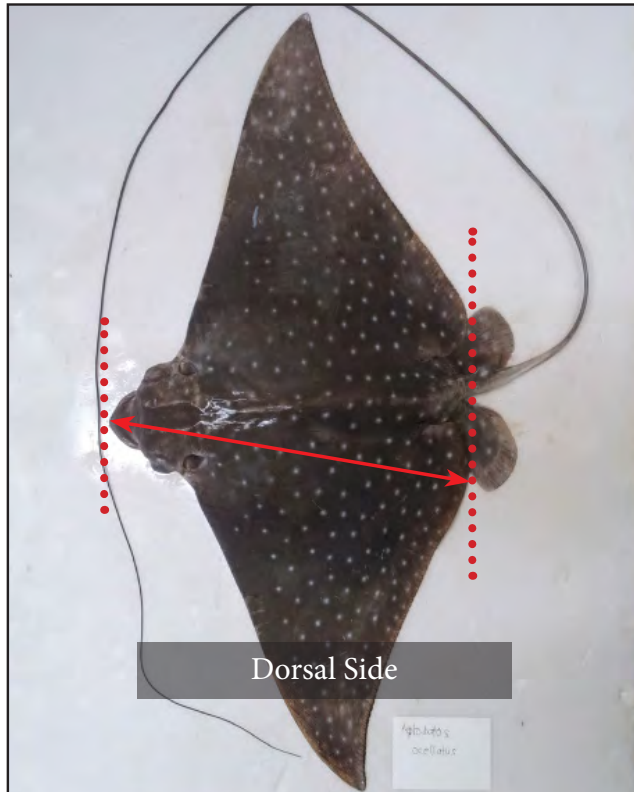
- ☑ Measuring tape or ruler must put straight.
- ☑ Easy to measure if enumerators using big caliper.
- ☒ **Do not** put on the dorsal surface because dorsal surface not flat.



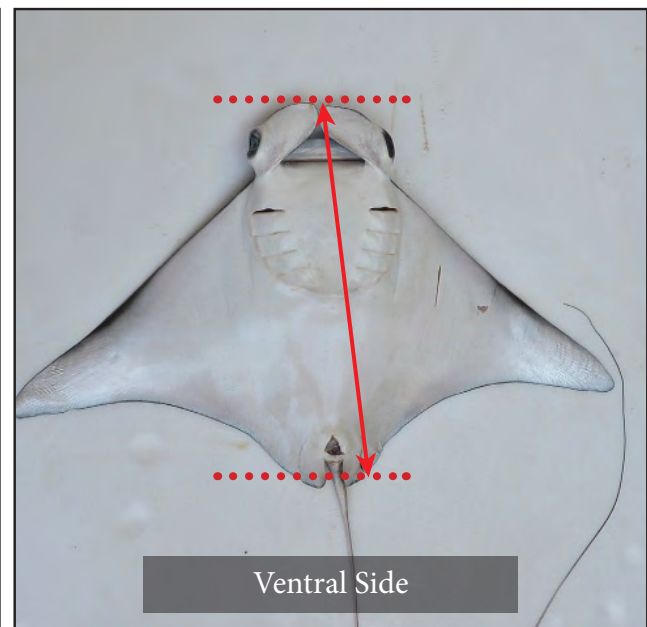
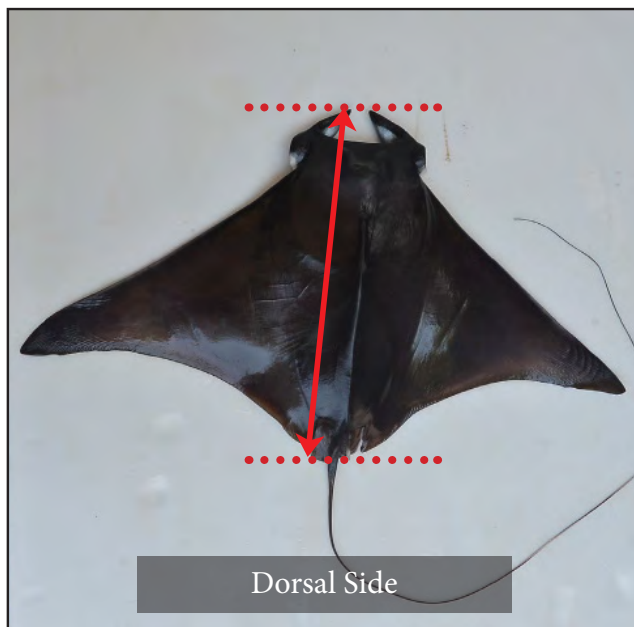
Measuring Disc Length for rays and skates  
(measure either from dorsal side or ventral side)



