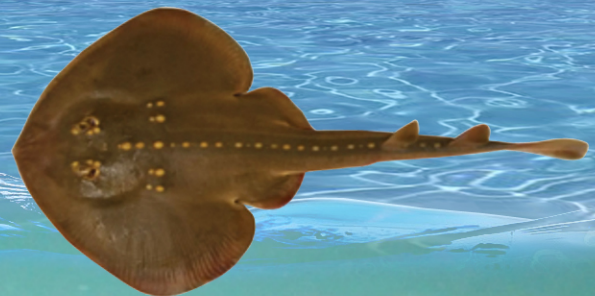




IDENTIFICATION GUIDE TO SHARKS, RAYS AND SKATES OF THE SOUTHEAST ASIAN REGION



By

Ahmad Ali
Annie Lim Pek Khiok
Fahmi
Dharmadi
Tassapon Krajangdara

IDENTIFICATION GUIDE TO SHARKS, RAYS AND SKATES OF THE SOUTHEAST ASIAN REGION

By

Ahmad Ali

Annie Lim Pek Khiok

Fahmi

Dharmadi

Tassapon Krajangdara

2017

Ahmad Ali

Identification Guide to Sharks, Rays and Skates of the Southeast Asian Region / Ahmad Ali, Annie Lim Pek Khiok, Fahmi, Dharmadi, Tassapon Krajangdara.

ISBN 978-983-9114-69-0

1. Sharks--Asia, southeastern.

2. Rays (Fishes)--Asia, southeastern.

I. Lim, Annie Lim Pek Khiok. II. Fahmi. III. Dharmadi.

IV. Tassapon Krajangdara. V. Title.

597.3

Copyright©2017 SEAFDEC/MFRDMD

All Right Reserved

This publication may be reproduced for educational and other non-commercial purposes without permission of the copyright holder, provided the source is cited and the copyright holder receives a copy of the reproduce material. Reproduce for commercial purposes is prohibited without prior written permission of the copyright holder.

This publication should be cited as follows;

Ahmad, A., Lim, A.P.K., Fahmi, Dharmadi and Krajangdara, T. 2017. Identification Guide to Sharks, Rays and Skates of the Southeast Asian Region. SEAFDEC/MFRDMD/SP/31:33pp

February 2017

Introduction

This guide was developed by SEAFDEC-MFRDMD, SEAFDEC SECRETARIAT and SEAFDEC-TD in collaboration with Department of Fisheries Malaysia; Research Centre for Oceanography, Indonesia Institute of Science; Research Center for Fisheries Management and Conservation, Indonesia; and the Department of Fisheries Thailand. This guide is one of the outcome of a one-year comprehensive data collection on sharks, rays and skates landings conducted from 2015-2016 in Cambodia, Malaysia, Myanmar, Indonesia, Vietnam and Thailand. This guide was used by enumerators to identify sharks, rays and skates up to species level at all landing sites. Printing cost was funded by EU-CITES.

Most sharks, rays and skates species look very similar within the family and difficult to quickly identify by enumerators or in some cases even taxonomists. With more than 300 species already recognized and many new species continuously being discovered in the Southeast Asian Region, the challenge is becoming more complicated.

This waterproof guide was developed in addition to that of three publications of SEAFDEC including 'Field guide to Sharks of the Southeast Asian Region'; Field guide to Look-alike Sharks and Rays Species of the Southeast Asian Region, and 'Field guide to Rays, Skates and Chimaeras of the Southeast Asian Region'.

This guide includes 56 species of sharks, 62 species of rays and five species of skates found in this region. Most of these species are found in abundance in this region. Colour photographs are provided for each species with highlighted arrows on the main identifying characters. Images of look-alike species were arranged in one page or the following adjacent page for easy comparison.

This guide was made possible based on knowledge and experiences of the authors through their studies especially in Malaysia, Indonesia, Myanmar, Cambodia, Vietnam and Thailand and accumulated information from enumerators during this project. All authors of this guidebook were directly involved in this project as taxonomist.

Classification

The classification used in this book follows classification adopted by Compagno (1999), Last and Stevens (2009), Weigmann (2016) and Last *et al.*, (2016).

Acknowledgement

The authors would like to thank The Secretary-General of SEAFDEC Dr. Kom Silapajarn, Chief of SEAFDEC/MFRDMD Mr. Raja Bidin bin Raja Hassan and Deputy Chief of SEAFDEC/MFRDMD Dr. Osamu Abe for their support in the research and management of elasmobranch in the Southeast Asian Region. Special thanks to Dr. Haruko Okusu, Senior Programme Officer and Chief, Knowledge Management and Outreach Services (KMOS), CITES Secretariat, United Nations Environment Programme, Geneva, Switzerland for her support in getting funding from European Union (EU) to conduct this project in Cambodia, Malaysia, Myanmar, Indonesia, Thailand and Vietnam.

We express gratitude to Dr. Worawit Wanchana, Assistance Policy and Program Coordinator (SEAFDEC-SECRETARIAT), Mr. Abdul Haris Hilmi bin Ahmad Arshad, Senior Research Officer, Fisheries Research Institute, Kg. Acheh, Perak, Malaysia; Mr. Lawrence Kissol Jr, Assistant Director (Marine Resource Management), Department of Fisheries Sabah; Mr. Nor Azman bin Zakaria, Mr. Mohd Saki bin Nor, Mr. Wahab bin Daud and Mr. Ruzelan bin Jusoh (SEAFDEC-MFRDMD); Mr. Sukchai Arnupapboon and Mr. Santiphong Putsa (SEAFDEC-TD); Mr. Abdul Rahman bin Haji Ali Hasan and Mr. Mahazir bin Baharom (Department of Fisheries Malaysia); Mr. Justin Agon, Mr. Norhairul bin Nordin, Mr. Chin En Kiong and Mr. Maurice @ Kassim bin Anchi (Department of Fisheries Sabah); Mr. Ly Seyha (Department of Fisheries Cambodia); Mr. Agung Ferieigha Nugroho (State Fisheries Office Cilacap, Indonesia), Mr. Munawir (State Fisheries Office Lampulo); Mr. Min Naung, Mr. Soe Win, Mr. Kyaw Swar Win, Mr. Soe Nyunt and Mr. Nay Myo Aye (Department of Fisheries Myanmar); Mr. Montri Sumontha, Ms. Suwantana Tossapornpitakkul, Mr. Watchira Sodop and Ms. Jureerat Songnui (Department of Fisheries Thailand); Mr. Le Huu Tuan Anh, Mr. Bui Quang Manh, Mr. Cao Van Hung, Mr. Nguyen Xuan Toan, Mr. Dinh Xuan Hung and Nguyen Phuoc Trieu (Department of Fisheries Vietnam) for helping us in many ways in the preparation for publication of this guidebook.

IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

CONTENTS

SHARKS

Order HEXANCHIFORMES:

HEXANCHIDAE

[Sixgill and Sevengill Sharks]

<i>Heptanchias perlo</i>	2
<i>Hexanchus griseus</i>	2
<i>Hexanchus nakamurai</i>	2

Order SQUALIFORMES:

SQUALIDAE [Dogfishes]

<i>Squalus altipinnis</i>	2
<i>Squalus megalops</i>	2

CENTROPHORIDAE [Gulper Sharks]

<i>Centrophorus moluccensis</i>	3
---------------------------------	---

Order HETERODONTIFORMES:

HETERODONTIDAE [Hornsharks]

<i>Heterodontus zebra</i>	3
---------------------------	---

Order ORECTOLOBIFORMES

ORECTOLOBIDAE [Wobbegongs]

<i>Orectolobus leptolineatus</i>	3
----------------------------------	---

Order SQUATINIFORMES

SQUATINIDAE [Angleshark]

<i>Squatina tergocellatoides</i>	3
----------------------------------	---

HEMISCYLLIIDAE [Longtail Carpetsharks]

<i>Chiloscyllium indicum</i>	4
<i>Chiloscyllium plagiosum</i>	4
<i>Chiloscyllium punctatum</i>	4
<i>Chiloscyllium hasseltii</i>	4

GINGLYMOSTOMATIDAE [Nurse Sharks]

<i>Nebrius ferrugineus</i>	5
----------------------------	---

STEGOSTOMATIDAE [Zebra Sharks]

<i>Stegostoma fasciatum</i>	5
-----------------------------	---

PSEUDOCARCHARIIDAE

[Crocodile Sharks]

<i>Pseudocarcharias kamoharai</i>	5
-----------------------------------	---

Order LAMNIFORMES

ALOPIIDAE [Thresher Sharks]

<i>Alopias pelagicus</i>	5
<i>Alopias superciliosus</i>	6

LAMNIDAE [Mackerel Sharks]

<i>Isurus oxyrinchus</i>	6
<i>Isurus paucus</i>	6

Order CARCHARHINIFORMES

SCYLIIORHINIDAE [Catsharks]

<i>Cephaloscyllium sarawakensis</i>	6
<i>Atelomycterus erdmanni</i>	7
<i>Atelomycterus marmoratus</i>	7
<i>Atelomycterus baliensis</i>	7
<i>Halaelurus buergeri</i>	7
<i>Halaelurus maculosus</i>	8

PROSCYLLIIDAE [Finback Catsharks]

<i>Proscyllium magnificum</i>	8
<i>Proscyllium habereri</i>	8
<i>Eridacnis radcliffei</i>	8

TRIKIDAE [Houndsharks]

<i>Mustelus manazo</i>	9
<i>Mustelus widodoi</i>	9

HEMIGALEIDAE [Weasel Sharks]

<i>Hemipristis elongata</i>	9
<i>Hemigaleus microstoma</i>	9

CARCHARHINIDAE [Whaler Sharks]

<i>Carcharhinus amblyrhynchoides</i>	10
<i>Carcharhinus amblyrhynchos</i>	10
<i>Carcharhinus leucas</i>	10
<i>Carcharhinus plumbeus</i>	10
<i>Carcharhinus tjtjot</i>	11
<i>Carcharhinus sealei</i>	11
<i>Carcharhinus falciformis</i>	11
<i>Carcharhinus brevipinna</i>	11
<i>Carcharhinus limbatus</i>	12
<i>Carcharhinus melanopterus</i>	12
<i>Carcharhinus sorrah</i>	12
<i>Prionace glauca</i>	12
<i>Triaenodon obesus</i>	13
<i>Galeocerdo cuvier</i>	13
<i>Carcharhinus longimanus</i>	13
<i>Prionace glauca</i>	12
<i>Loxodon macrorhinus</i>	14
<i>Rhizoprionodon acutus</i>	14
<i>Rhizoprionodon oligolinx</i>	14
<i>Scoliodon macrorhynchus</i>	14

SPHYRNIDAE [Hammerhead Sharks]

<i>Sphyrna lewini</i>	15
<i>Sphyrna mokarran</i>	15
<i>Eusphyra blochii</i>	15

RAYS

Order RHINOBATIFORMES

RHINIDAE [Wedgefishes]

<i>Rhina ancylostoma</i>	15
<i>Rhynchobatus australiae</i>	16
<i>Rhynchobatus laevis</i>	16
<i>Rhynchobatus springeri</i>	16

GLAUCOSTEGIDAE [Giant Guitarfishes]

<i>Glaucostegus cf granulatus</i>	16
<i>Glaucostegus thouin</i>	17
<i>Glaucostegus typus</i>	17
<i>Glaucostegus obtusus</i>	17

RHINOBATIDAE [Guitarfish]

<i>Rhinobatos borneensis</i>	17
<i>Rhinobatos jimbaranensis</i>	18
<i>Rhinobatos penggali</i>	18
<i>Rhinobatos annandalei</i>	18

PLATYRHINIDAE [Fanrays]

<i>Platyrrhina tangi</i>	18
--------------------------	----

Order TORPEDINIFORMES

NARCINIDAE [Numbfishes]

<i>Narcine timlei</i>	19
<i>Narcine brevlabiata</i>	19
<i>Narcine maculata</i>	19

NARKIDAE [Sleeper ray]

<i>Narke dipterygia</i>	20
<i>Temera hardwickii</i>	20

Order RAJIFORMES

RAJIAE [SKATES]

<i>Dipturus kwangtungensis</i>	20
<i>Orbiraja jensenae</i>	21
<i>Okamejei boesemani</i>	21
<i>Okamejei cairae</i>	21
<i>Okamejei hollandi</i>	21

Order MYLIOBATIFORMES

UROLOPIDAE [Stingarees]

<i>Urolophus aurantiacus</i>	19
------------------------------	----

PLESIOBATIDAE [Giant Stingarees]

<i>Plesiobatis daviesi</i>	22
----------------------------	----

DASYATIDAE [Stingrays]

<i>Urogymnus polylepis</i>	22
<i>Megatrygon microps</i>	22
<i>Bathytoshia lata</i>	22
<i>Hemistrygon akajei</i>	23
<i>Hemistrygon fluviorum</i>	23
<i>Brevistrygon imbricata</i>	23
<i>Brevistrygon heterura</i>	23
<i>Telatrygon zugei</i>	24
<i>Urogymnus lobistoma</i>	24
<i>Pateobatis uarnacoides</i>	24
<i>Maculabatis astra</i>	24
<i>Himantura undulata</i>	25
<i>Himantura leoparda</i>	25
<i>Himantura uarnak</i>	25
<i>Maculabatis gerrardi</i>	25
<i>Pateobatis jenkinsii</i>	26
<i>Maculabatis fai</i>	26
<i>Maculabatis pastinacoides</i>	26
<i>Neotrygon orientalis</i>	26
<i>Pastinachus ater</i>	27
<i>Pastinachus gracilicaudus</i>	27
<i>Pastinachus solocirostris</i>	27
<i>Pastinachus stellulostris</i>	27
<i>Taeniura lymma</i>	28
<i>Taeniurops meyeri</i>	28
<i>Pteroplatytrygon violacea</i>	28
<i>Urogymnus asperrimus</i>	28

GYMNURIDAE [Butterfly Rays]

<i>Gymnura japonica</i>	29
<i>Gymnura poecilura</i>	29
<i>Gymnura zonura</i>	29

MYLIOBATIDAE [Eagle Rays]

<i>Aetobatus flagellum</i>	30
<i>Aetobatus ocellatus</i>	30
<i>Aetomylaeus maculatus</i>	30
<i>Aetomylaeus nichofii</i>	30
<i>Aetomylaeus vesperilio</i>	31
<i>Myliobatis hamlyni</i>	31

RHINOPTERIDAE [Cownose Rays]

<i>Rhinoptera javanica</i>	31
<i>Rhinoptera jayakari</i>	31

MOBULIDAE [Devilrays]

<i>Manta birostris</i>	32
<i>Mobula japanica</i>	32
<i>Mobula thurstoni</i>	32
<i>Mobula kuhlii</i>	32

IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

HEXANCHIDAE

Heptanchias perlo (Bonnaterre, 1788)

Sharpnose sevengill shark

Head narrow and pointed

Eyes large, green in life

Slender body

Single dorsal fin origin over inner margin of pelvic fin

Caudal peduncle long [twice length of dorsal fin base]



Seven gill slits



Snout pointed

HEXANCHIDAE

Hexanchus griseus (Bonnaterre, 1788)

Bluntnose sixgill shark

Head broad

Eyes small, fluorescent green in life

Single dorsal fin origin over inner margin of pelvic fin

Caudal peduncle short [equal length of dorsal fin base]

Body fusiform & relatively stout



Six gill slits

HEXANCHIDAE

Hexanchus nakamurai Teng, 1962

Bigeye sixgill shark

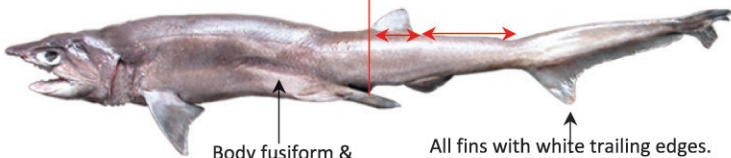
Single dorsal fin origin over inner margin of pelvic fin

Caudal peduncle long [at least twice length of dorsal fin base]

Head narrow

Eyes large, fluorescent green in life

Six gill slits



Body fusiform & relatively slender

All fins with white trailing edges. Upper caudal fin for juvenile with black tip

Head dorsoventrally flattened



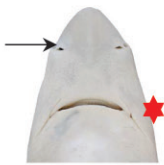
SQUALIDAE

Squalus altipinnis Last, White & Stevens, 2007

Western highfin spurdog

Anterior nasal flap with two lobes

Snout moderate; rather pointed, preoral snout short



Dorsal spines robust; second dorsal fin spine with broad base

First dorsal fin spine origin over or anterior to free rear tips of pectoral fins

Caudal fin with narrow pale posterior margin [caudal bar absent]



First dorsal spine length more than half anterior margin



Second dorsal spine almost reaching anterior margin tip



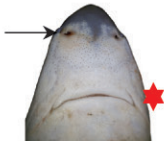
SQUALIDAE

Squalus megalops (Macleay, 1881)

Pike spurdog, Shortnose spurdog

Anterior nasal flap with two lobes

Snout bluntly pointed to blunt, preoral snout short



First dorsal fin spine short [2.4 - 3.4% TL]

Interdorsal space 24 - 25% of TL

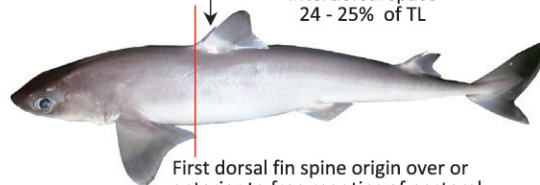
First dorsal fin spine origin over or anterior to free rear tips of pectoral fins



First dorsal spine very short; less than half anterior margin



Second dorsal fin spine not reaching anterior margin tip

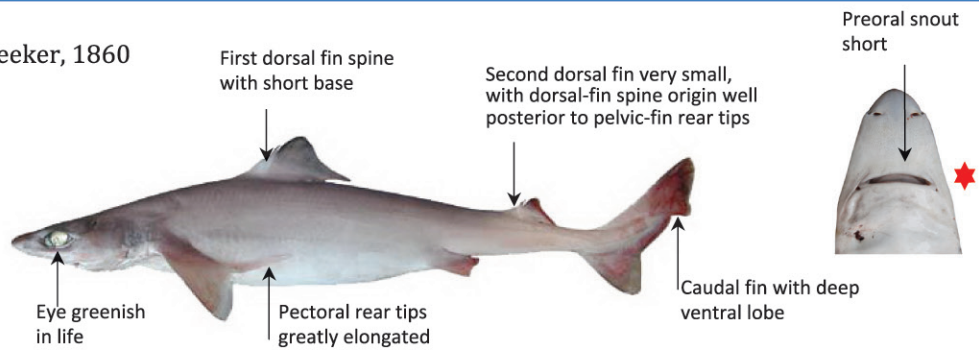


Caudal fin with white posterior margin [occasionally with a bar through base of lower caudal lobe]

IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

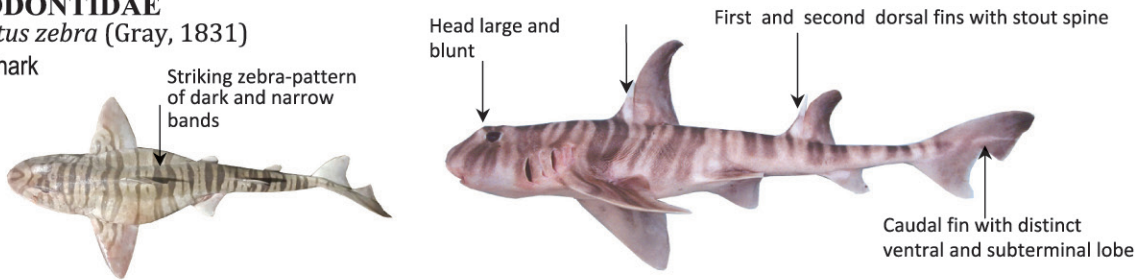
CENTROPHORIDAE

Centrophorus moluccensis Bleeker, 1860
Smallfin gulper dogfish



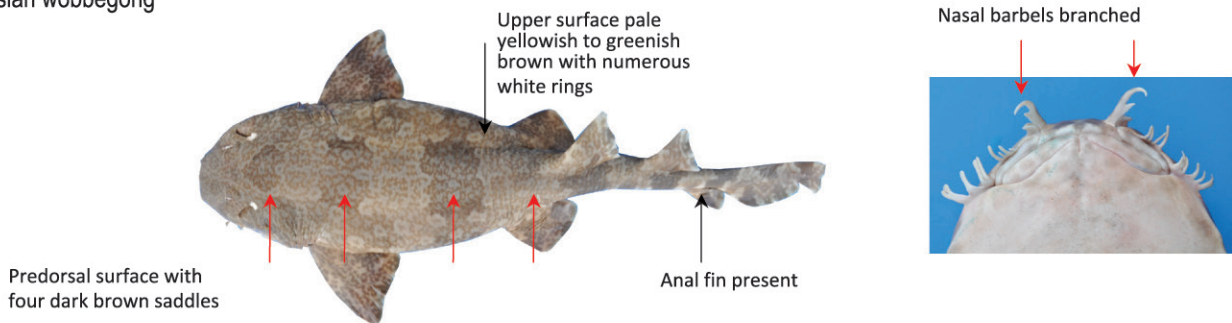
HETERODONTIDAE

Heterodontus zebra (Gray, 1831)
Zebra hornshark



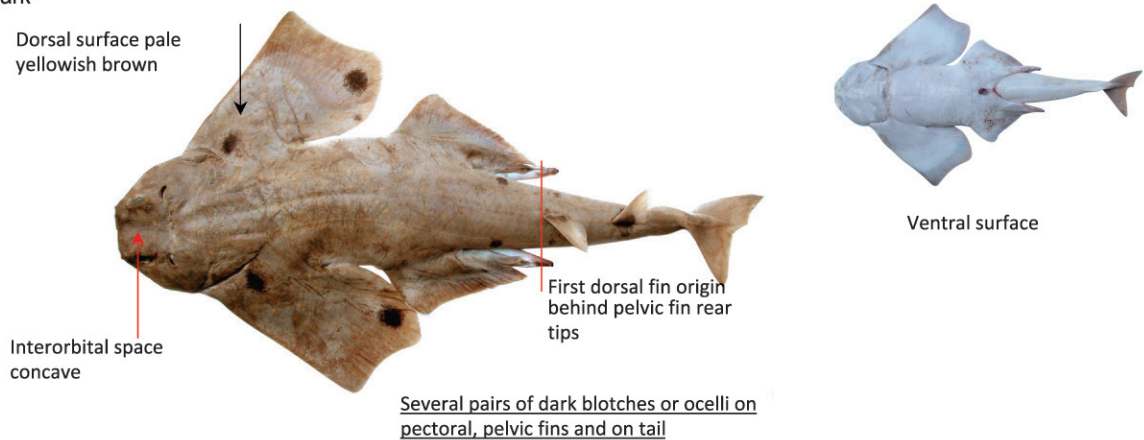
ORECTOLOBIDAE

Orectolobus leptolineatus Last, Pogonoski & White, 2010
Indonesian wobbegong



SQUATINIDAE

Squatina tergocellatoides Chan, 1963
Ocellated angelshark

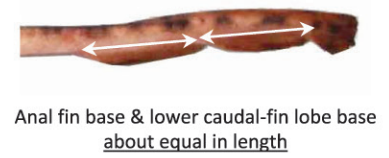
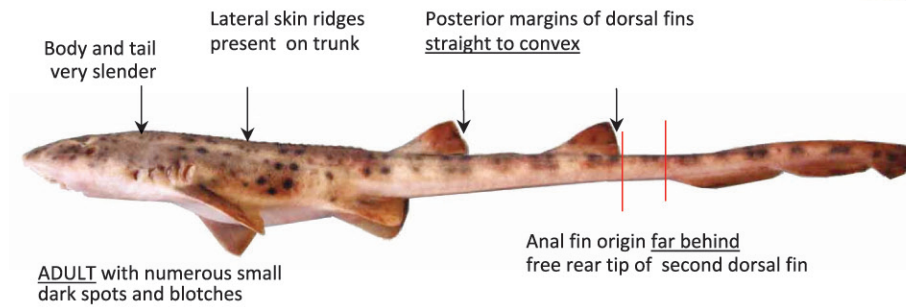


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

HEMISCYLLIIDAE

Chiloscyllium indicum (Gremlin, 1789)

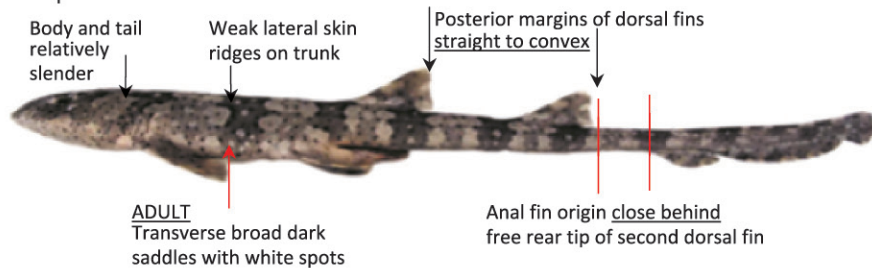
Slender bambooshark



HEMISCYLLIIDAE

Chiloscyllium plagiosum (Bennett, 1830)

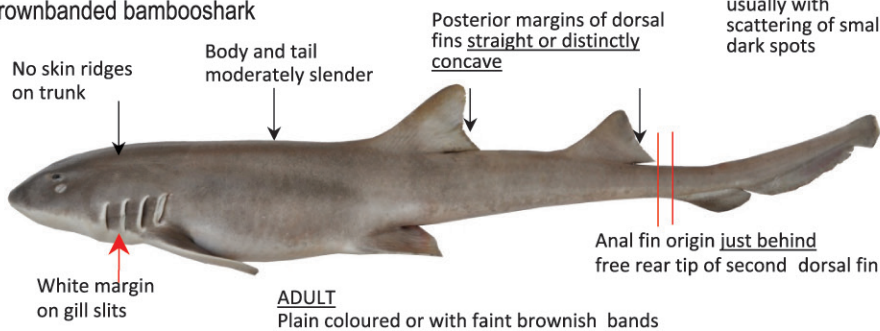
Whitespotted bambooshark



HEMISCYLLIIDAE

Chiloscyllium punctatum Müller and Henle, 1839

Brownbanded bambooshark



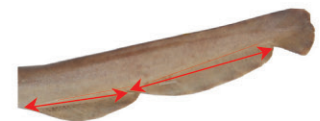
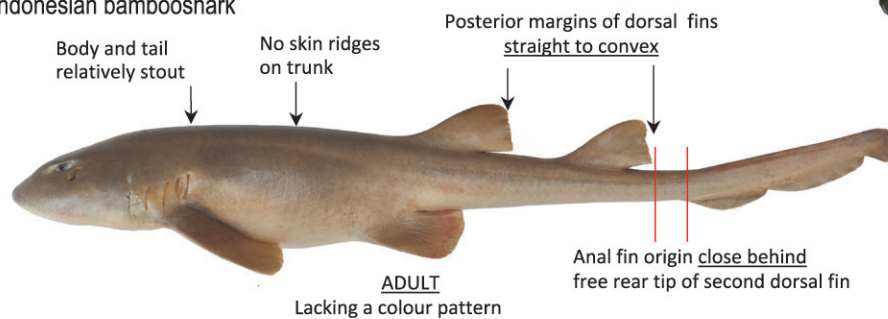
JUVENILE
Transverse bands usually with scattering of small dark spots



HEMISCYLLIIDAE

Chiloscyllium hasseltii Bleeker, 1852

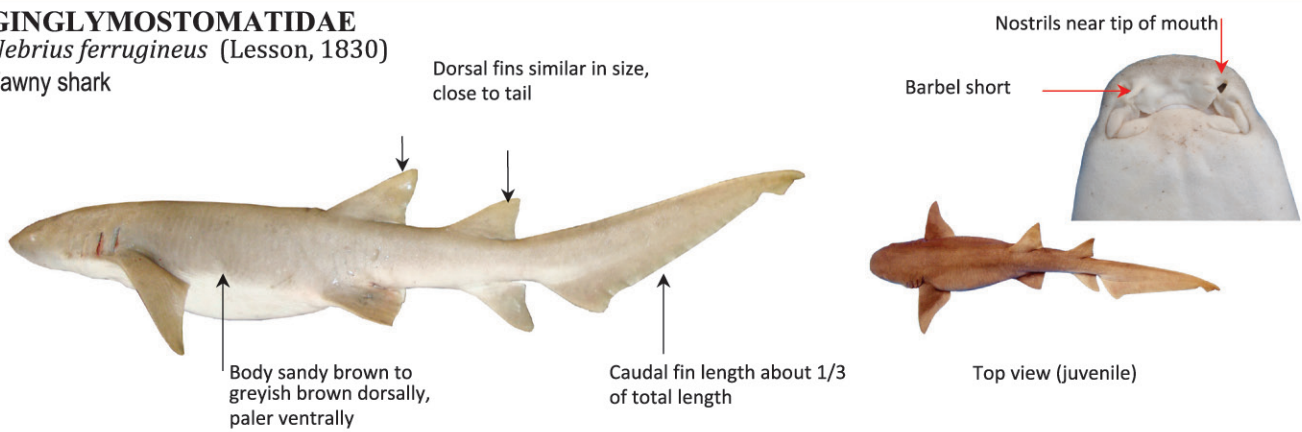
Indonesian bambooshark



IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

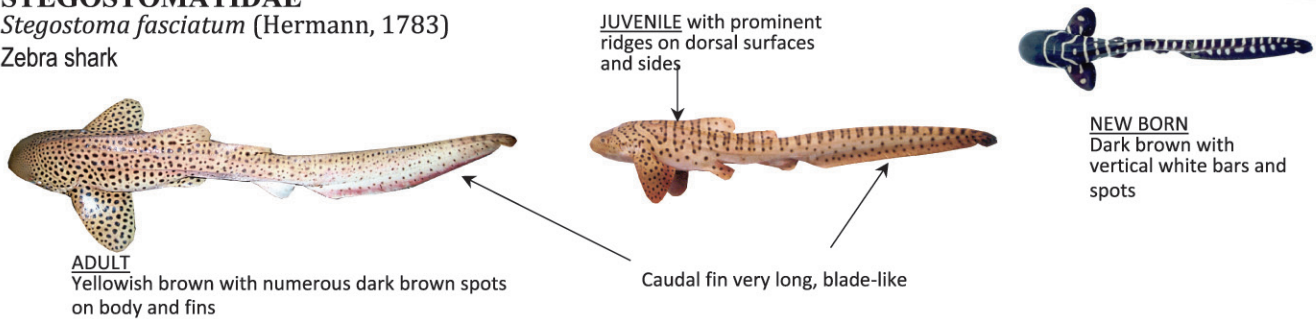
GINGLYMOSTOMATIDAE

Nebrius ferrugineus (Lesson, 1830)
Tawny shark



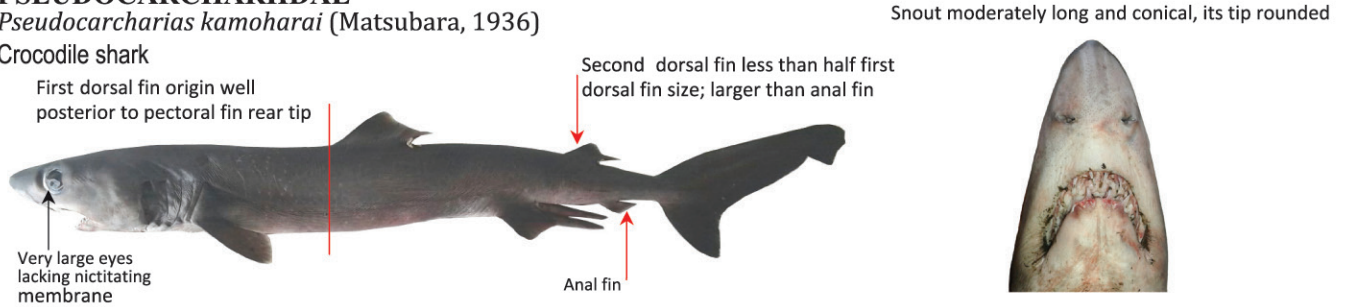
STEGOSTOMATIDAE

Stegostoma fasciatum (Hermann, 1783)
Zebra shark



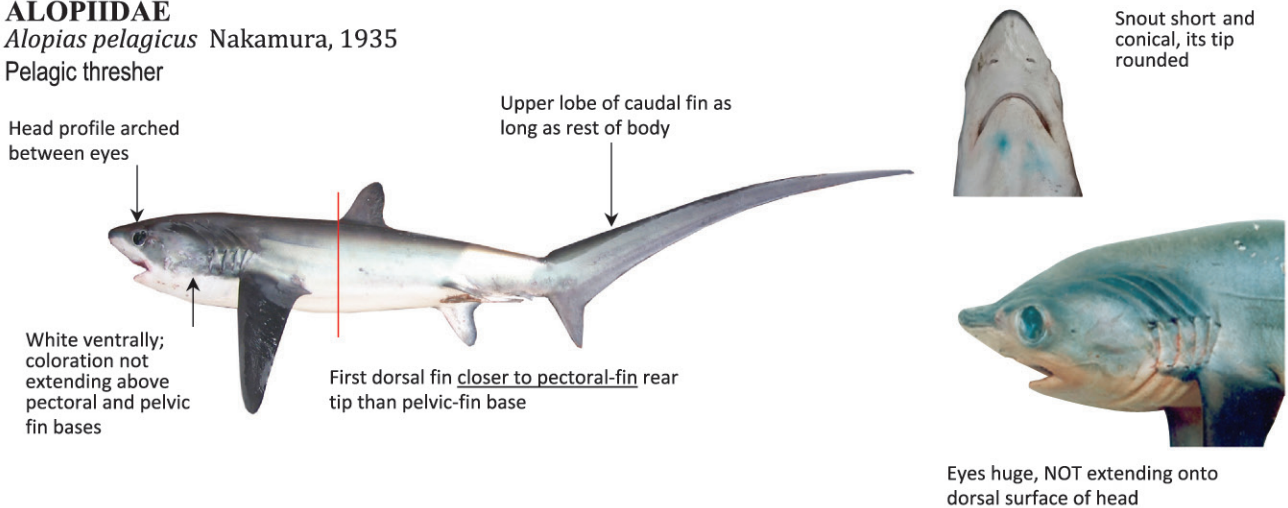
PSEUDOCARCHARIIDAE

Pseudocarcharias kamoharai (Matsubara, 1936)
Crocodile shark



ALOPIIDAE

Alopias pelagicus Nakamura, 1935
Pelagic thresher



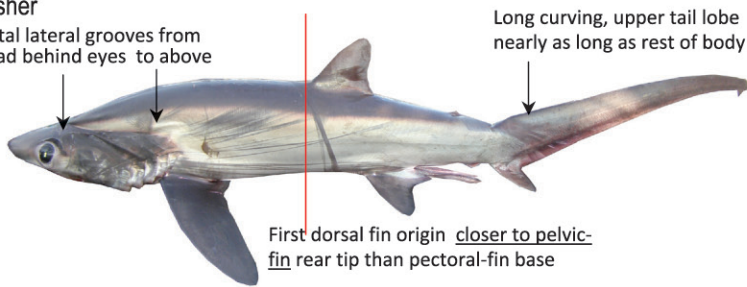
IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

ALOPHIIDAE

Alopias superciliosus (Lowe, 1839)

Bigeye thresher

Deep horizontal lateral grooves from midline of head behind eyes to above gill region



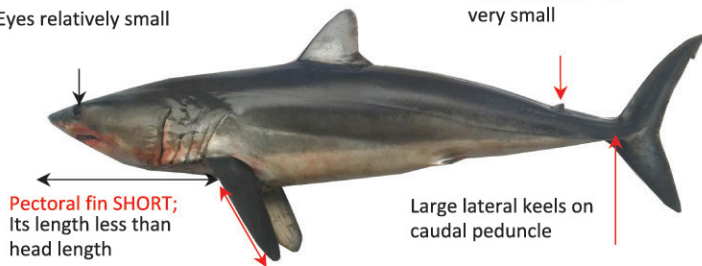
Eyes huge, extending onto dorsal surface of head

LAMNIDAE

Isurus oxyrinchus Rafinesque, 1810

Shortfin mako

Eyes relatively small



Snout acutely long and pointed

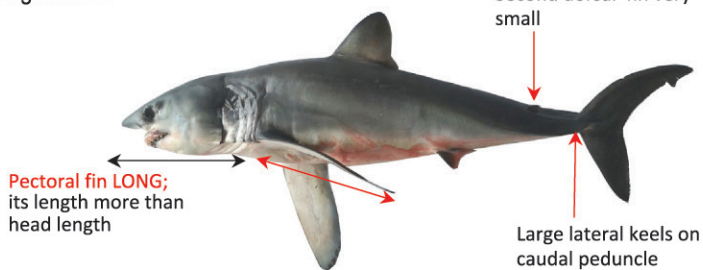


Underside of snout and jaw white in adults

LAMNIDAE

Isurus paucus Guitart Manday, 1966

Longfin mako



Top view

Underside of snout and jaws dark [in adults]

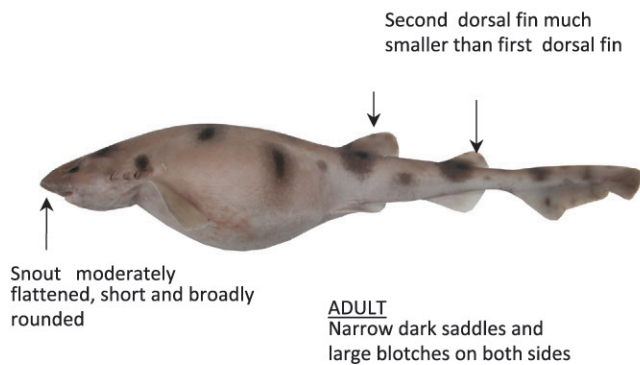
Snout long and pointed



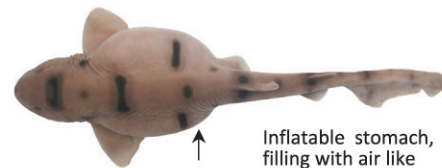
SCYLIORHINIDAE

Cephaloscyllium sarawakensis Yano, Ahmad & Gambang, 2005

Sarawak pygmy swellshark



Top view



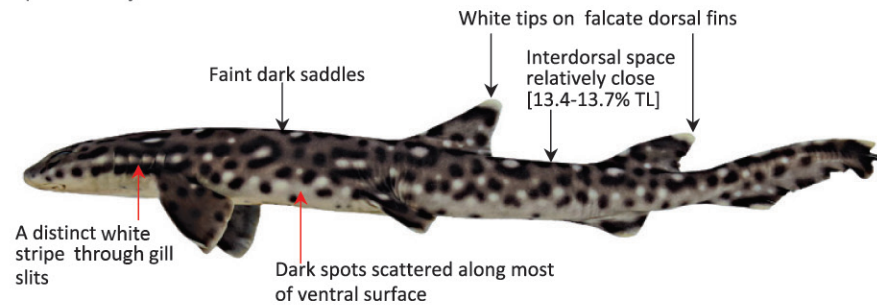
JUVENILE
Body light brown with dark elongate spots and small light brown spots

IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

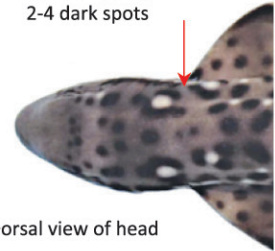
SCYLIORHINIDAE

Atelomycterus erdmanni Fahmi & White, 2015

Spotted-belly catshark



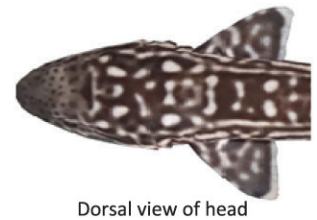
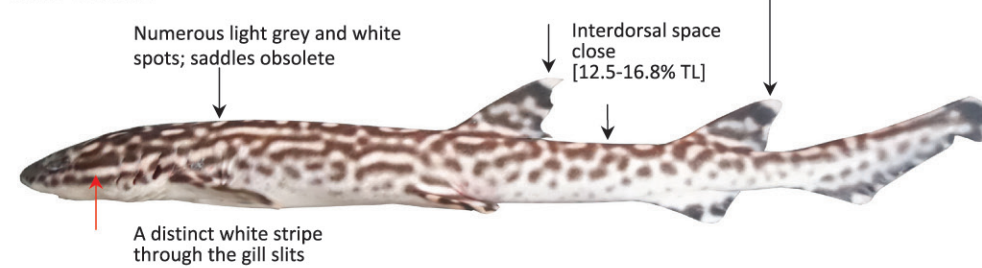
White spots surrounded by 2-4 dark spots



SCYLIORHINIDAE

Atelomycterus marmoratus (Bennett, 1830)