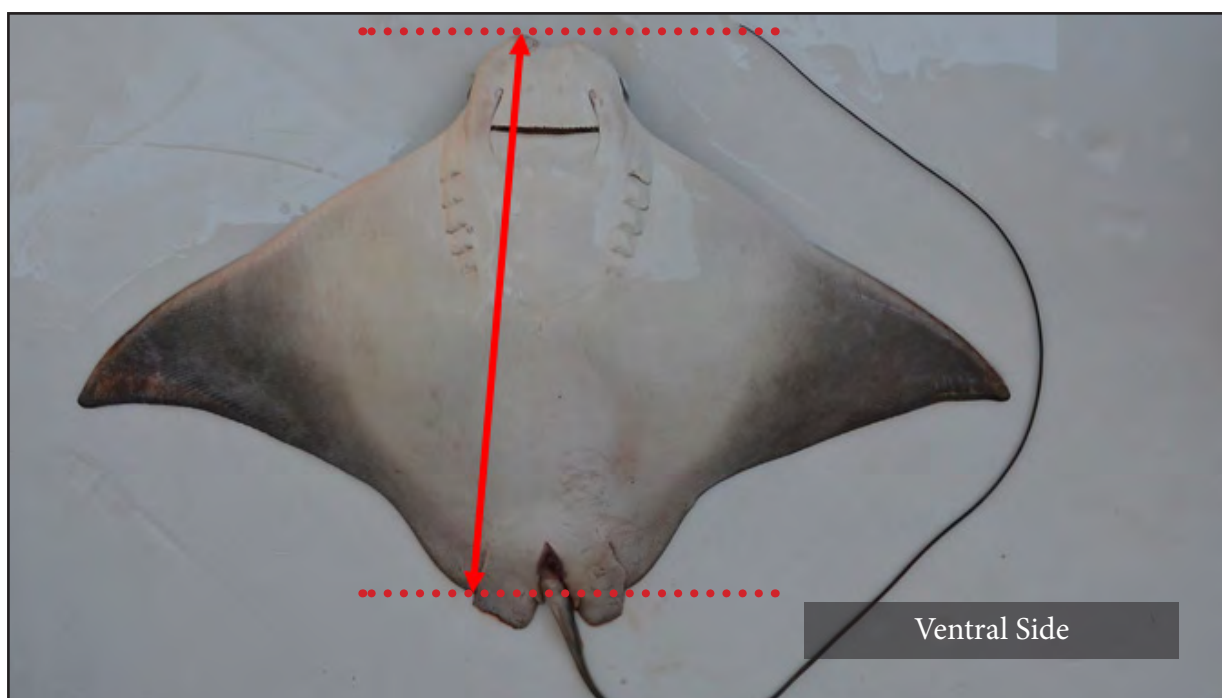
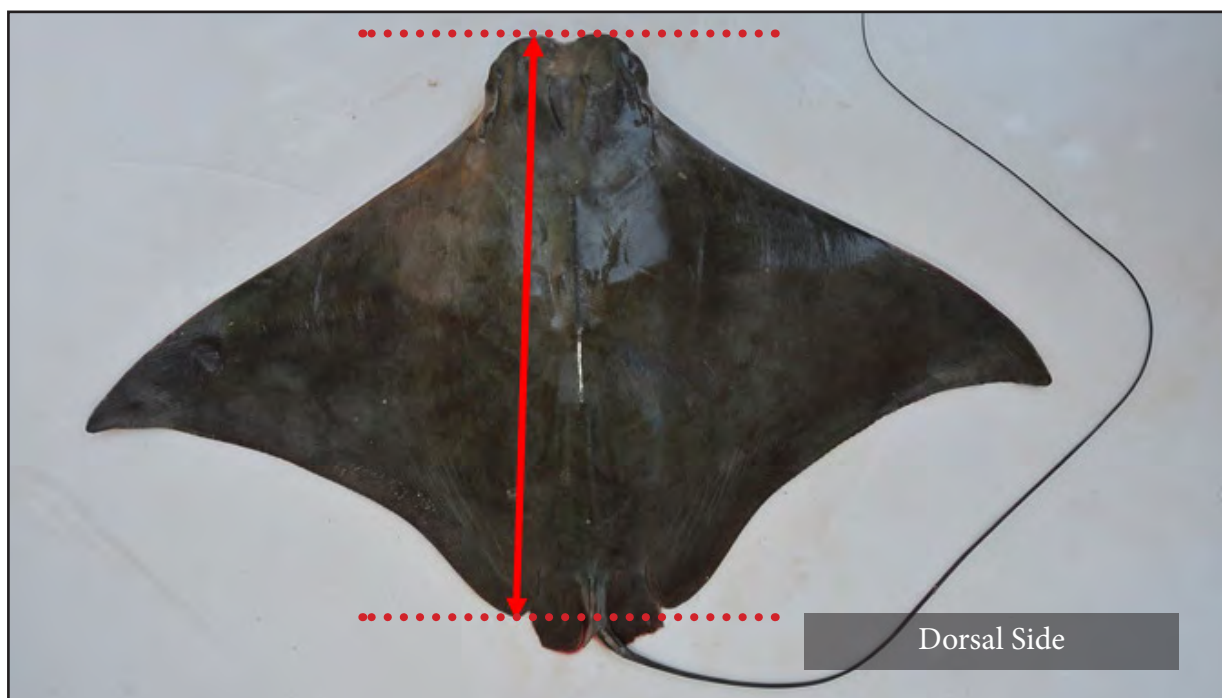
Measuring Disc Length for Eagle rays (Family Myliobatidae)  
(measure either from dorsal side or ventral side)



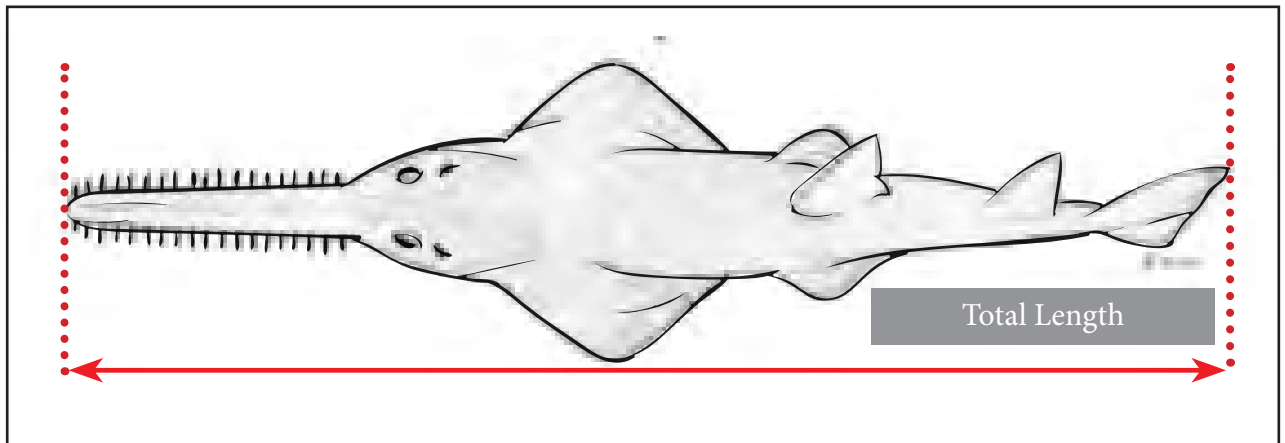
Measuring Disc Length for Mobula and Manta rays (Family Mobulidae)  
(measure either from dorsal side or ventral side)



Measuring Disc Length for Cownose ray (Family Rhinopteridae)  
(Measure either from dorsal side or ventral side)



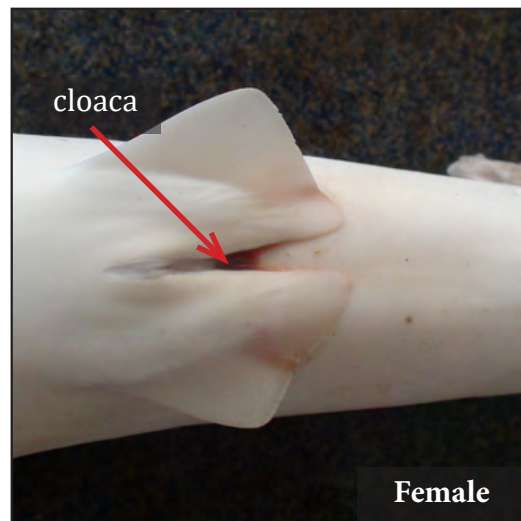
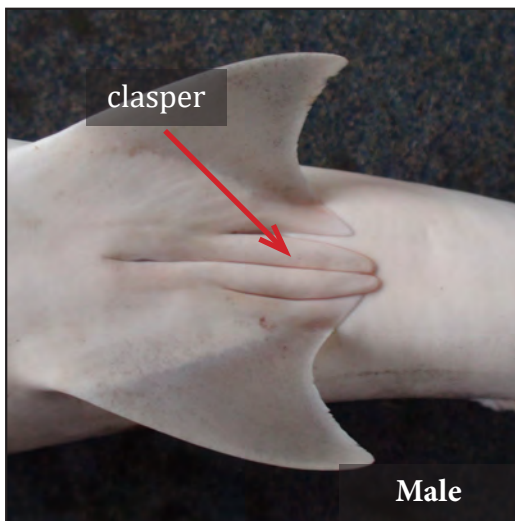
Measuring Total Length (TL): for Ray species from Order Pristiformes, Rhiniformes, Rhinobatiformes and Torpediniformes



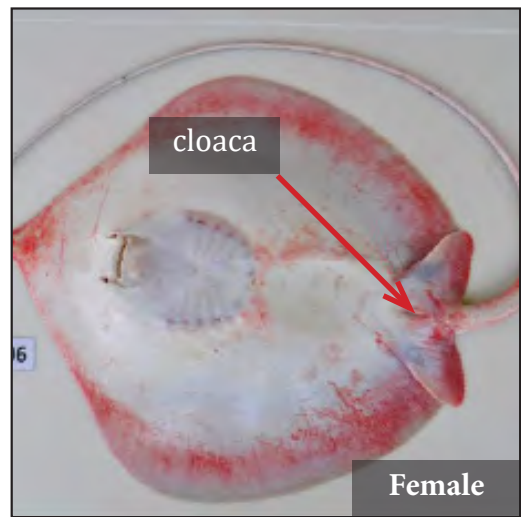
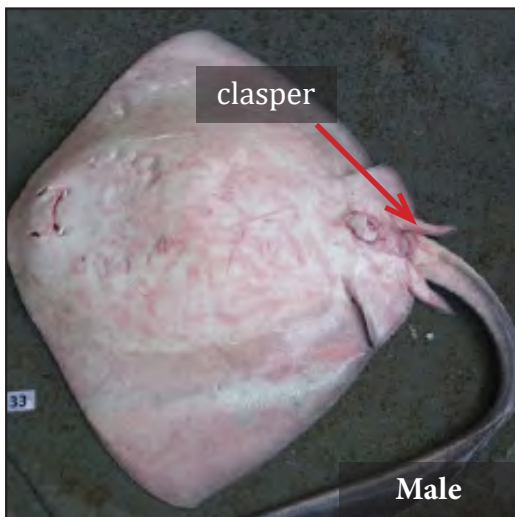
## 4.3 Record Sex of Sharks, Rays and Skates

Identify sex by looking for claspers or cloaca

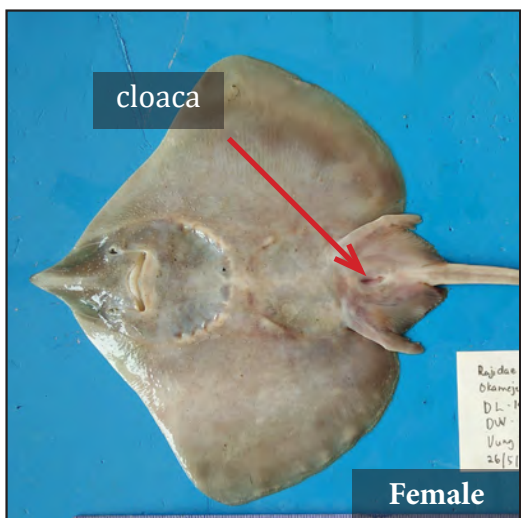
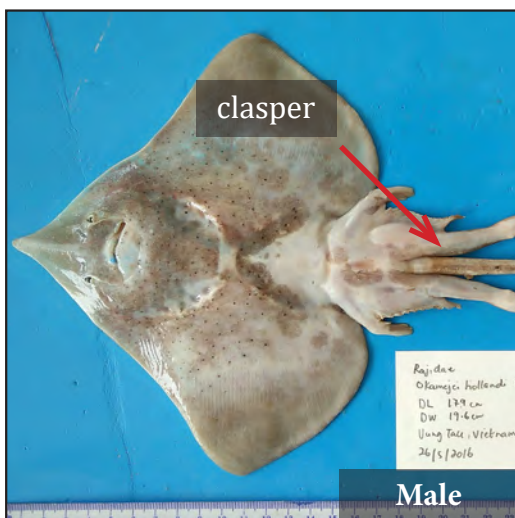
### Sharks