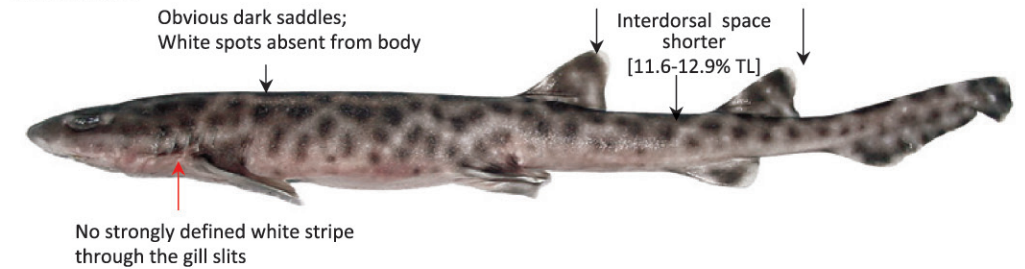
Coral catshark



SCYLIORHINIDAE

Atelomycterus baliensis White, Last & Dharmadi, 2005

Bali catshark

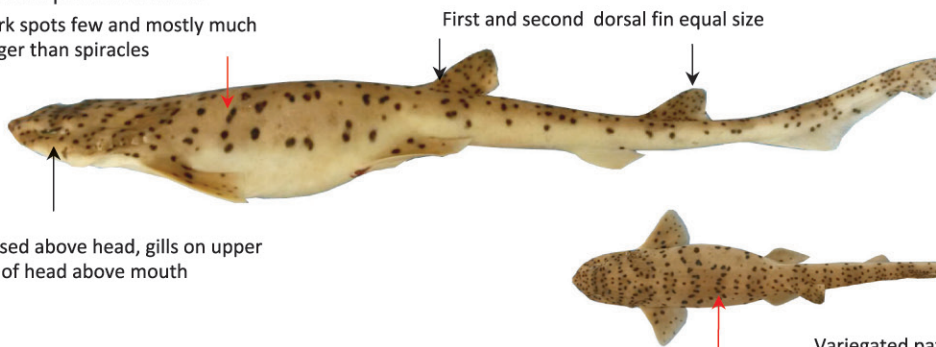


SCYLIORHINIDAE

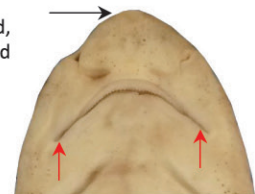
Halaelurus buergeri (Müller and Henle, 1839)

Blackspotted catshark

Dark spots few and mostly much larger than spiracles



Snout pointed, not upturned

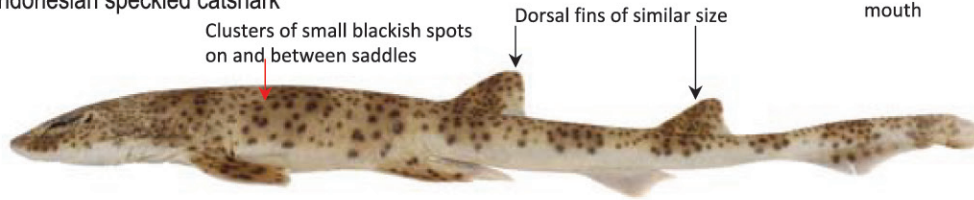


Labial furrows reduced or absent, lower furrows two mm long or less

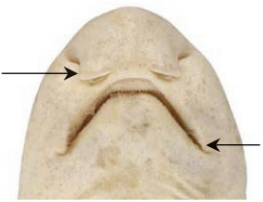
**IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES
OF THE SOUTHEAST ASIAN REGION**

SCYLIORHINIDAE

Halaelurus maculosus White, Last & Stevens, 2007
Indonesian speckled catshark



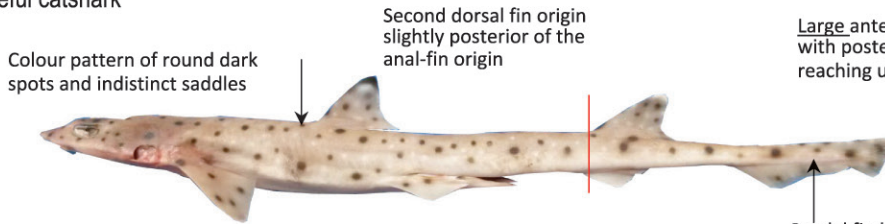
Anterior nasal flaps short, not reaching mouth



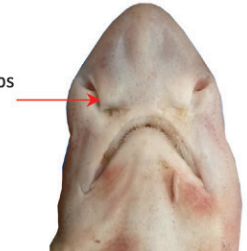
Upper labial furrows barely noticeable

PROSCYLLIIDAE

Proscyllium habereri Hilgendorf, 1904
Graceful catshark

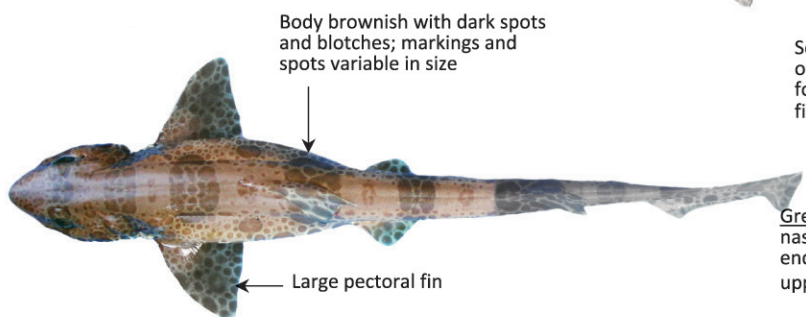


Large anterior nasal flaps with posterior not reaching upper jaw



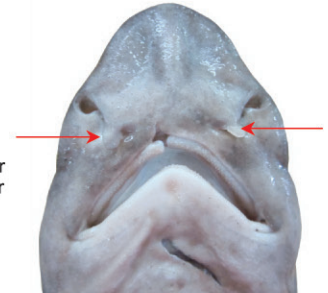
PROSCYLLIIDAE

Proscyllium magnificentum Last & Vongpanich, 2004
Magnificent catshark



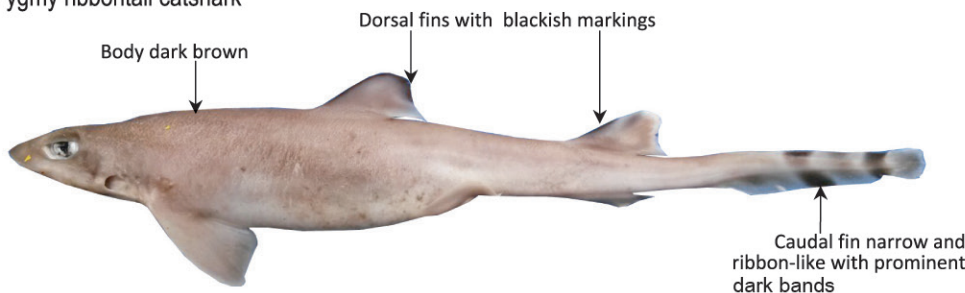
Second dorsal fin origin slightly forward of the anal-fin origin

Greatly enlarged anterior nasal flaps with posterior ends almost reaching upper jaw

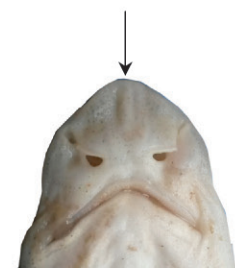


PROSCYLLIIDAE

Eridacnis radcliffei Smith, 1913
Pygmy ribbontail catshark



Snout short and narrowly rounded



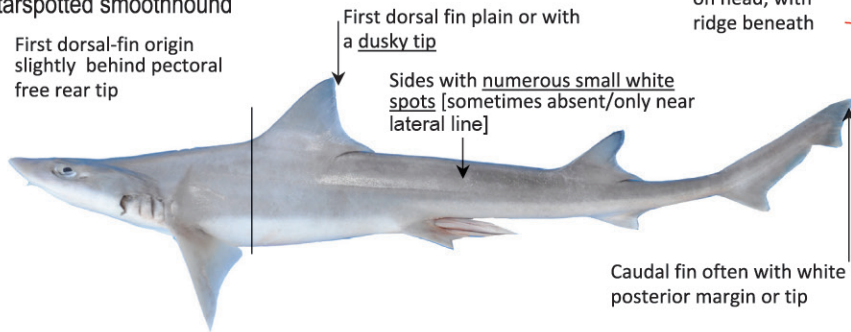
IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

TRIAKIDAE

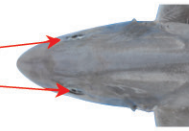
Mustelus manazo Bleeker, 1854

Starspotted smoothhound

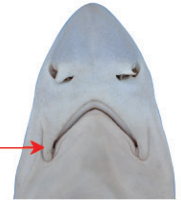
First dorsal-fin origin slightly behind pectoral free rear tip



Eye dorsolateral on head, with ridge beneath



Upper labial furrow much longer than lower furrow

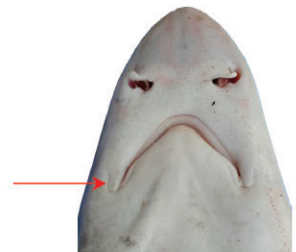
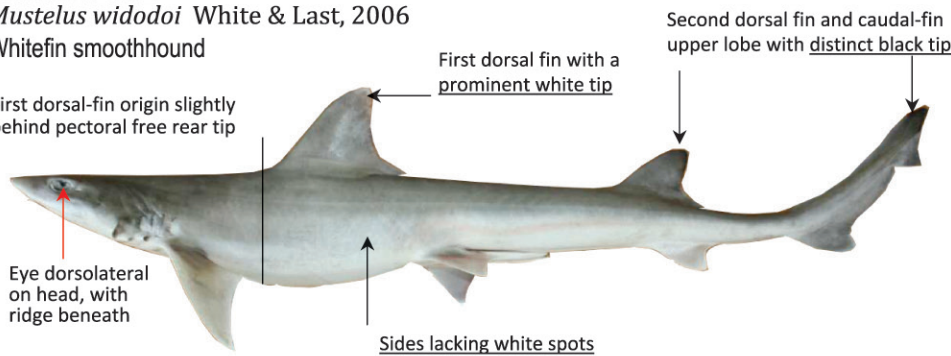


TRIAKIDAE

Mustelus widodoi White & Last, 2006

Whitefin smoothhound

First dorsal-fin origin slightly behind pectoral free rear tip

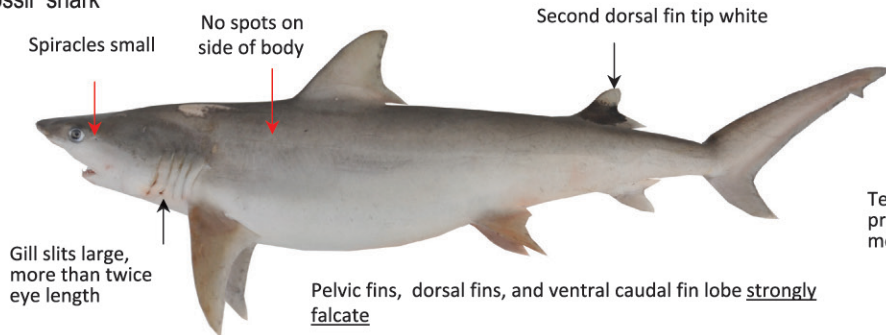


Upper labial furrow subequal to/ slightly longer than lower furrow

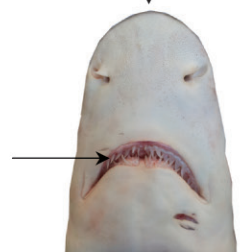
HEMIGALEIDAE

Hemipristis elongata (Klunzinger, 1871)

Fossil shark



Snout bluntly rounded and relatively long

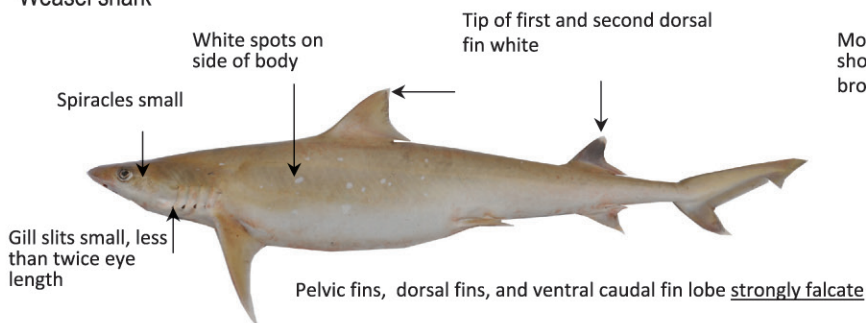


Teeth protruding prominently when mouth closed

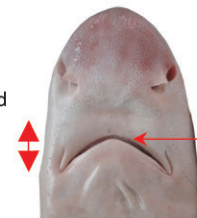
HEMIGALEIDAE

Hemigaleus microstoma Bleeker, 1852

Weasel shark



Mouth very short and broadly arched



Teeth concealed when mouth closed

IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

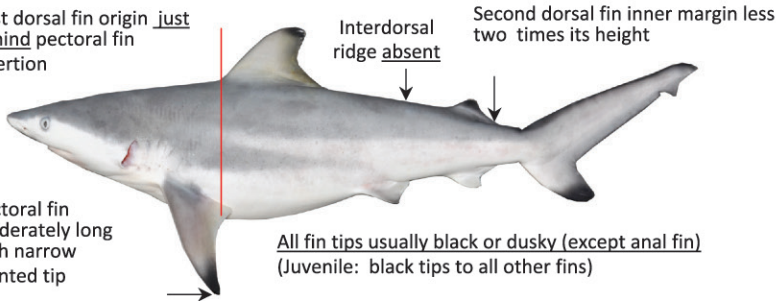
CARCHARHINIDAE

Carcharhinus amblyrhynchoides (Whitley, 1934)

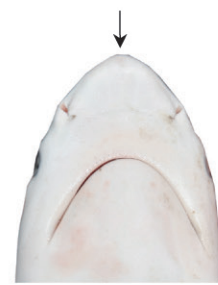
Graceful shark

First dorsal fin origin just behind pectoral fin insertion

Pectoral fin moderately long with narrow pointed tip



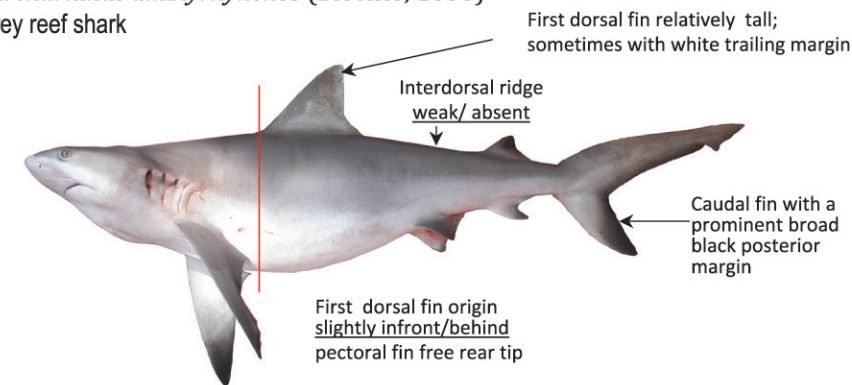
Snout rather short; narrowly rounded to pointed



CARCHARHINIDAE

Carcharhinus amblyrhynchos (Bleeker, 1856)

Grey reef shark



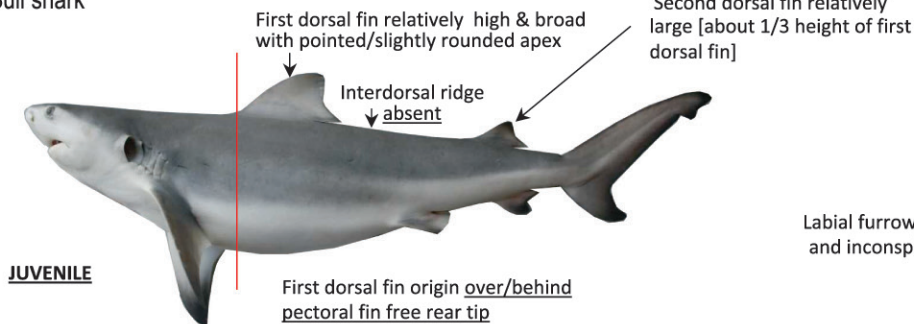
Snout broadly rounded



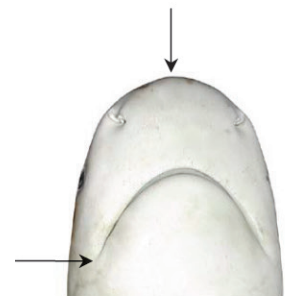
CARCHARHINIDAE

Carcharhinus leucas (Müller and Henle, 1839)

Bull shark



Snout broadly rounded and very short

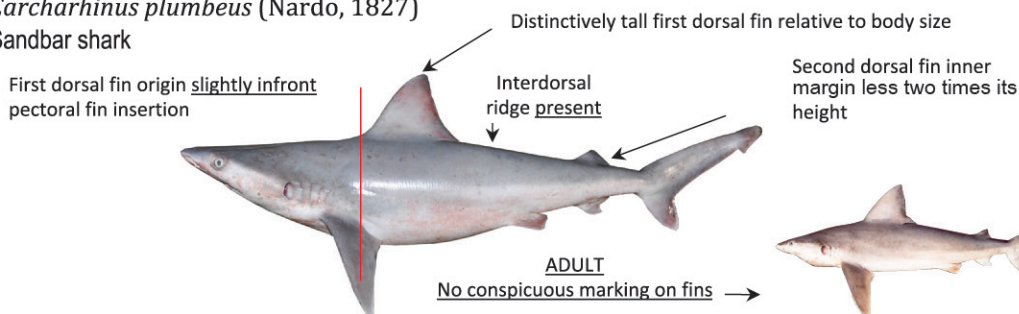


CARCHARHINIDAE

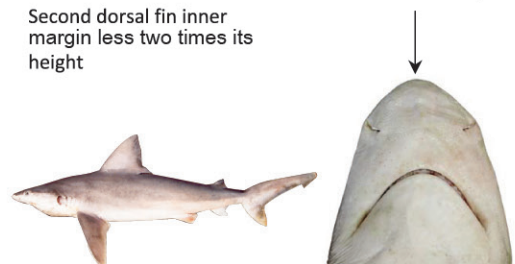
Carcharhinus plumbeus (Nardo, 1827)

Sandbar shark

First dorsal fin origin slightly in front pectoral fin insertion



Snout broadly rounded and short

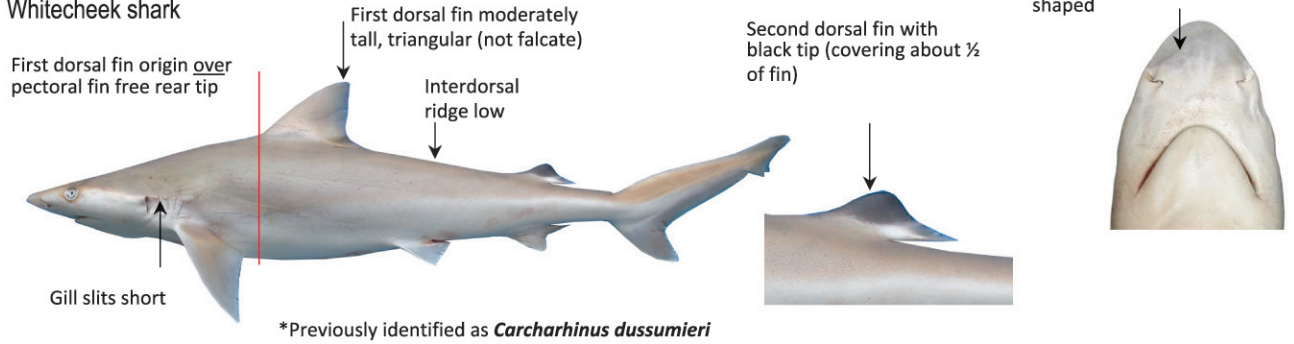


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

CARCHARHINIDAE

Carcharhinus tjtjtj Bleeker, 1852

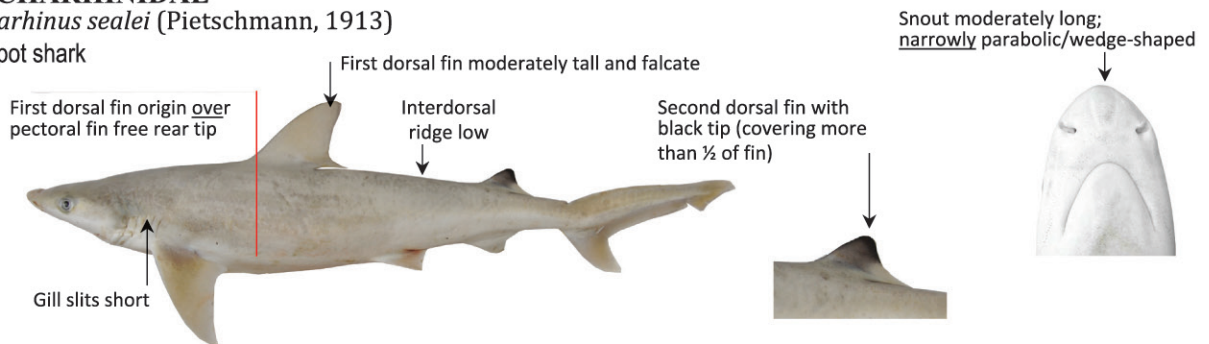
Whitecheek shark



CARCHARHINIDAE

Carcharhinus sealei (Pietschmann, 1913)