### Rays



### Skates





## 5 Photographic Techniques for Unidentified Specimens

Some species may be very difficult to identify due to;

- Specimens are uncommon;
- Specimens are most probably new species;
- Specimens are new record in the country or region;
- Specimens are new born or too old;
- Specimens are not listed in field guide suggested by SEAFDEC;
- Specimens in bad condition (rotten);
- Untrained enumerators; and
- Some parts of body lost or broken

For unidentified specimens, enumerators must take photos and send to national experts or regional expert for correct identification using: **WhatsApp/Line (+60199143150)**

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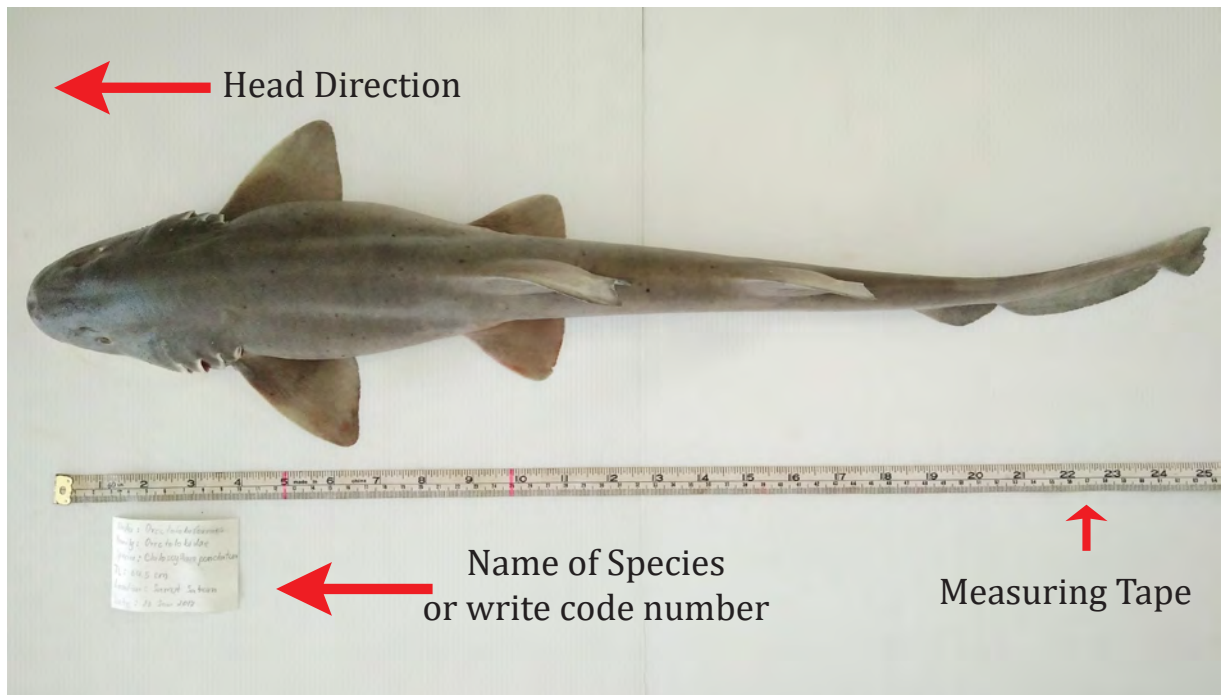


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# 6 Photographic Techniques

## 6.1 Photographic Techniques for Sharks

**Step 1 :** Take photo of whole body of sharks with use white or dark background (polystyrene) pending colour of specimens



**Step 2 :** Close-up of eye



**Step 3 :** Close-up of gill slits



**Step 4 :** Close-up of 1<sup>st</sup> dorsal fin



**Step 5 :** Close-up of 2<sup>nd</sup> dorsal fin  
(to see colour of dorsal fin tip)



Put bright background to show  
the white colour of tip



**Step 6 :** Close-up of caudal fin



**Step 7 :** Close-up of 2<sup>nd</sup> dorsal fin and anal fin (to compare size of 2<sup>nd</sup> dorsal fin and anal fin)