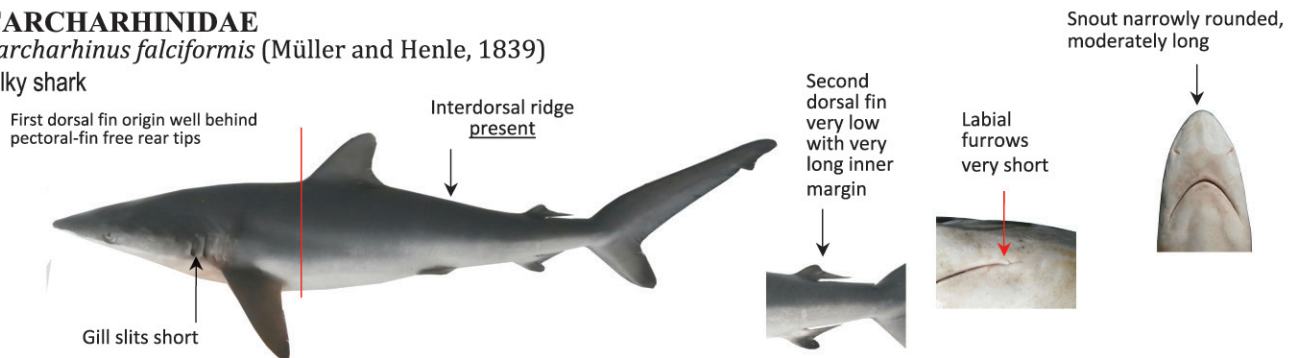
Blackspot shark



CARCHARHINIDAE

Carcharhinus falciformis (Müller and Henle, 1839)

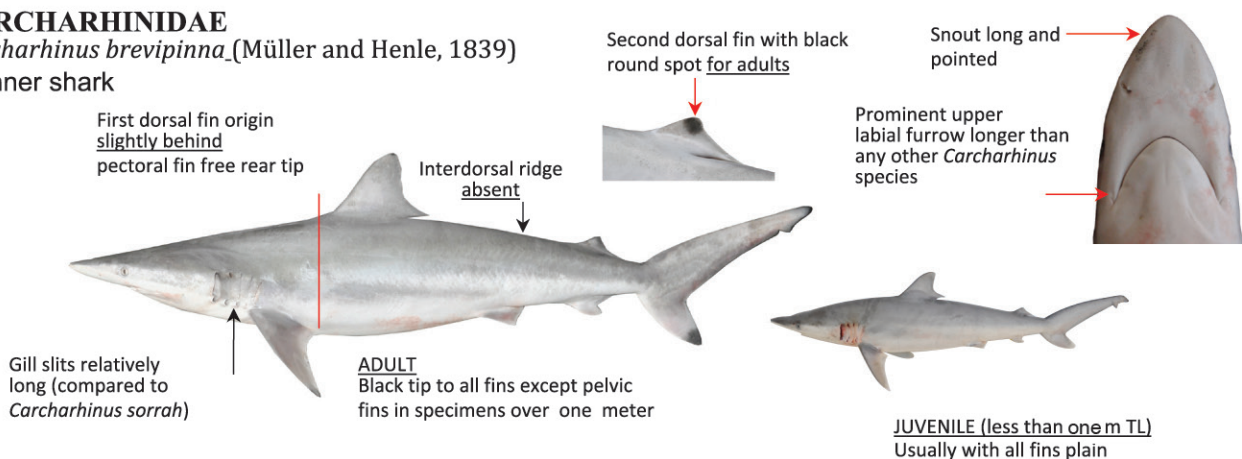
Silky shark



CARCHARHINIDAE

Carcharhinus brevipinna (Müller and Henle, 1839)

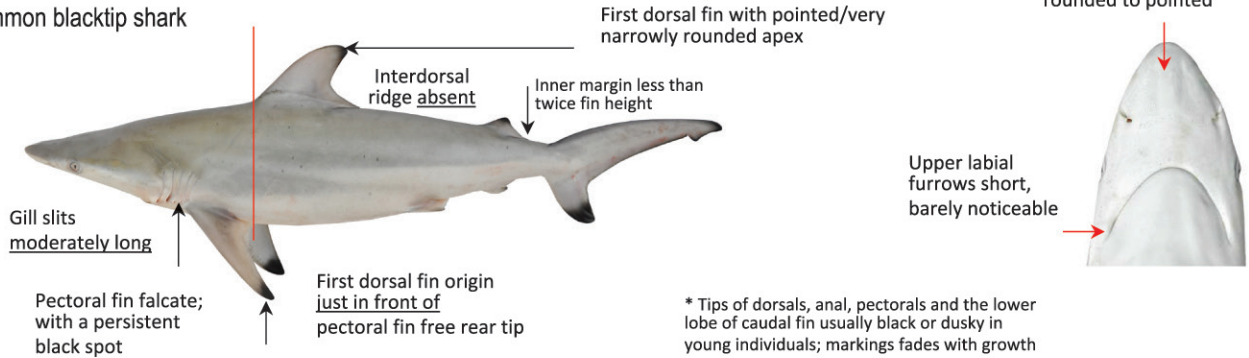
Spinner shark



IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

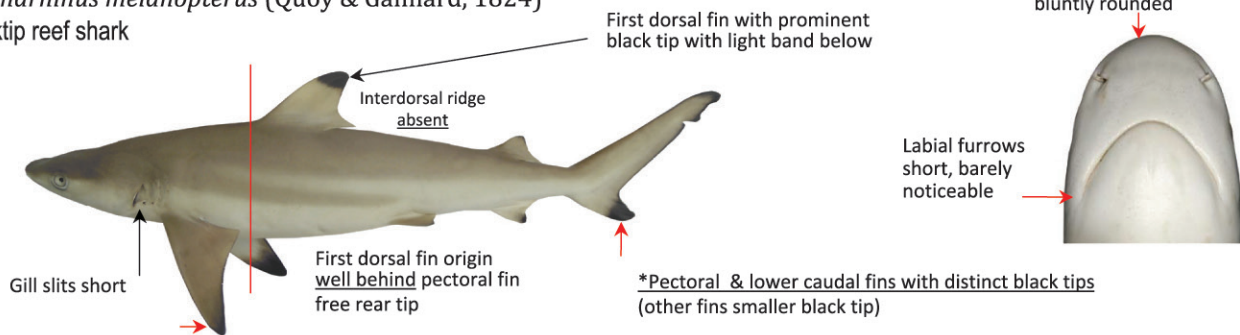
CARCHARHINIDAE

Carcharhinus limbatus (Müller and Henle, 1839)
Common blacktip shark



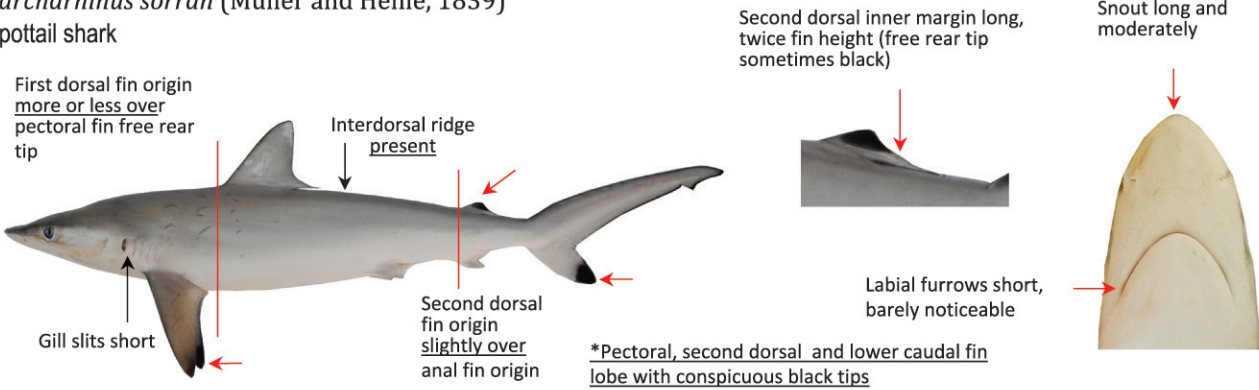
CARCHARHINIDAE

Carcharhinus melanopterus (Quoy & Gaimard, 1824)
Blacktip reef shark



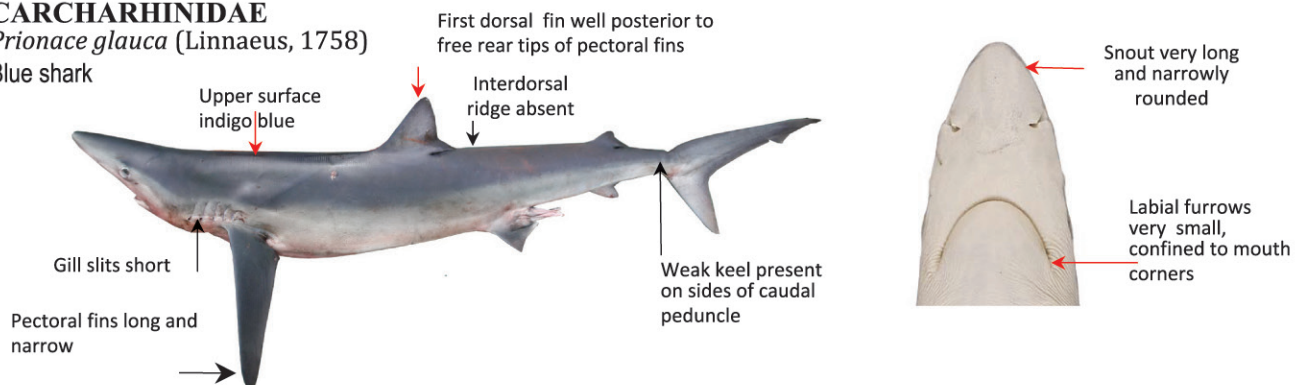
CARCHARHINIDAE

Carcharhinus sorrah (Müller and Henle, 1839)
Spottail shark



CARCHARHINIDAE

Prionace glauca (Linnaeus, 1758)
Blue shark

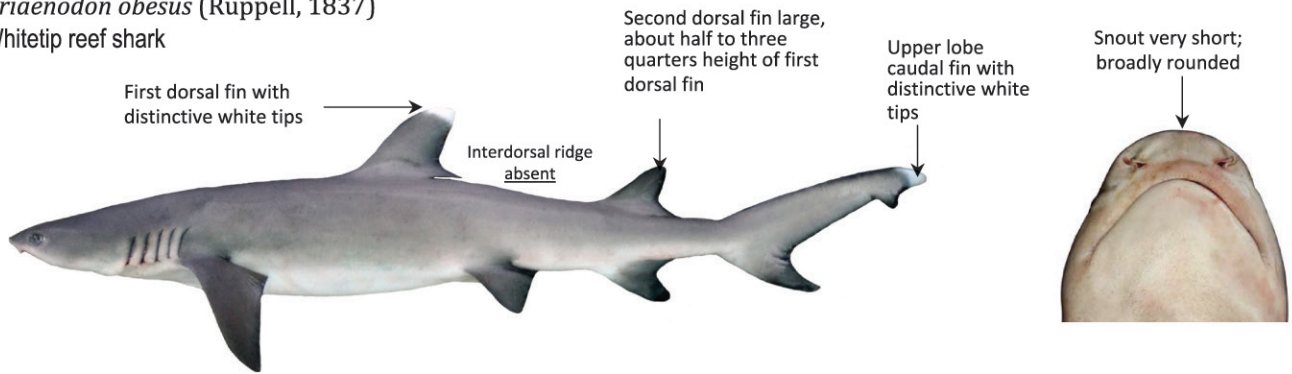


**IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES
OF THE SOUTHEAST ASIAN REGION**

CARCHARHINIDAE

Triaenodon obesus (Rüppell, 1837)

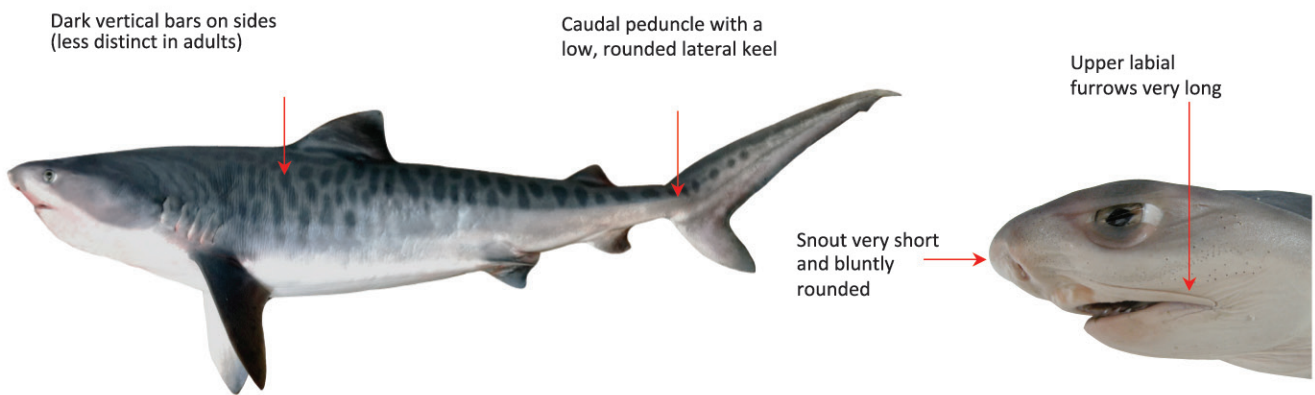
Whitetip reef shark



CARCHARHINIDAE

Galeocerdo cuvier (Peron & Lesueur, 1822)

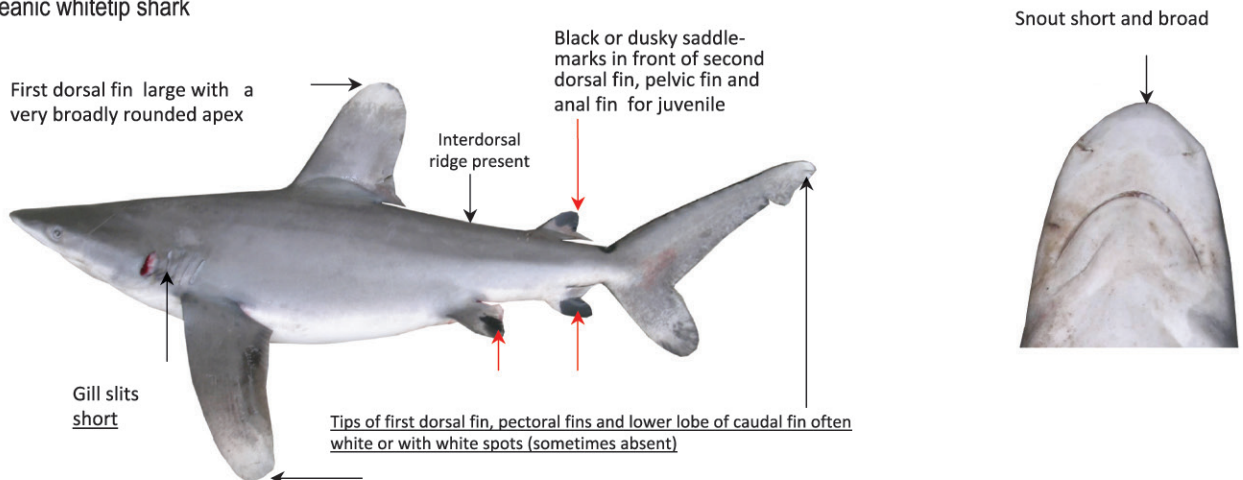
Tiger shark



CARCHARHINIDAE

Carcharhinus longimanus (Poey, 1861)

Oceanic whitetip shark

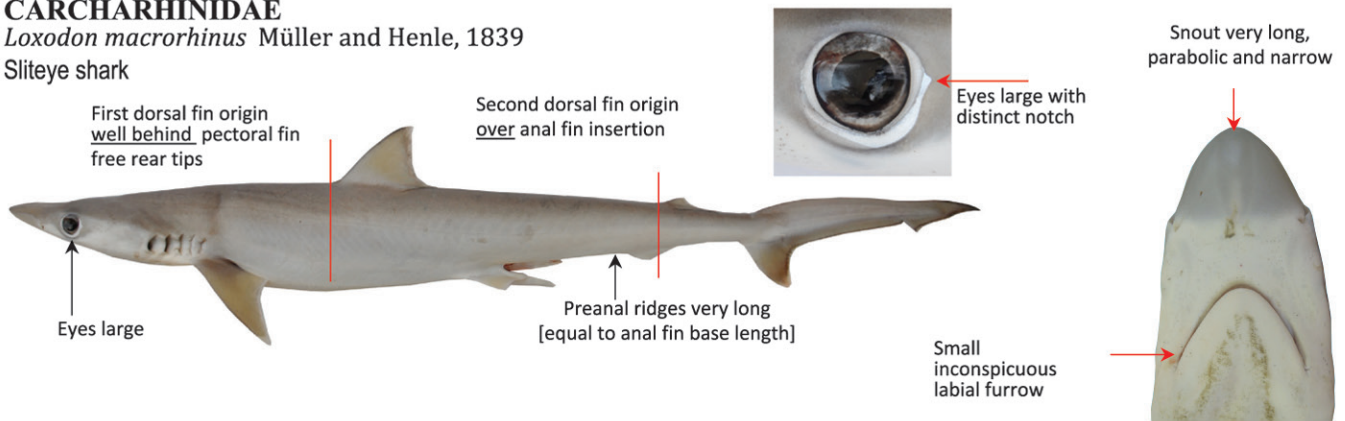


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

CARCHARHINIDAE

Loxodon macrorhinus Müller and Henle, 1839

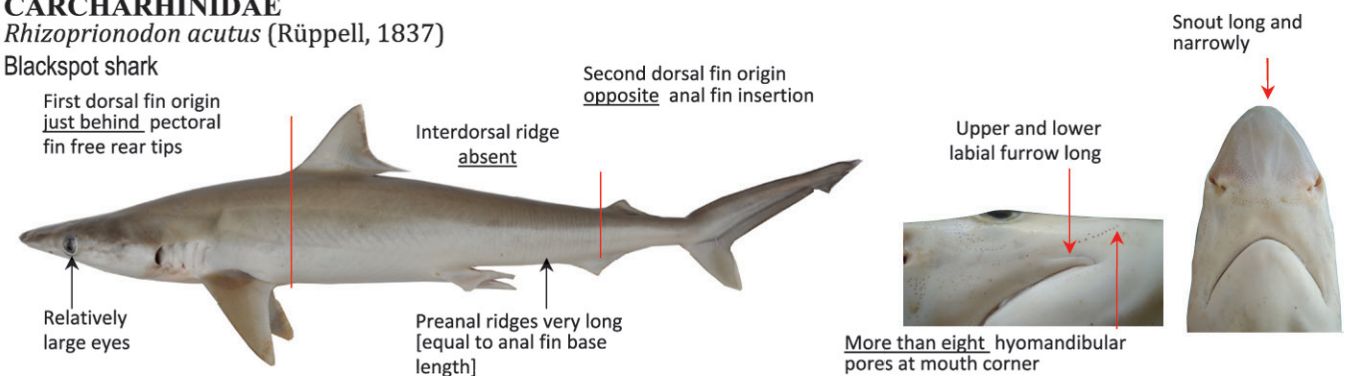
Sliteye shark



CARCHARHINIDAE

Rhizoprionodon acutus (Rüppell, 1837)

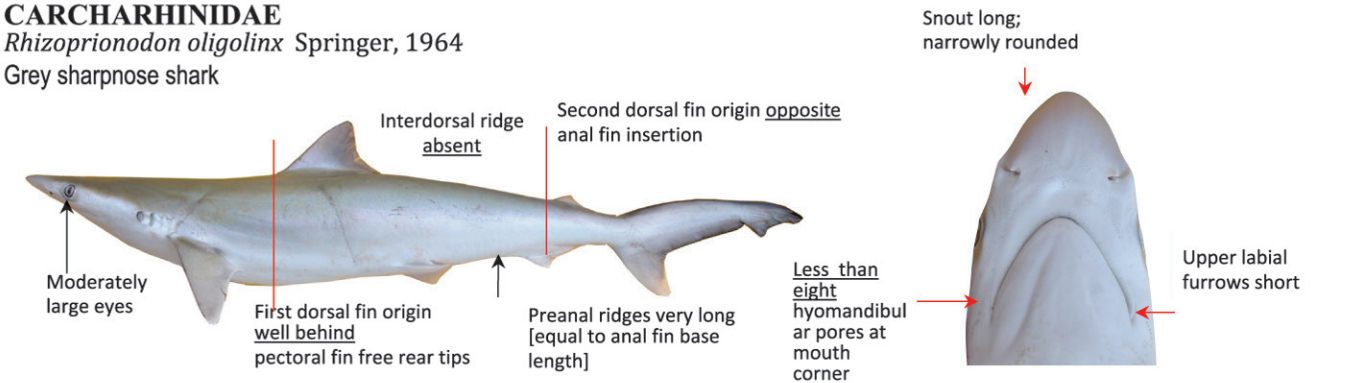
Blackspot shark



CARCHARHINIDAE

Rhizoprionodon oligolinx Springer, 1964

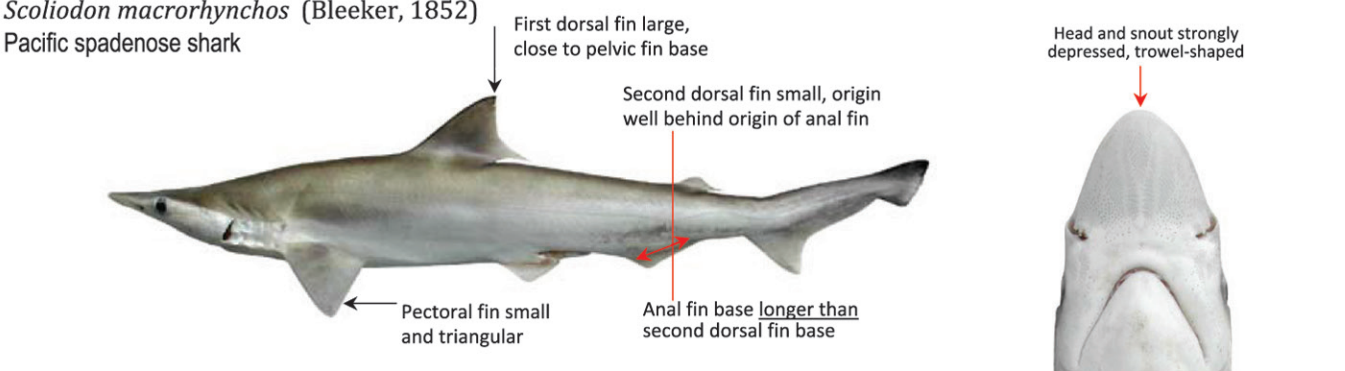
Grey sharpnose shark



CARCHARHINIDAE

Scoliodon macrorhynchus (Bleeker, 1852)