**Step 8 :** Close-up of free rear tip of second dorsal fin and anal fin



**Step 9 :** Top view of whole body



**Step 10 :** Top view of head, pectoral fins, origin of 1<sup>st</sup> dorsal fin



**Step 11 :** Close-up of interdorsal space



**Step 12 :** Close-up of interdorsal (to check inter dorsal ridge present or not)



**Step 13 :** Close-up of pre-caudal pit



**Step 14 :** Close-up of underside of head



*Hemigaleus microstoma*

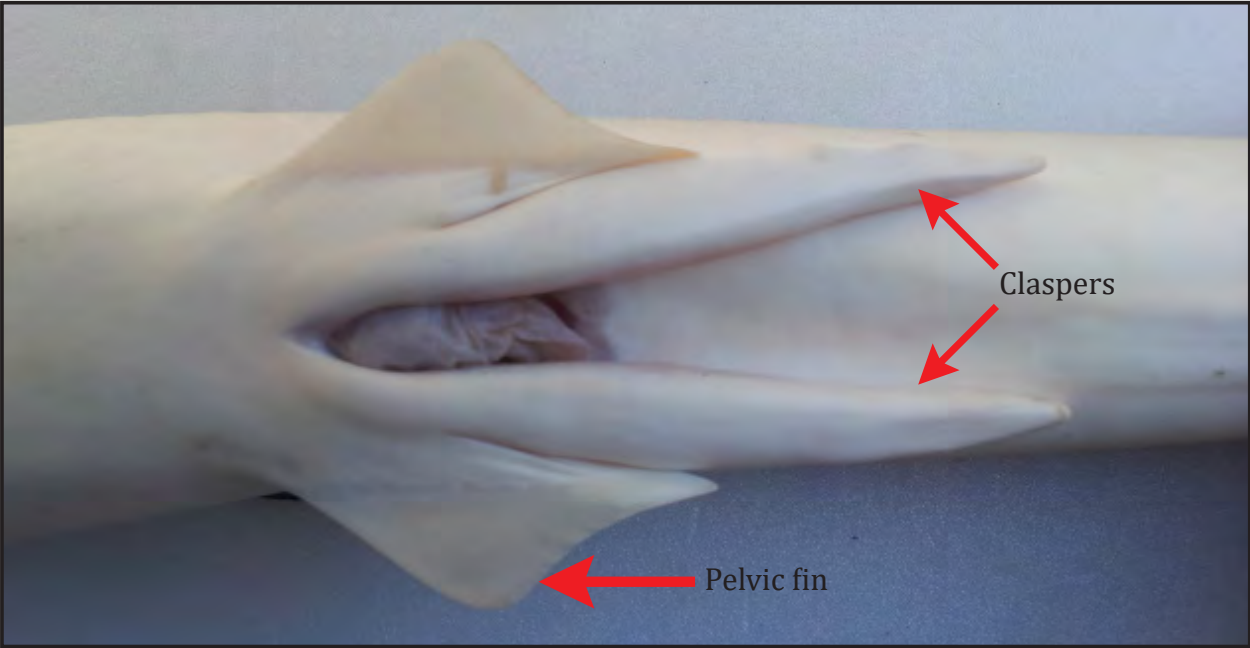


*Hemipristis elongata*



*Loxodon macrorhinus*

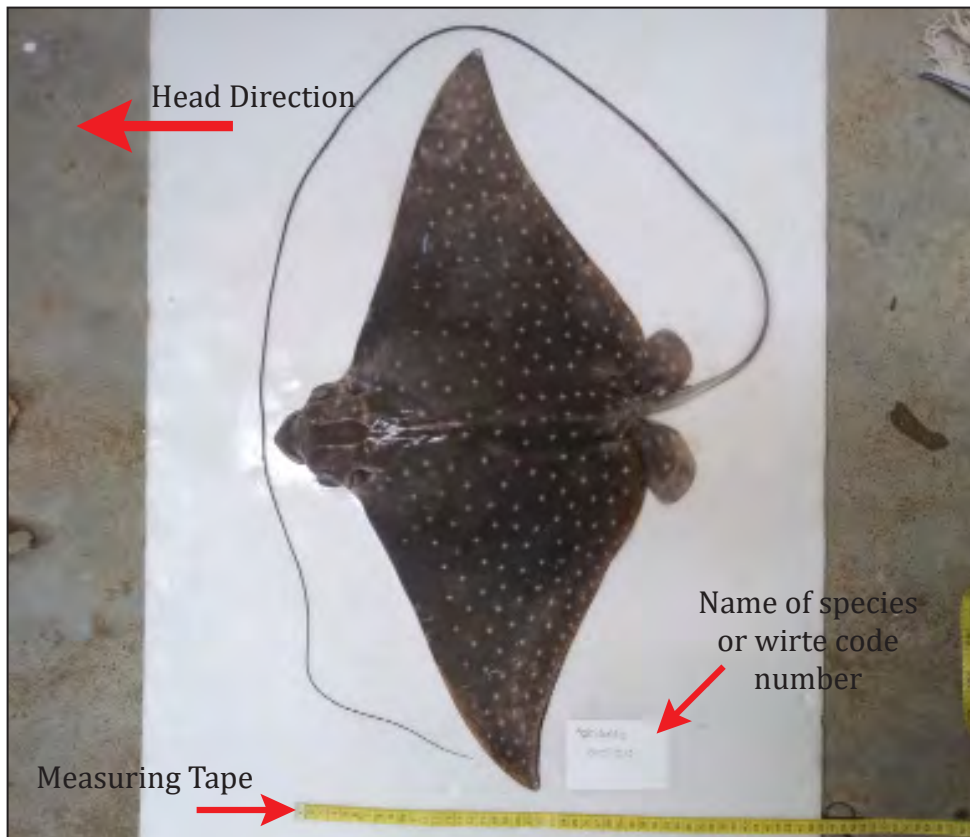
**Step 15 :** Close-up to check male or female