Pacific spadenose shark

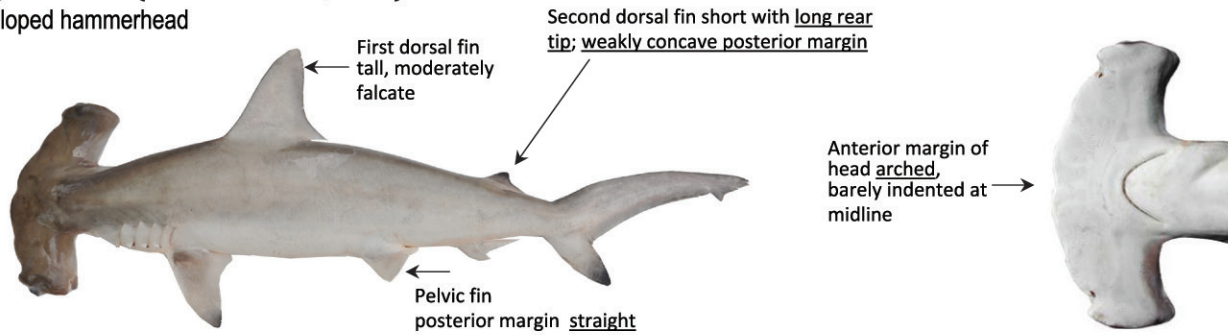


**IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES
OF THE SOUTHEAST ASIAN REGION**

SPHYRNIDAE

Sphyrna lewini (Griffith & Smith, 1834)

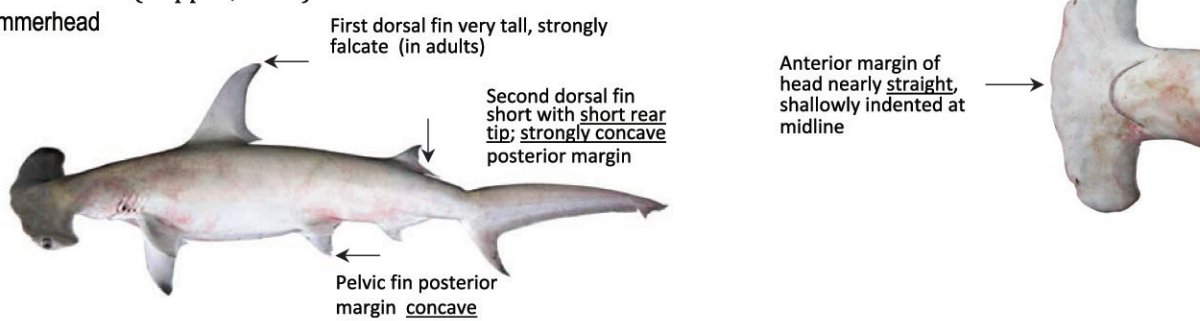
Scalloped hammerhead



SPHYRNIDAE

Sphyrna mokarran (Rüppell, 1837)

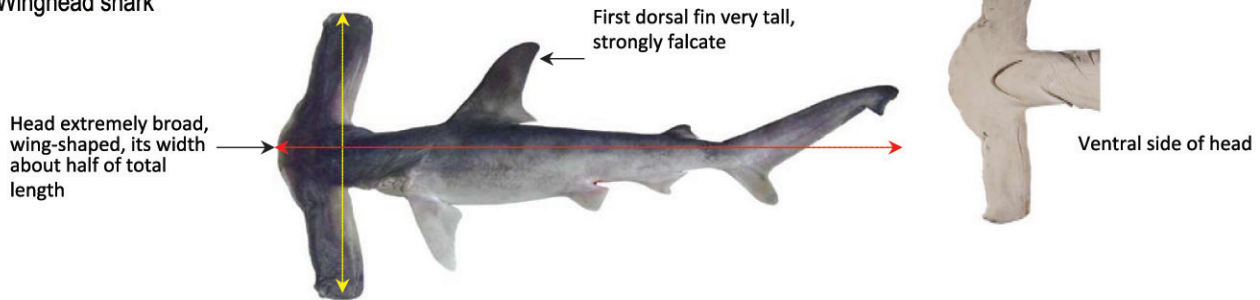
Great hammerhead



SPHYRNIDAE

Eusphyra blochii (Cuvier, 1816)

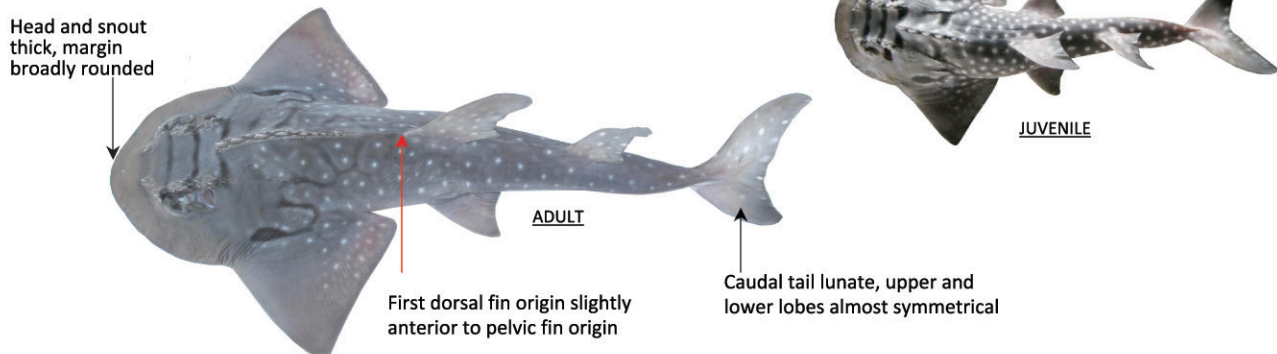
Winghead shark



RHINIDAE

Rhina ancylostoma Bloch & Schneider, 1801

Shark ray

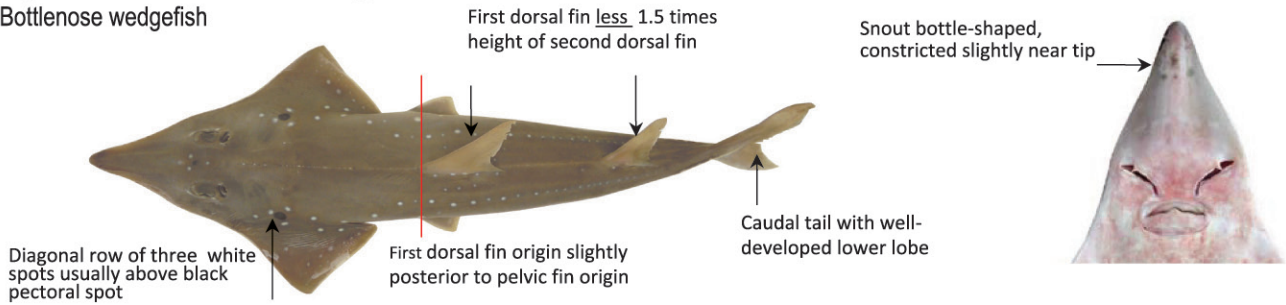


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

RHINIDAE

Rhynchobatus australiae Whitley, 1939

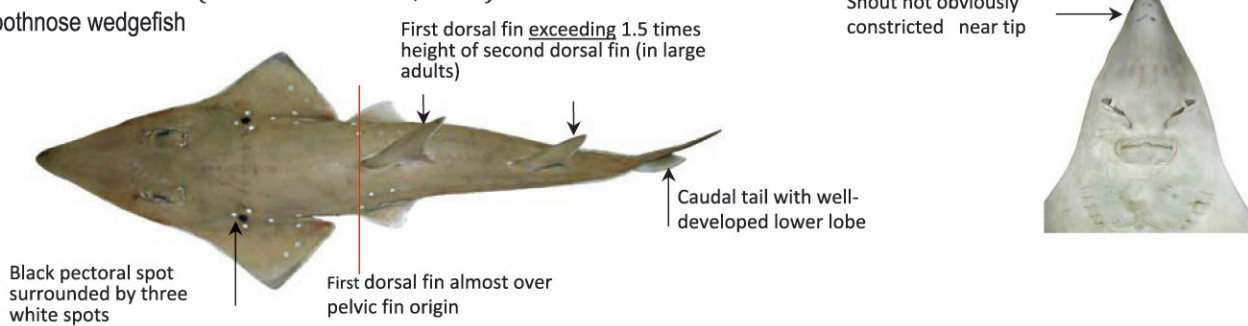
Bottlenose wedgefish



RHINIDAE

Rhynchobatus laevis (Bloch & Schneider, 1801)

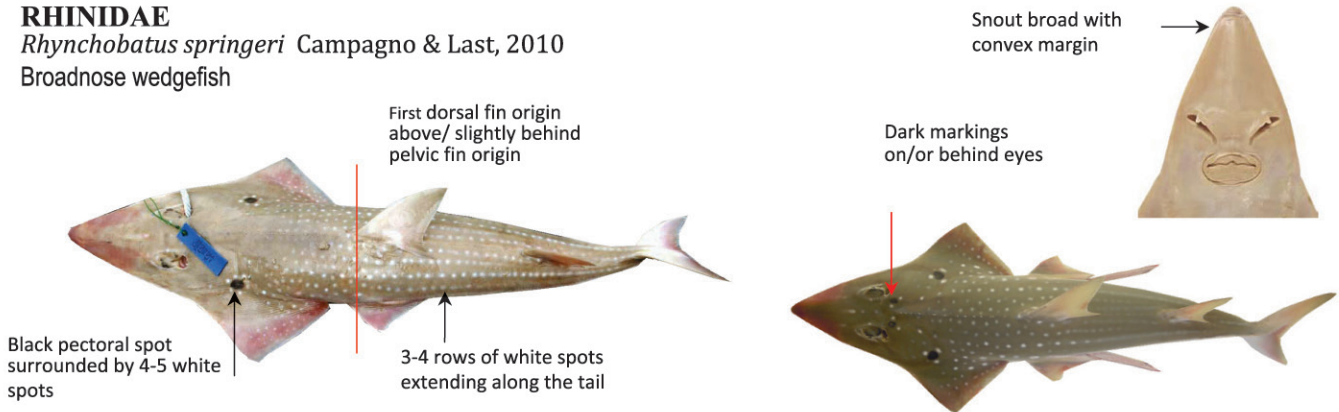
Smoothnose wedgefish



RHINIDAE

Rhynchobatus springeri Campagno & Last, 2010

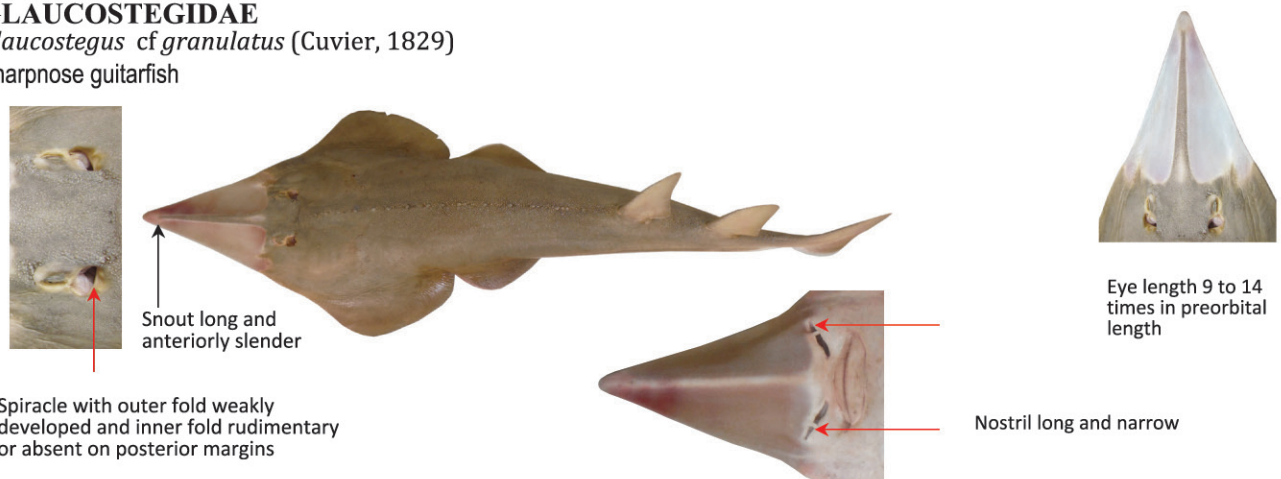
Broadnose wedgefish



GLAUCOSTEGIDAE

Glaucostegus cf granulatus (Cuvier, 1829)

Sharpnose guitarfish



**IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES
OF THE SOUTHEAST ASIAN REGION**

GLAUCOSTEGIDAE

Glaucostegus thouin (Anonymous, 1798)

Clubnose guitarfish

Clear part of snout sharply demarcate from rest of head near eyes

Snout tip enlarged to form an elongate knob

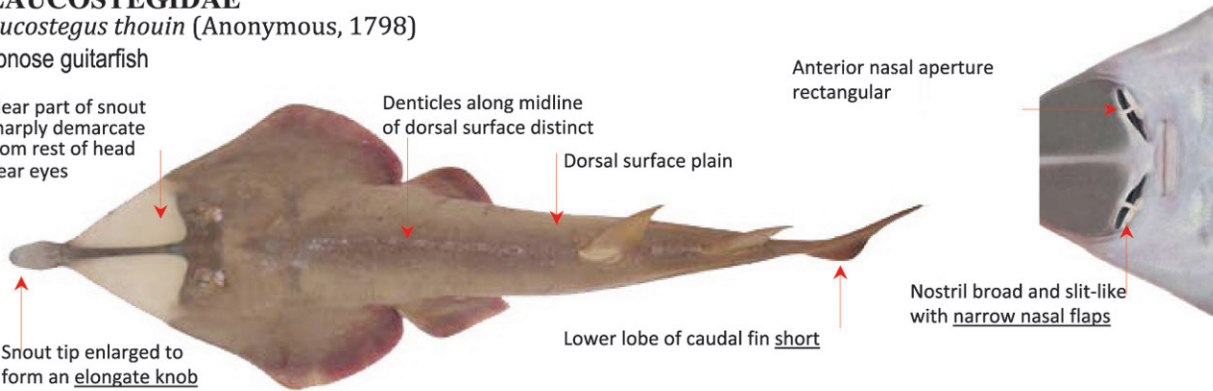
Denticles along midline of dorsal surface distinct

Dorsal surface plain

Lower lobe of caudal fin short

Anterior nasal aperture rectangular

Nostril broad and slit-like with narrow nasal flaps



GLAUCOSTEGIDAE

Glaucostegus typus (Bennett, 1830)

Giant guitarfish

Clear part of snout sharply demarcated from rest of head near eyes

Snout tip not forming a knob

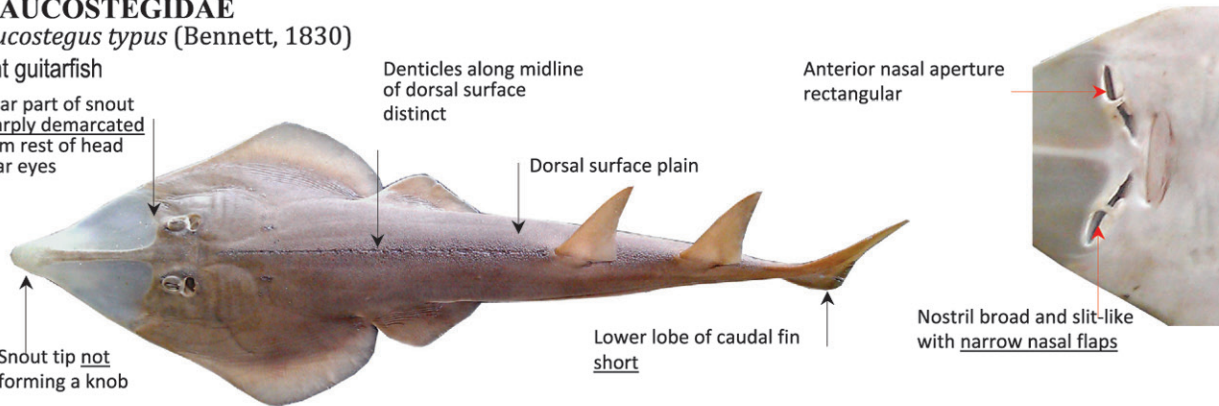
Denticles along midline of dorsal surface distinct

Dorsal surface plain

Lower lobe of caudal fin short

Anterior nasal aperture rectangular

Nostril broad and slit-like with narrow nasal flaps



GLAUCOSTEGIDAE

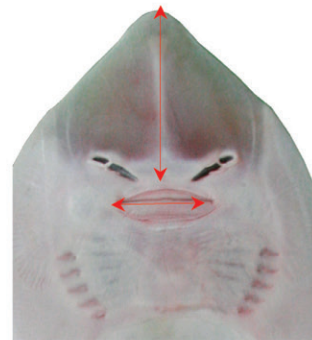
Glaucostegus obtusus (Müller & Henle, 1841)

Bluntnose guitarfish

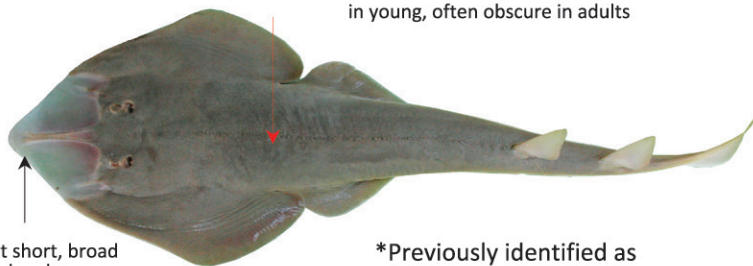
Snout short, broad tipped and obtusely angular

Thorns in irregular row along mid-line of body in young, often obscure in adults

*Previously identified as ***Rhinobatus obtusus***



Preoral length less than two times mouth width



RHINOBATIDAE

Rhinobatos borneensis Last, Seret & Naylor, 2016

Borneo guitarfish

Clear part of snout not sharply demarcated from rest of head near eyes

Snout tip not forming a knob

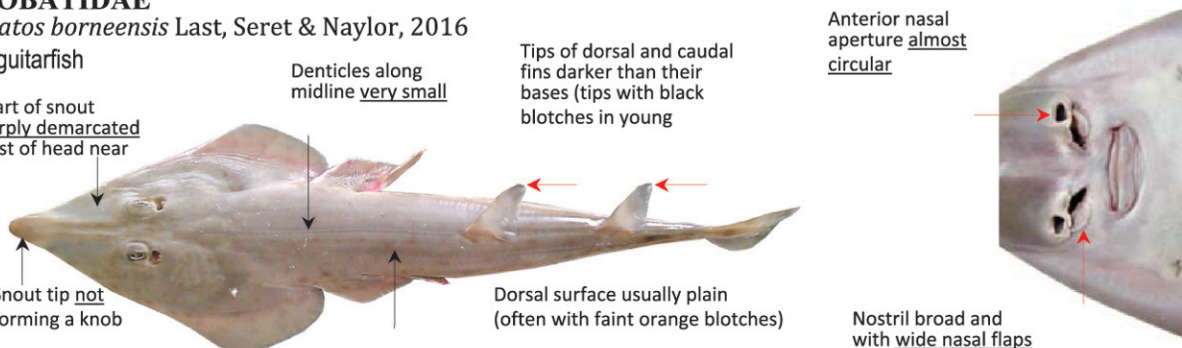
Denticles along midline very small

Tips of dorsal and caudal fins darker than their bases (tips with black blotches in young)

Dorsal surface usually plain (often with faint orange blotches)

Anterior nasal aperture almost circular

Nostril broad and with wide nasal flaps



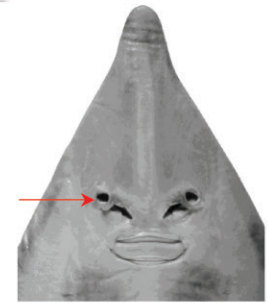
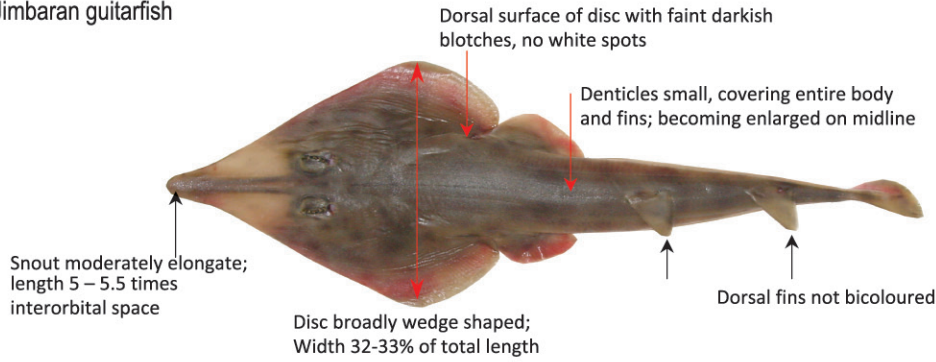
Previously identified as *Rhinobatos formosensis* in Ahmad *et al.*, 2014

IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

RHINOBATIDAE

Rhinobatos jimbaranensis Last, White & Fahmi, 2006

Jimbaran guitarfish

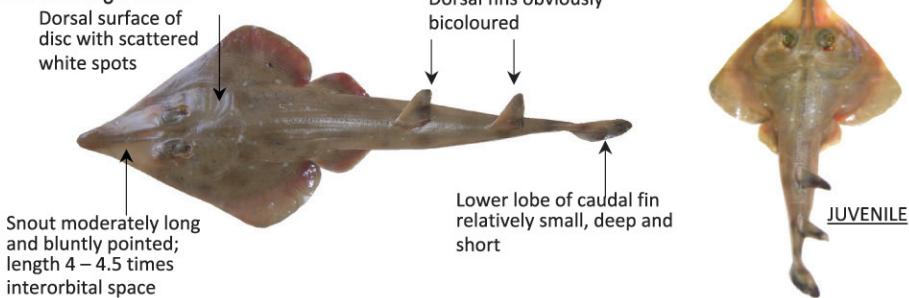


Anterior nasal aperture almost circular

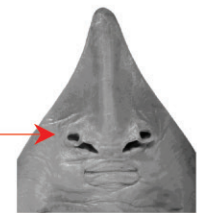
RHINOBATIDAE

Rhinobatos penggali Last, White & Fahmi, 2006

Indonesian guitarfish



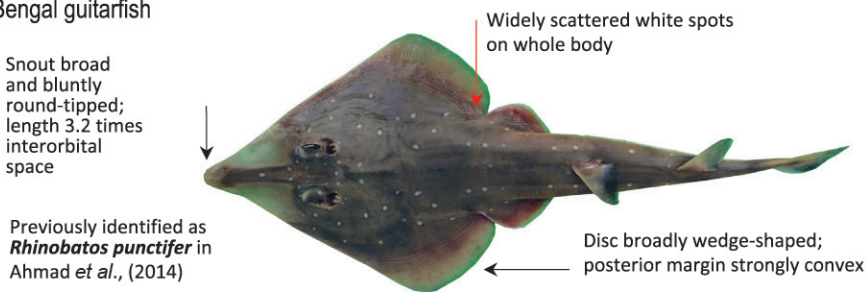
Anterior nasal aperture almost circular



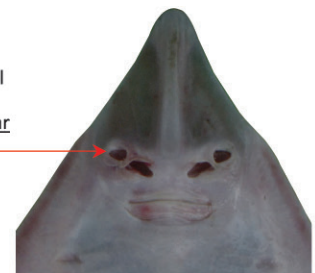
RHINOBATIDAE

Rhinobatos annandalei Norman, 1926

Bengal guitarfish



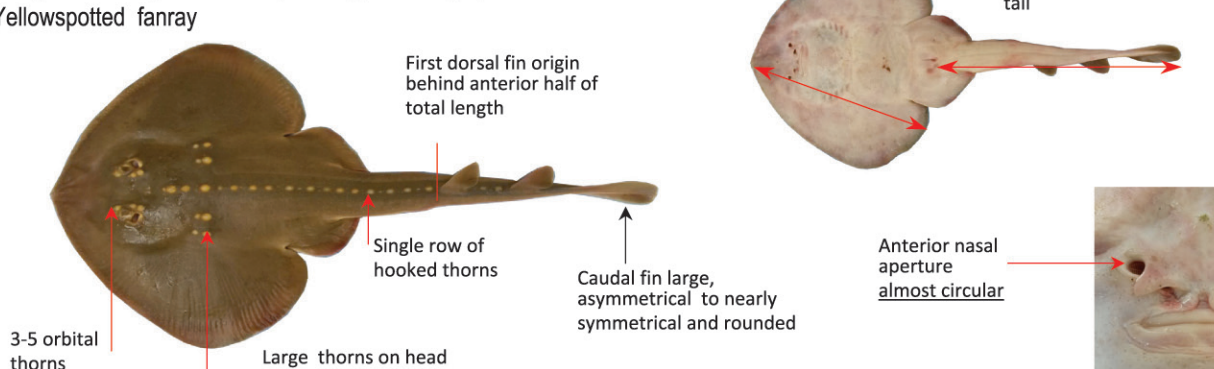
Anterior nasal aperture almost circular



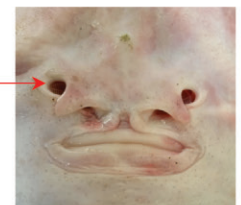
PLATYRHINIDAE

Platyrrhina tangi Iwatsuki, Zhang, & Nakaya, 2011

Yellowspotted fanray



Anterior nasal aperture almost circular

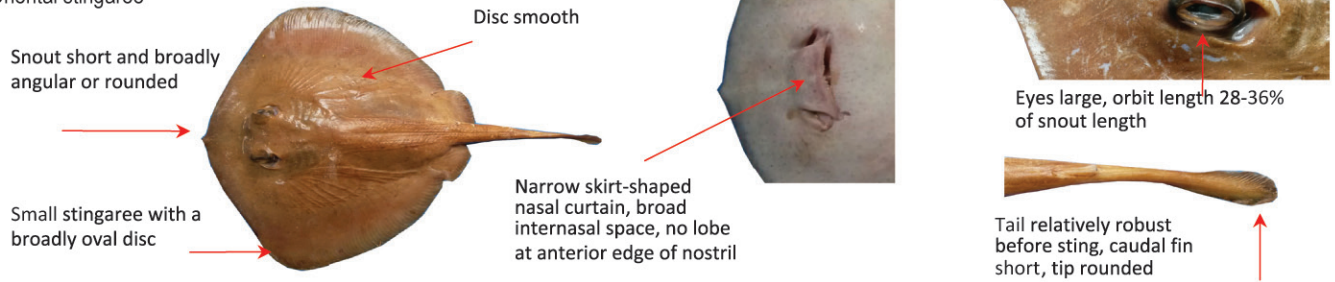


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

UROLOPHIDAE

Urolophus aurantiacus Müller and Henle, 1841

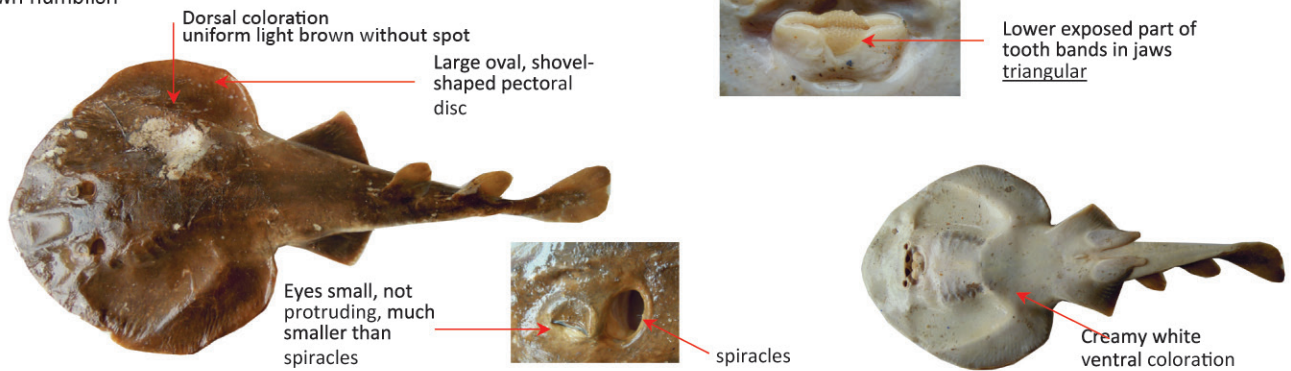
Oriental stingaree



NARCINIDAE

Narcine timplei (Blotch & Schneider, 1801)

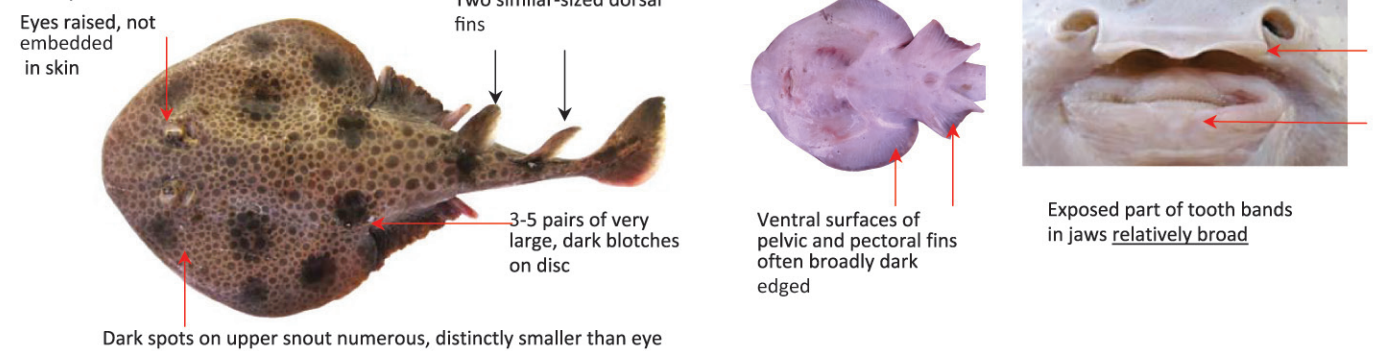
Brown numbfish



NARCINIDAE

Narcine brevilibiata Bessednov, 1966

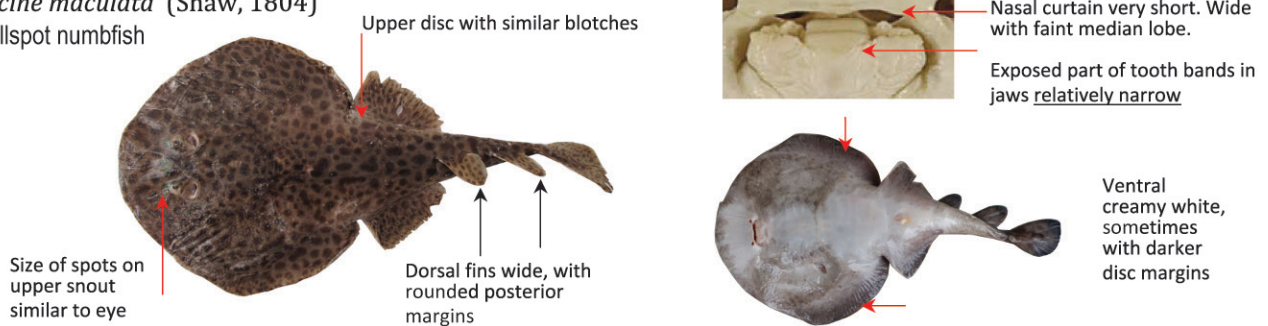
Shortlip numbfish



NARCINIDAE

Narcine maculata (Shaw, 1804)

Smallspot numbfish

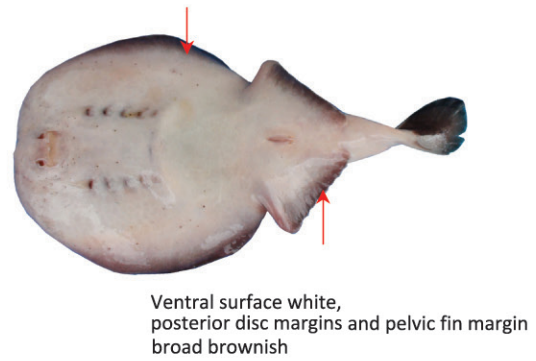
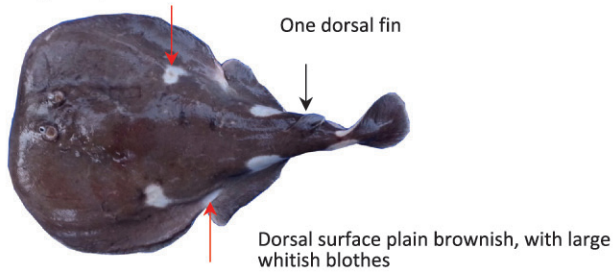


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

NARCINIDAE

Narke dipterygia (Bloch & Schneider, 1801)

Spot-tail sleeper ray



NARCINIDAE

Temera hardwickii Gray, 1831

Finless sleeper ray

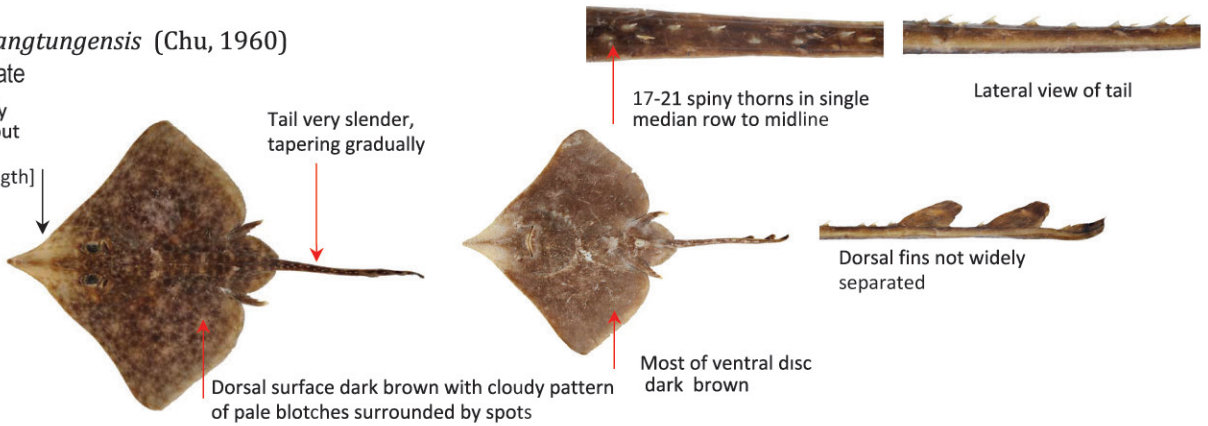


RAJIDAE

Dipturus kwangtungensis (Chu, 1960)

Kwangtung skate

Snout narrowly triangular. Snout length 4.4-5.3 times orbit length]



RAJIDAE

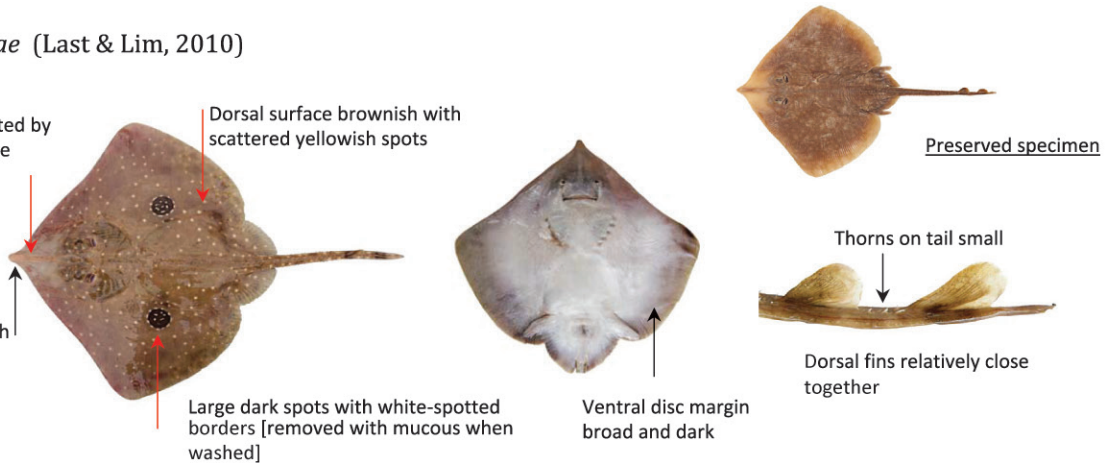
Orbiraja jensenae (Last & Lim, 2010)

Sulu ring skate

Snout supported by a firm cartilage

Snout broadly triangular, quite long [preorbital length ~3x orbit diameter]

*Previously identified as *Okamejei jensenae*

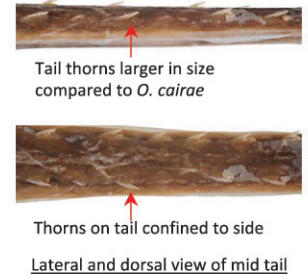
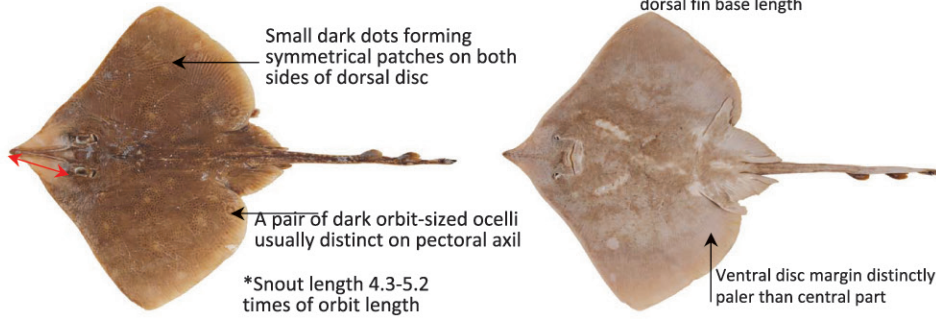


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

RAJIDAE

Okamejei boesemani (Ishihara, 1987)

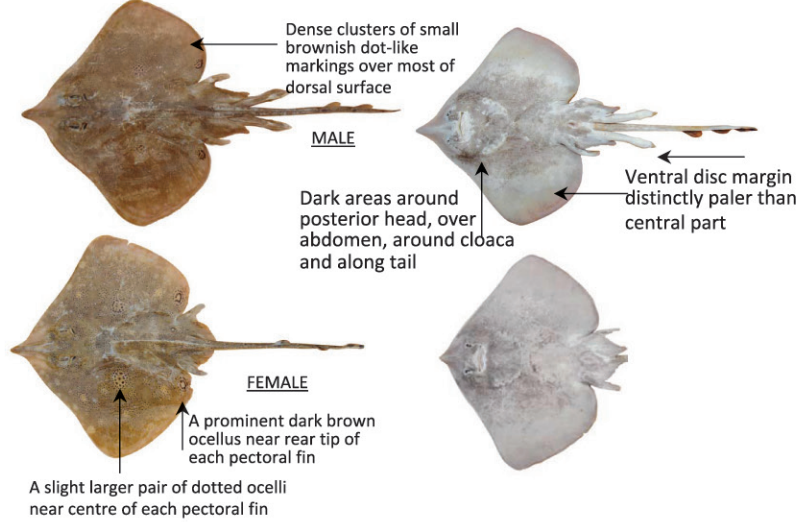
Black sand skate



RAJIDAE

Okamejei cairae Last, Fahmi & Ishihara, 2010

Borneo sand skate

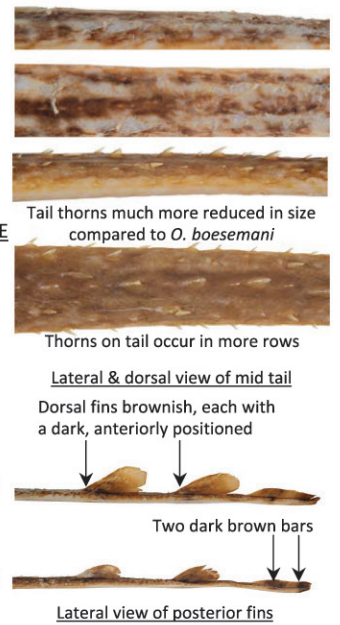


MALE

FEMALE

MALE

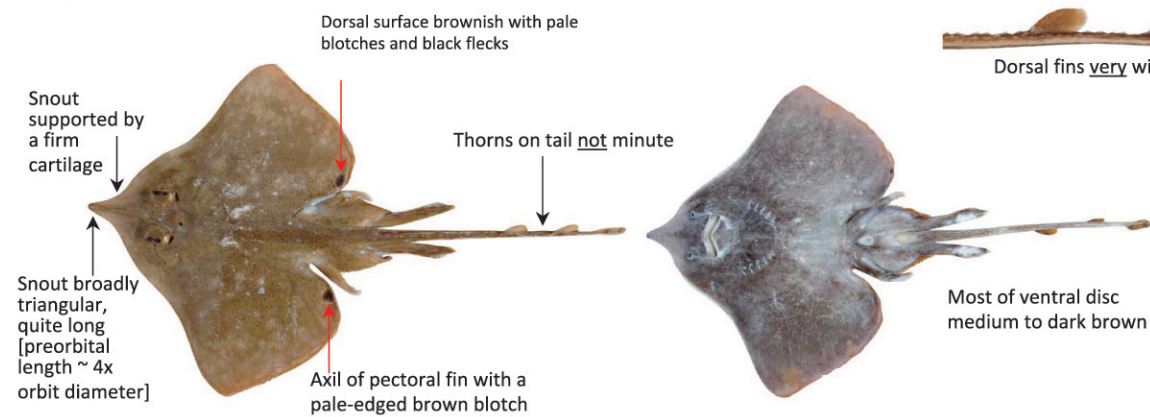
FEMALE



RAJIDAE

Okamejei hollandi (Jordan & Richardson, 1909)