## 6.2 Photographic Techniques for Rays and Skates

**Step 1 :** Take photo of whole body of rays/skates



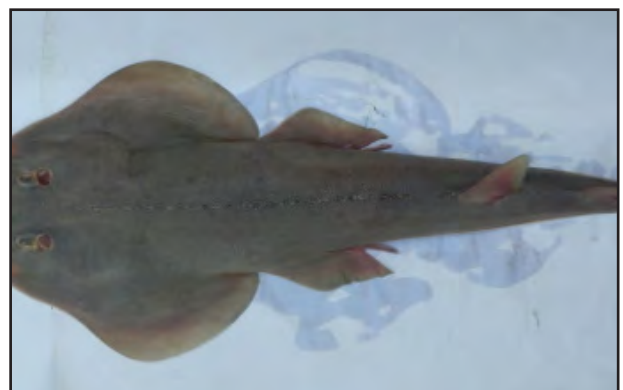
**Step 2 :** Close-up of head



**Step 3 : Close-up of head side**



**Step 4 : Close-up of center of disc**



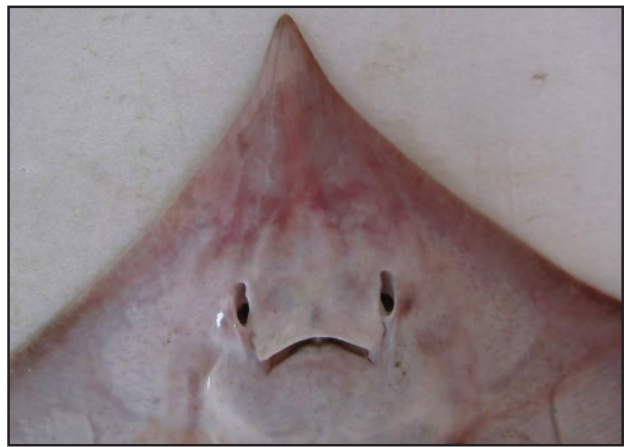
**Step 5 : Close-up of base of tail and end of tail**



**Step 6 : Ventral side of whole body**



**Step 7 : Close-up of mouth**



## Photographic Techniques Not easy to identify



Head not in a good position and fin(s) is not complete



Photo only from ventral side



Holding fish: Also not easy to identify



## **7** Verification of Species Using “Whatsapp” or “LINE” Application

The project’s participating countries are encouraged to use smart mobile telephone application such as Whatsapp or LINE. Members of the National Sharks Group, including regional shark experts and resource persons from SEAFDEC, National Technical Coordinator of respective countries and local enumerators, use this application for data validation and confirmation of unidentified species. For the unidentified species, enumerator is requested to take photos as referred to the session 6 Photographic Techniques of this SOP, and send to national/regional expert for correct identification through Whatsapp or LINE +6019914350

## **8** Results

### **Data Management**

Enumerator will key-in all data from field form in Microsoft excel and e-mail to National Coordinator at the end of each month or within first week of new month.

National Coordinator will verify all data and any miss-recording will be referred back to enumerator.

The data then key and arrange according to standard for ‘Pivot Table’ analysis or for shark database manage by SEAFDEC.

### **Expected Output**

One national report publish by participating countries on the landing data of sharks, rays and skates at species level, percentage and marketing.

One regional report publish by SEAFDEC Secretariat on the landing data of sharks, rays and skates at species level, percentage and marketing.

## 9 Possible Issues

### Possible Issues

1. One enumerator at each landing site. It is very difficult to sample many specimens and species.
2. Enumerators will be confused by same species at different stages of maturity (juvenile, young and adult)
3. There are many look a-like species (sharks, rays and skates) in this region.
4. Many boats landed their catches during the same period. Sampling could be only conducted for one boat at one time.
5. One enumerator only manage to sample three boats per day or less.
6. Recording landing data must be conducted very fast because packaging process is usually undertaken very fast. Enumerators should work faster and be alert.
7. Enumerators also need to do their routine landings data collection activities for fisheries statistics or other official duties.
8. They are also involved in other functions organized by the DoF such as training, extension works, meeting, etc.
9. Submitting data in excel format via e-mail sometime after dateline due to lack of personnel computer. Some enumerators could only key-in landings data during office hour.
10. Boat owners sell their catch very early in some sites starting from 0100hr in certain sites. Enumerators should be arriving before 0100hr at landing sites. At 0700hr landing activity already completed.
11. Need extra manpower to verify the data.
12. Less cooperation among middlemen and jetty owners.

# Appendix I

## Standard Form Provided for Recording Landing Data at Sampling Sites

### SAMPLE OF STANDARD FORM : Data Collection Project on Sharks, Rays and Skates (SEAFDEC)

Country		State	
Landing Site		Day/Month/Year	
Name of Enumerator		Record No.	

#### Vessel Information

Type of Fishing Gear			
Vessel Name		Registration No.	
GRT		No. of Crew	

#### Trip Information

Day at Sea		(days)	Day at Operation		(days)
Total Number of Operation				(times)	

#### Fishing Ground Information

Fishing Zone		Depth (average)		(m)
Distance from Port		Distance from coastline		(mm)
Longitude		Latitude		

#### Gear Information (Select and Check one Gear below)

Trawl Net

Width of Mouth		(m)	Height of Mouth		(m)
Length of Net		(m)	Mesh Size		(cm)
No. of Operation/day		(times)	Time of Operation/haul		(hours)
Vessel Speed		(Knot)	Fishing Layer		Mid/Bottom

Gillnet / Drift Net

Length of Net		(m)	Height of Net		(m)
Fishing Layer		Surface/Bottom	Mesh Size		(cm)
No. of Operation/day		(times)	Time of Operation/haul		(hours)

Hook and Line / Troll

No. of Hooks			Size of Hook		(cm)
Time of Operation/day		(hours)	Vessel Speed		(Knot)

Longline

Total No. of Hooks			Size of Hook		(cm)
Length of Mainline		(km)	Fishing Layer		Mid/Bottom
No. of Operation/day		(times)	Time of Operation/set		(hours)

Purse Seine

Length of Net		(m)	Mesh Size 3		(cm)
No. Operation/day		(times)	Duration of Operation		(hours)
Fish Searching	Luring / FADS / Wild / Others ( )				

Other gears:







**f. Total Catch of Sampling Vessel (kg)**

No.	All Sharks	All Rays	All Skates	Commercial Bony Fish	Trash Fish	Total

**g. Price of Sharks and Marketing Information (Local Currency)**

Species	Price/kg (Small Size)	Price/kg (Medium Size)	Price/kg (Big Size)	Market Destination	Utilization