Yellowspotted skate

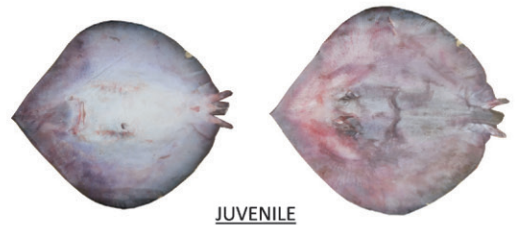
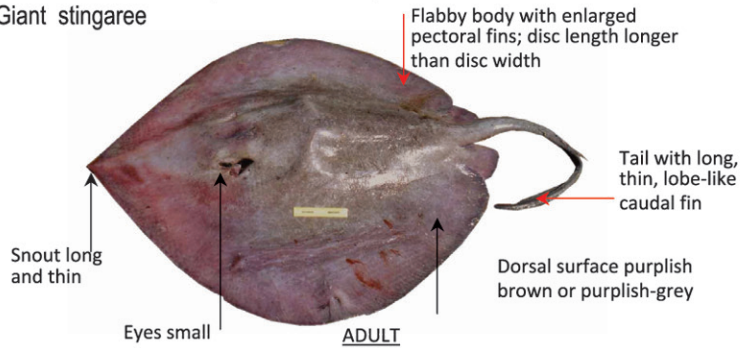


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

PLESIOBATIDAE

Plesiobatis daviesi (Wallace, 1967)

Giant stingaree

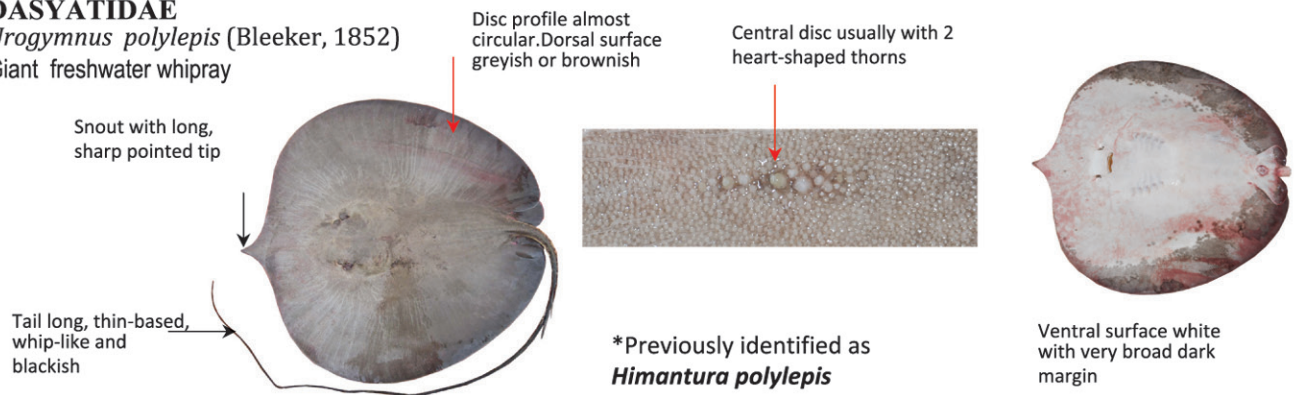


Underside white, with a narrow dark border along the lateral disc margin

DASYATIDAE

Urogymnus polylepis (Bleeker, 1852)

Giant freshwater whipray

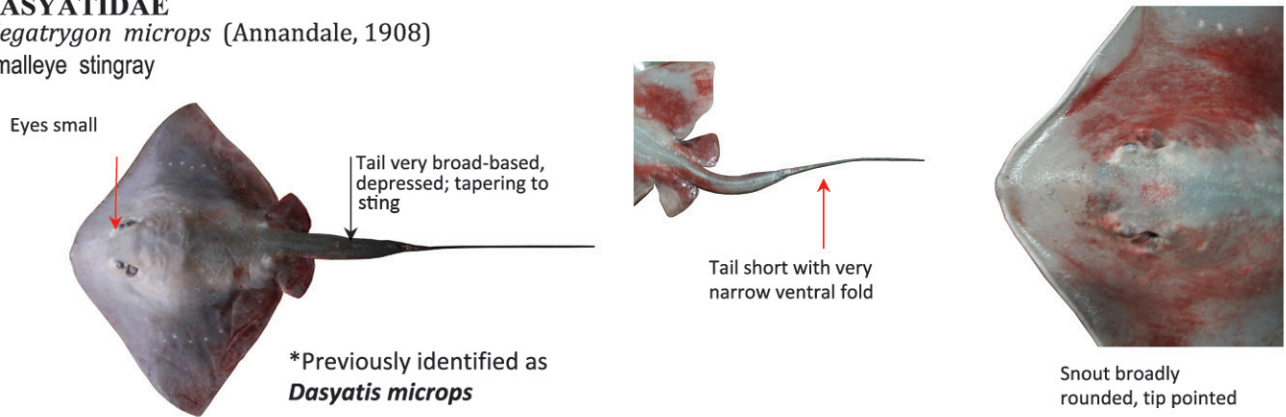


Ventral surface white with very broad dark margin

DASYATIDAE

Megatrygon microps (Annandale, 1908)

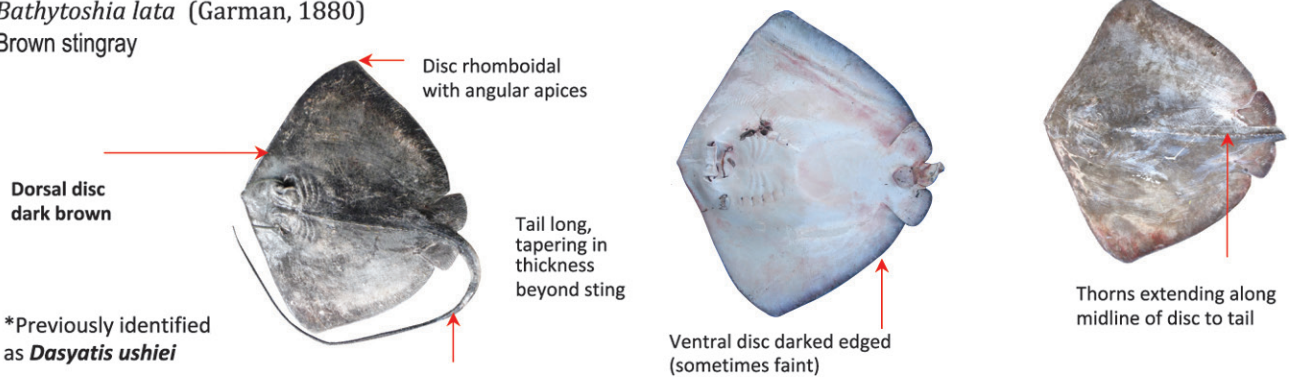
Smalleye stingray



DASYATIDAE

Bathytoshia lata (Garman, 1880)

Brown stingray

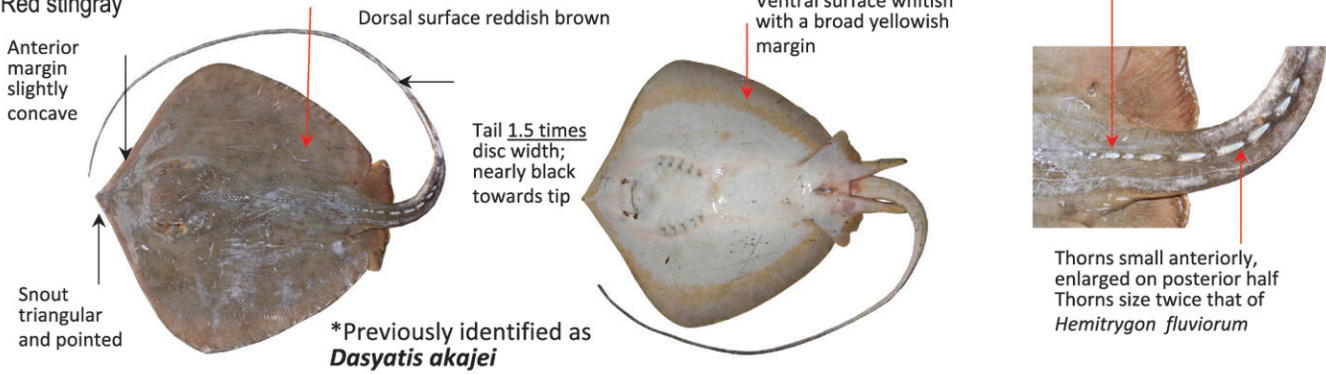


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

DASYATIDAE

Hemistrygon akajei (Müller and Henle, 1841)

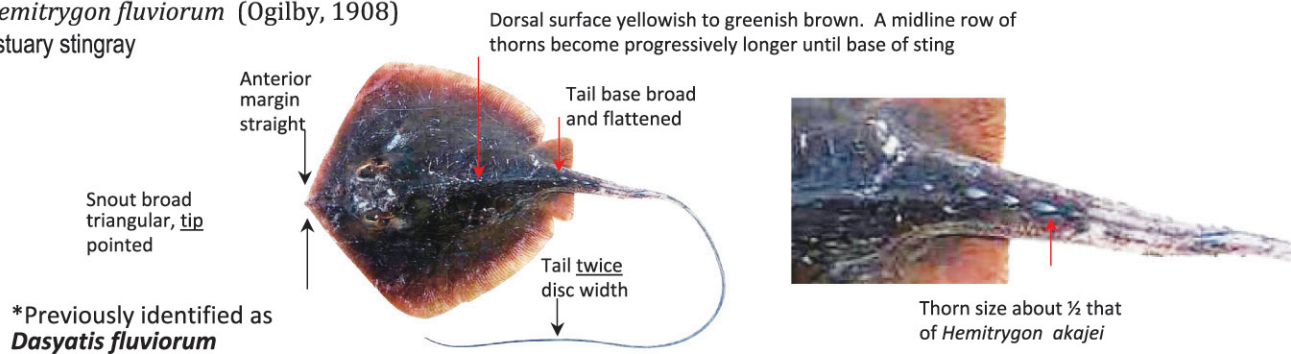
Red stingray



DASYATIDAE

Hemistrygon fluviorum (Ogilby, 1908)

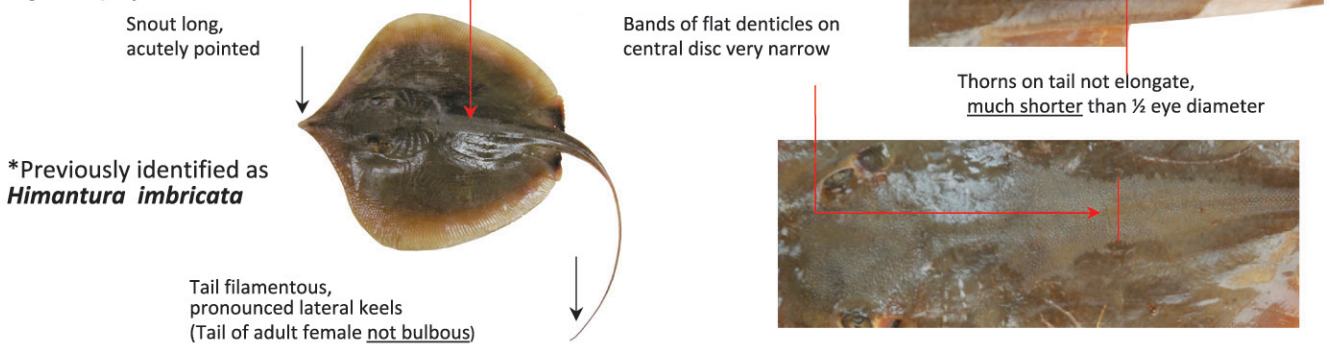
Estuary stingray



DASYATIDAE

Brevistrygon imbricata (Bloch & Schneider, 1801)

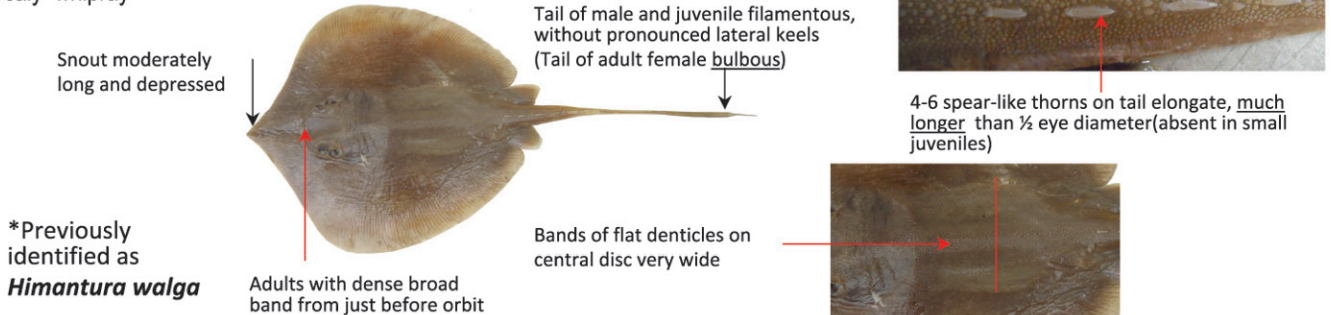
Bengal whipray



DASYATIDAE

Brevistrygon heterura

Scaly whipray



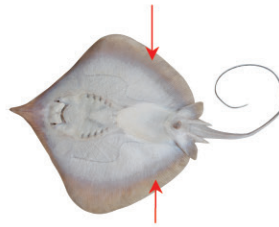
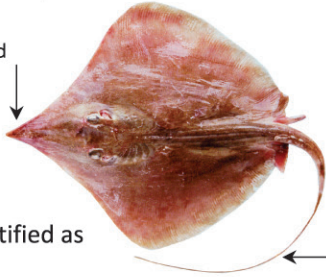
IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

DASYATIDAE

Telatrygon zugei (Müller and Henle, 1839)

Pale-edge sharpnose ray

Snout very elongate, pointed



Ventral disc pale or dark edged



Small thorns along midline of disc

*Previously Identified as *Dasyatis zugei*

Tail relatively short, without bands

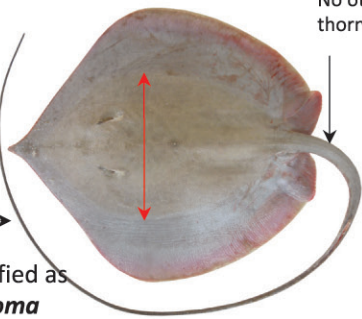
DASYATIDAE

Urogymnus lobistoma (Manjaji-Matsumoto & Last, 2006)

Tubemouth whipray

Denticle band very broad. 2-4 pearl thorns on central disc

Tail long, whip-like and plain (not banded)

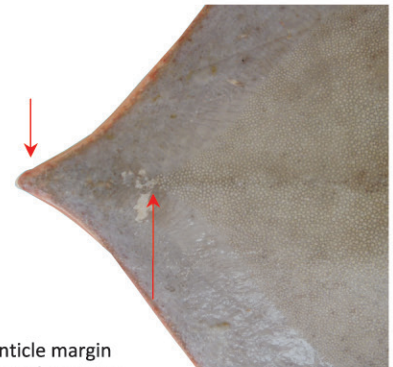


No other enlarged thorns on disc or tail

Snout extremely long and broadly triangular



Protrusible mouth



Denticle margin pointed on snout

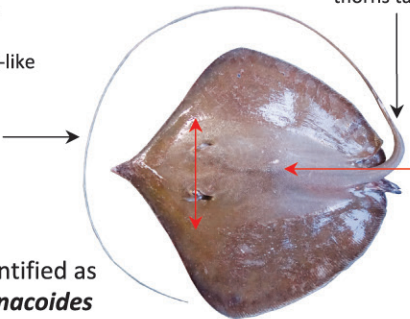
*Previously Identified as *Himantura lobistoma*

DASYATIDAE

Pateobatis uarnacoides (Bleeker, 1852)

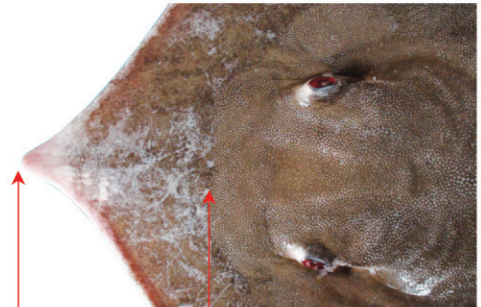
Whitenose whipray

Tail long, whip-like and pale (not banded)



No other enlarged thorns on tail

Denticle band very broad. 1-3 large pearl thorns on central disc



Snout triangular; snout tip white

Denticle margin rounded on snout

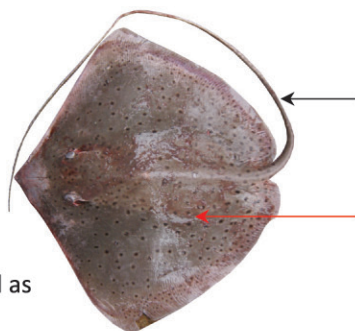
*Previously Identified as *Himantura uarnacoides*

DASYATIDAE

Maculabatis astra (Last, Manjaji-Matsumoto & Pogonoski 2008)

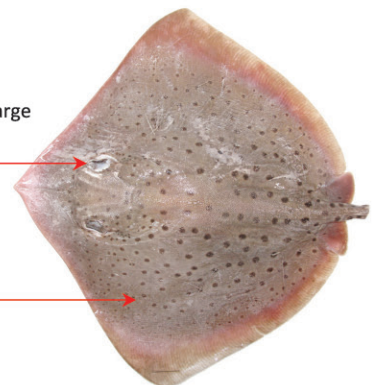
Blackspotted whipray

Snout triangular with broad obtuse angle



Eyes small with large oval spiracles

Tail with alternating light and dark saddles after tail spine



Dorsal surface grayish brown with many small dark with pale edges

*Previously Identified as *Himantura astra*

IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

DASYATIDAE

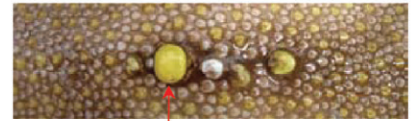
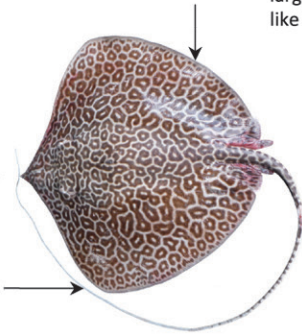
Himantura undulata (Bleeker, 1852)

Honeycomb whipray

Snout moderately long ; narrowly triangular

ADULTS
Tail very long, with patterns/bands

Upper surface with pattern of large ocelli and honeycomb-like reticulations



Central disc with dominant pearl-shaped followed by 2-3 smaller thorns

JUVENILE
Upper surface with relatively large dark spots

DASYATIDAE

Himantura leoparda Manjaji-Matsumoto & Last, 2008

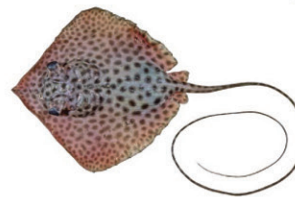
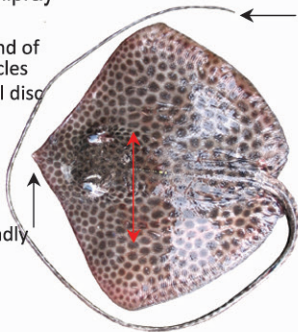
Leopard whipray