Please record : Small Size (TL/PCL) : cm ~ cm *ca*  
 Medium Size (TL/PCL) : cm ~ cm *ca*  
 Big Size (TL/PCL) : cm ~ cm *ca*

Small Size (kg) : kg ~ kg *ca*  
 Medium Size (kg) : kg ~ kg *ca*  
 Big Size (kg) : kg ~ kg *ca*

**h. Price of Rays/ Skates and Marketing Information (Local Currency)**

Name of Rays/Skates	Price/kg (Small Size)	Price/kg (Medium Size)	Price/kg (Big Size)	Market Destination	Utilization

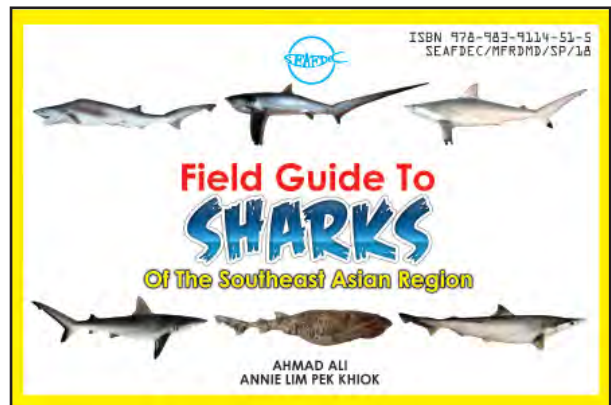
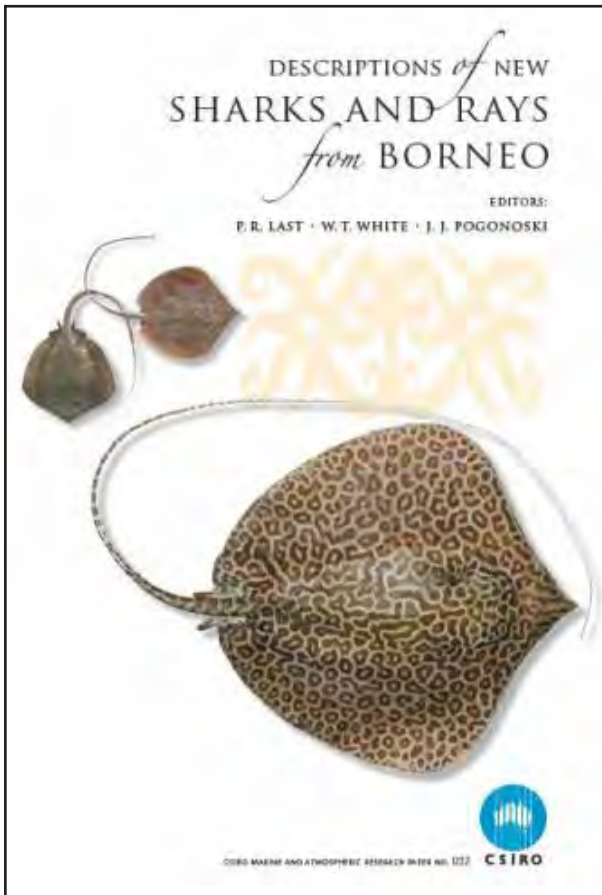
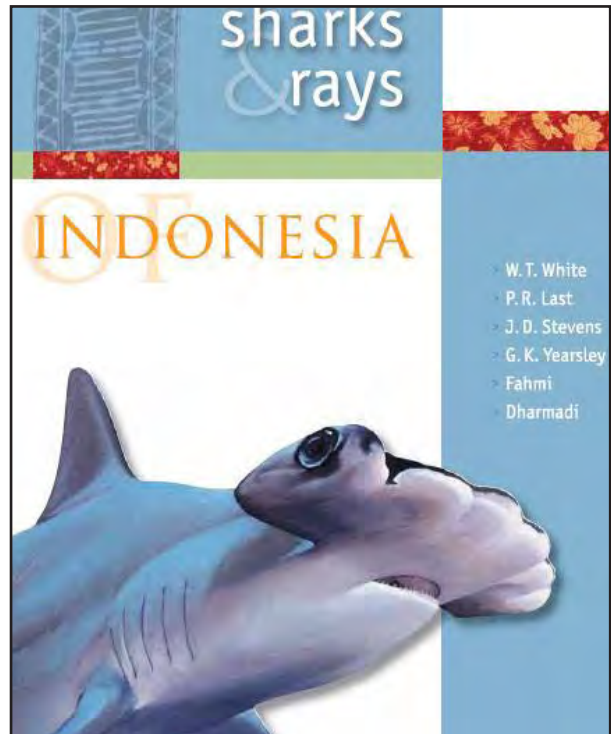
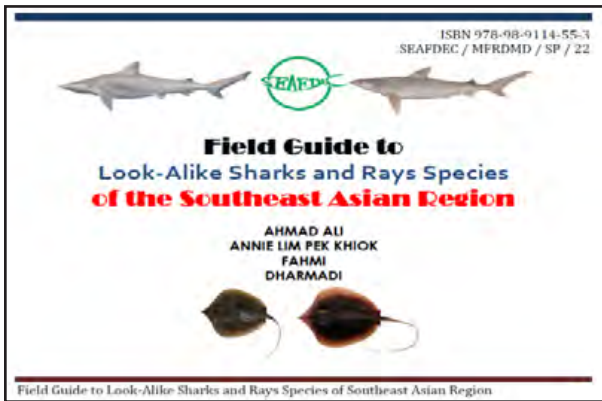
Please record : Small Size (DL/TL) : cm ~ cm *ca*  
 Medium Size (DL/TL) : cm ~ cm *ca*  
 Big Size (DL/TL) : cm ~ cm *ca*

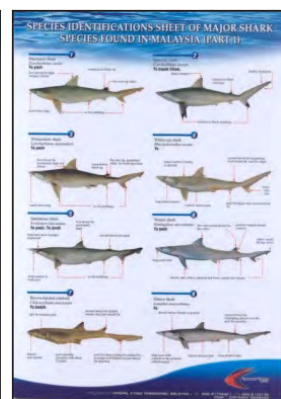
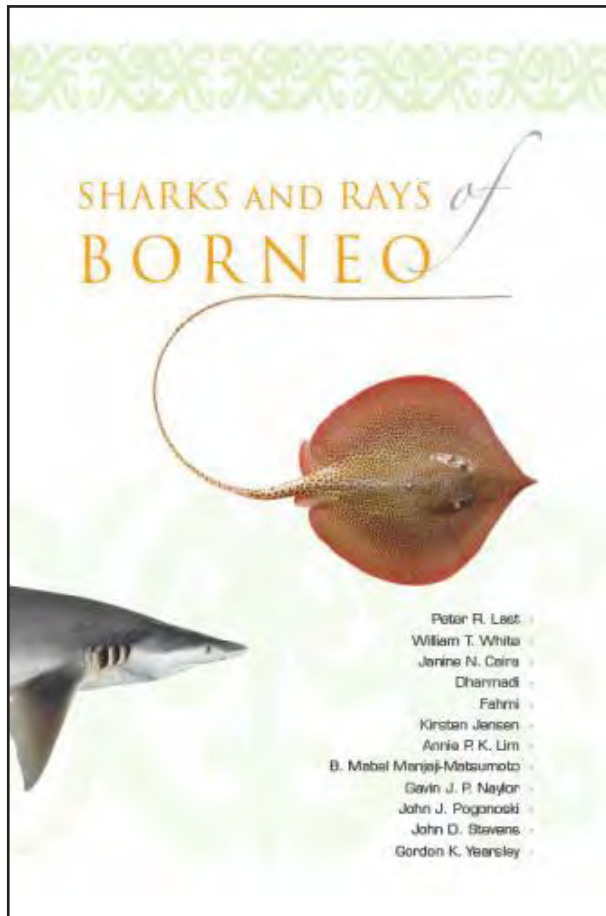
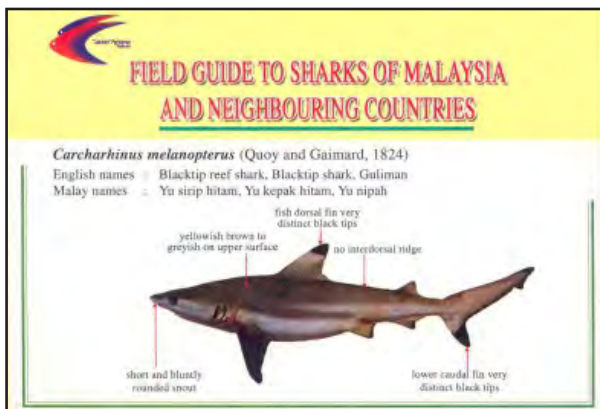
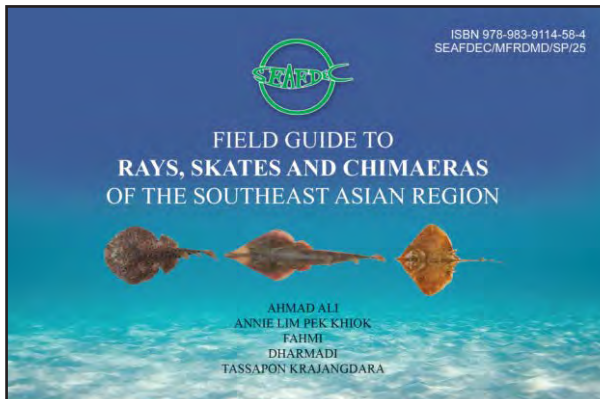
Small Size (kg) : kg ~ kg *ca*  
 Medium Size (kg) : kg ~ kg *ca*  
 Big Size (kg) : kg ~ kg *ca*

Note : \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# Appendix II

## References for Species Identification of Sharks, Rays and Skates





# About the Authors



**DR. AHMAD ALI** is a Senior Researcher of SEAFDEC/MFRDMD in Kuala Terengganu Malaysia. He is also a member and Co-Regional Vice Chair, IUCN Shark Specialist Group for Southeast Asia Region since 2007. He is an authored and co-authored of many books and papers on taxonomy, biology and management of elasmobranch in Southeast Asian Region.



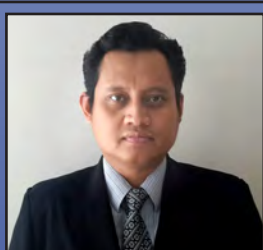
**MR. ABDUL HARIS HILMI BIN ARSHAD** is a Senior Researcher of Fisheries Research Institute, Kg. Aceh, Sitiawan Perak. He was involved in many national and regional studies in taxonomy, biology and landings of sharks and rays. In 2013 -2016 he was appointed as national coordinator for project of sharks and rays data collection for Malaysia.



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**MS. ANNIE LIM PEK KHIOK** is a Senior Laboratory Assistant of Regional Fisheries Biosecurity Centre, Kuching, Sarawak. She is a member of IUCN Shark Specialist Group for Southeast Asian Region. She authored and co-authored several books and published scientific papers on biology and taxonomy of elasmobranch.



**MR. TASSAPON KRAJANGDARA** is a Senior Fisheries Biologist of the Department of Fisheries, Thailand. He is a member of IUCN Shark Specialist Group for Southeast Asian Region and Chief of the Survey and Analysis of Aquatic Resources and Fisheries Status Unit, Andaman Sea Fisheries Research and Development Centre in Phuket. His field of interest is fish taxonomy, particularly in sharks and rays.