Broad band of flat denticles on central disc

Snout broadly triangular

Tail long, whip-like, variably banded

ADULT
Upper surface with leopard-like markings



JUVENILE
Dorsal surface with large dark spots



Central disc with row of up to 15 heart-shaped thorns

DASYATIDAE

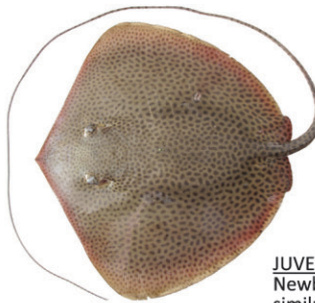
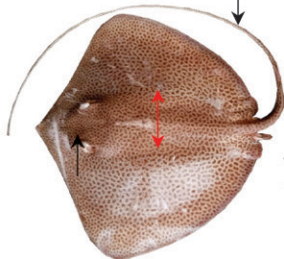
Himantura uarnak (Forsskal, 1775)

Coach whipray

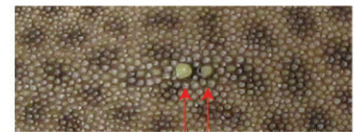
Broad band of flat denticles on central disc

Tail long, whip-like, variably banded (faint in adults)

ADULT
Upper surface pale yellowish with fine dark spots and reticulations



JUVENILE
Newborns with prominent pattern of similar-sized, closely spaced black spots



Central disc usually with two heart-shaped thorns

DASYATIDAE

Maculabatis gerrardi (Gray, 1851)

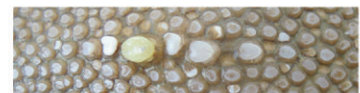
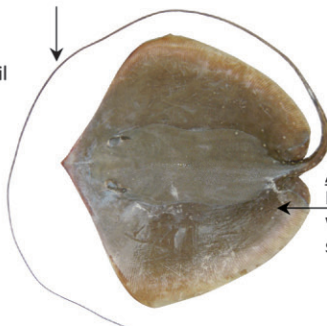
Whitespotted whipray

Tail long, whip-like; plain brown in adult. Tail with light and dark bands

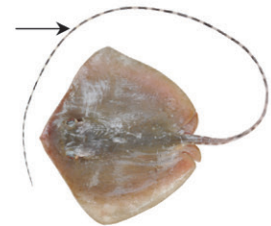
* Previously identified as *Himantura gerrardi*

ADULT
Dorsal surface with few white spots

JUVENILE
Dorsal disc with white spots; Denticles on central disc absent; Tail with white and dark bands



Central disc usually with 1-5 small thorns

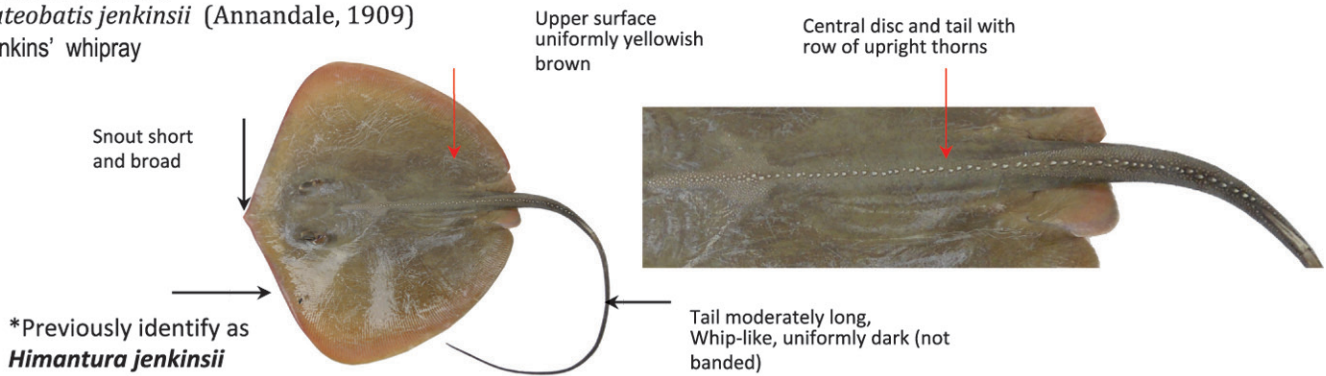


IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

DASYATIDAE

Pateobatis jenkinsii (Annandale, 1909)

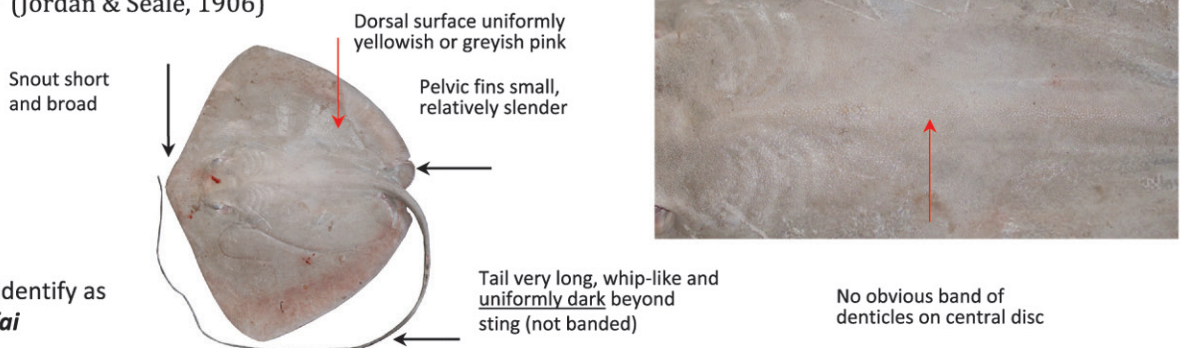
Jenkins' whipray



DASYATIDAE

Pateobatis fai (Jordan & Seale, 1906)

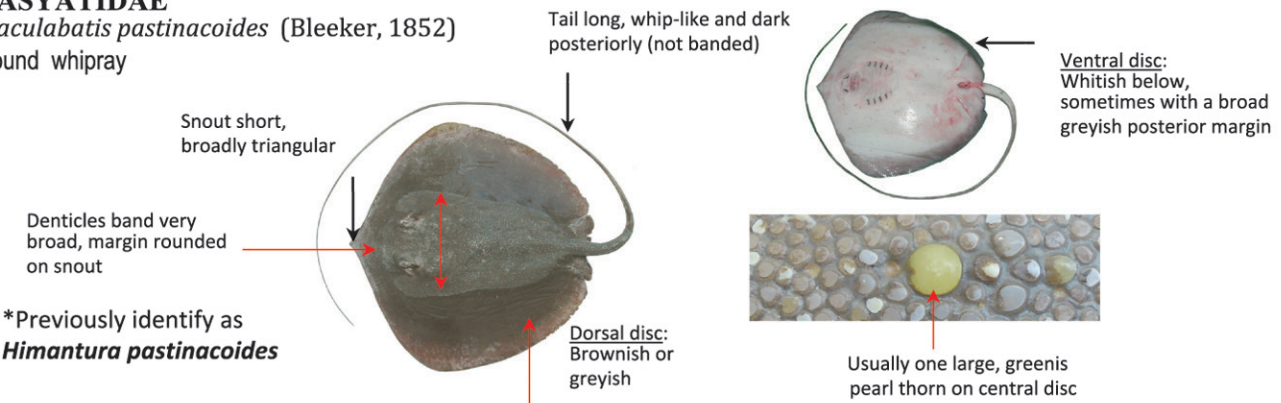
Pink whipray



DASYATIDAE

Maculabatis pastinacoides (Bleeker, 1852)

Round whipray



DASYATIDAE

Neotrygon orientalis Last, White & Seret, 2016

Oriental bluespotted maskray



IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

DASYATIDAE

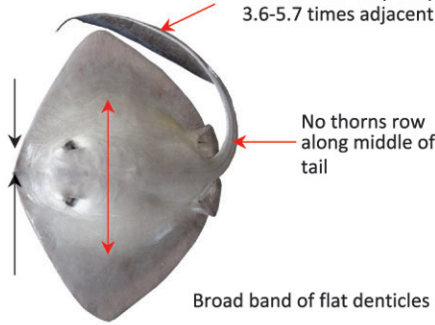
Pastinachus ater (Macleay, 1883)

Broad cowtail ray



Snout short, broadly rounded apex

Snout apex mostly lacking denticles



Ventral fold very deep, height behind sting 3.6-5.7 times adjacent tail height

No thorns row along middle of tail

Broad band of flat denticles



Usually four pearl thorns

*Previously identified as *Pastinachus atrus*

DASYATIDAE

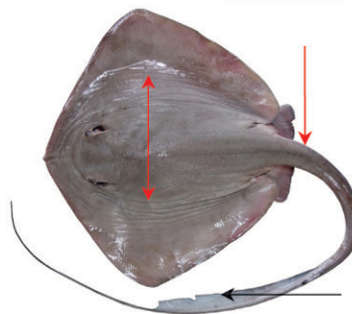
Pastinachus gracilicaudus Last & Manjaji-Matsumoto, 2010

Narrow cowtail ray

Snout obtuse and short, with a small well defined, apical triangular lobe



Broad band of flat denticles



No thorns row along middle of tail



Two enlarge pearl thorns usually preceded by smaller irregular shaped thorns

Ventral fold rather deep, height behind sting 2.8-3.6 times adjacent tail height

DASYATIDAE

Pastinachus solocirostris Last, Manjaji & Yearsley, 2005

Roughnose cowtail ray

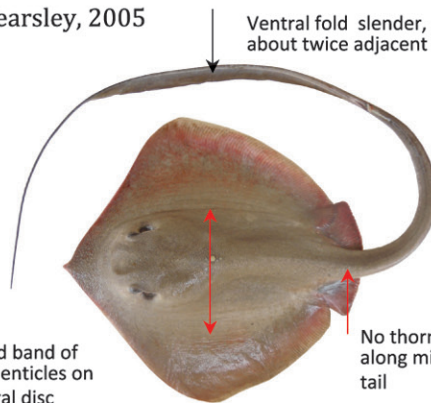
Snout acute, narrowly triangular



Snout apex covered with enlarged, spear-shaped or fork-like denticles

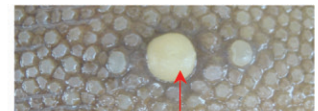


Broad band of flat denticles on central disc



Ventral fold slender, height behind sting about twice adjacent tail height

No thorns row along middle of tail

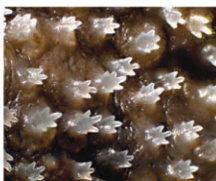


1-3 enlarged pearl-shaped thorns; [large pear between two small pearls]

DASYATIDAE

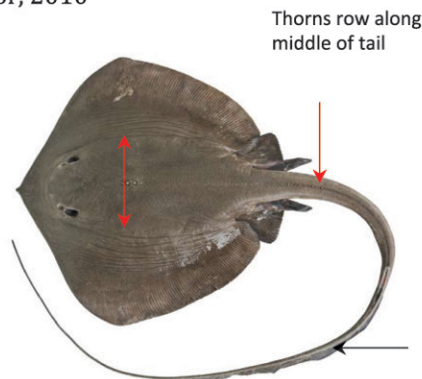
Pastinachus stellurostris Last, Fahmi & Nyalor, 2010

Starrynose cowtail ray



Snout apex covered with enlarged denticles with broad stellate crown

Broad band of flat denticles on central disc



Thorns row along middle of tail



1-3 enlarged pear-shaped thorns

Ventral fold narrow, height behind sting just exceeding adjacent tail height

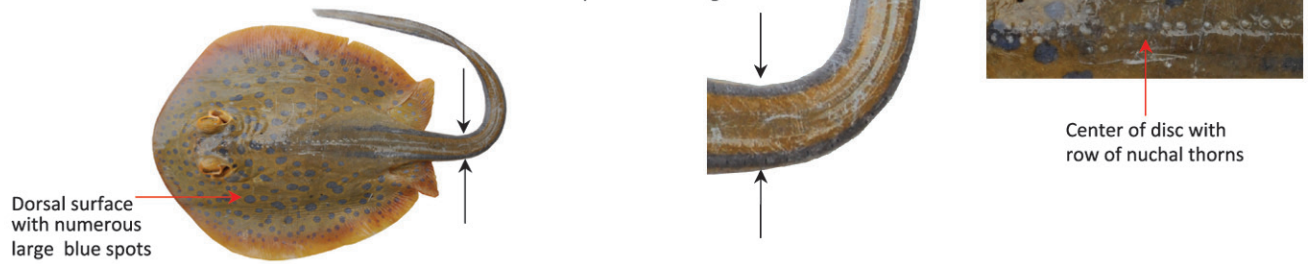
Photo source: Last *et al.*, 2010

**IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES
OF THE SOUTHEAST ASIAN REGION**

DASYATIDAE

Taeniura lymma (Forsskal, 1775)

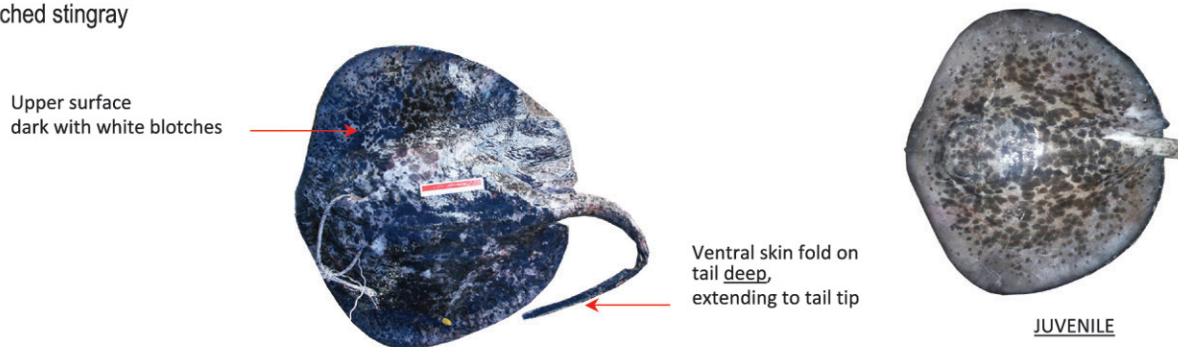
Bluespotted fantail ray



DASYATIDAE

Taeniurops meyeri Müller and Henle, 1841

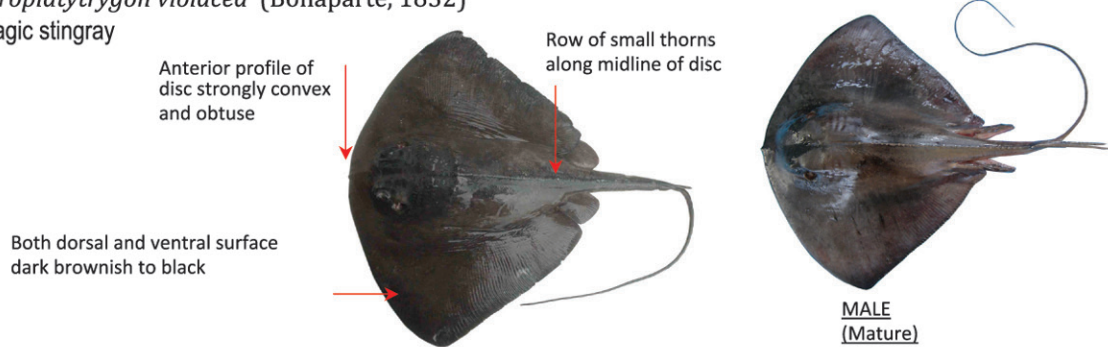
Blotched stingray



DASYATIDAE

Pteroplatytrygon violacea (Bonaparte, 1832)

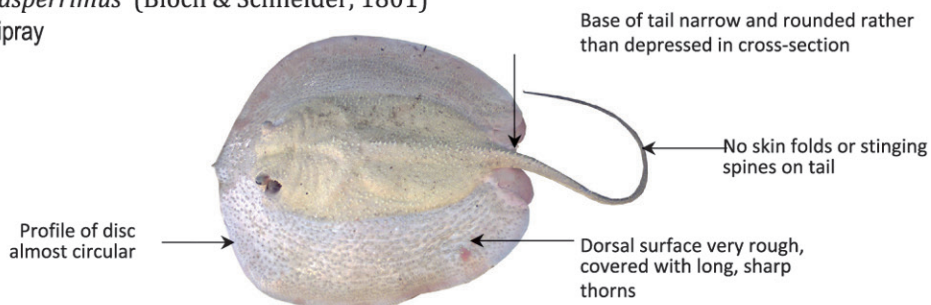
Pelagic stingray



DASYATIDAE

Urogymnus asperrimus (Bloch & Schneider, 1801)

Porcupine whipray



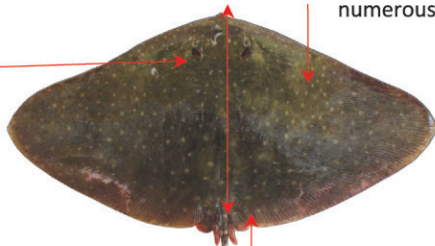
**IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES
OF THE SOUTHEAST ASIAN REGION**

GYMNURIDAE

Gymnura japonica (Temminck & Schlegel, 1850)

Japanese butterfly ray

A large white spot occasionally present behind each or just one spiracle



Dorsal surface plain, sometimes with numerous small dark flecks

Tail with 5-9 dark bands

Tail length as long as/less snout-vent length

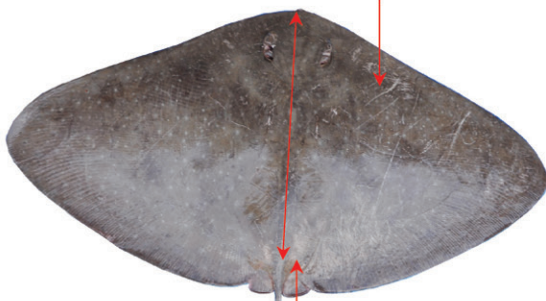


A small sting on tail

GYMNURIDAE

Gymnura poecilura (Shaw, 1804)

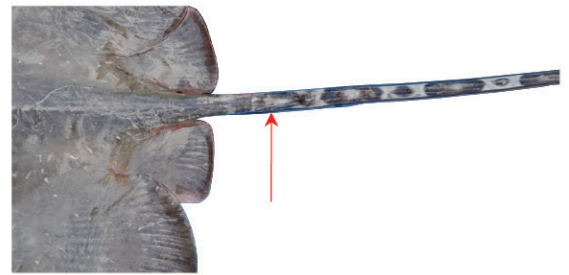
Longtail butterfly ray



Dorsal surface brown/ yellowish-brown, with dark / light spots

Tail with 8-14 dark bands

Tail length as long as snout-vent length



Dorsal fin absent; may have small sting on tail base. Dark spots frequently between each black band

GYMNURIDAE

Gymnura zonura (Bleeker, 1852)

Zonetail butterfly ray

Dorsal surface light brown with numerous dark spots and larger yellowish spots



Tail length 2/3 of snout-vent length



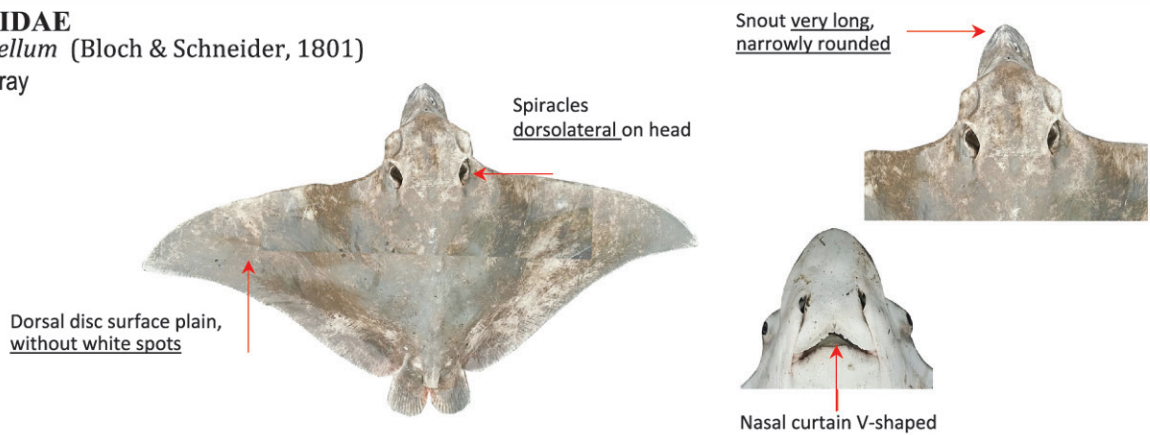
Dorsal fin present. A small sting (poorly developed) on tail base

**IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES
OF THE SOUTHEAST ASIAN REGION**

MYLIOBATIDAE

Aetobatus flagellum (Bloch & Schneider, 1801)

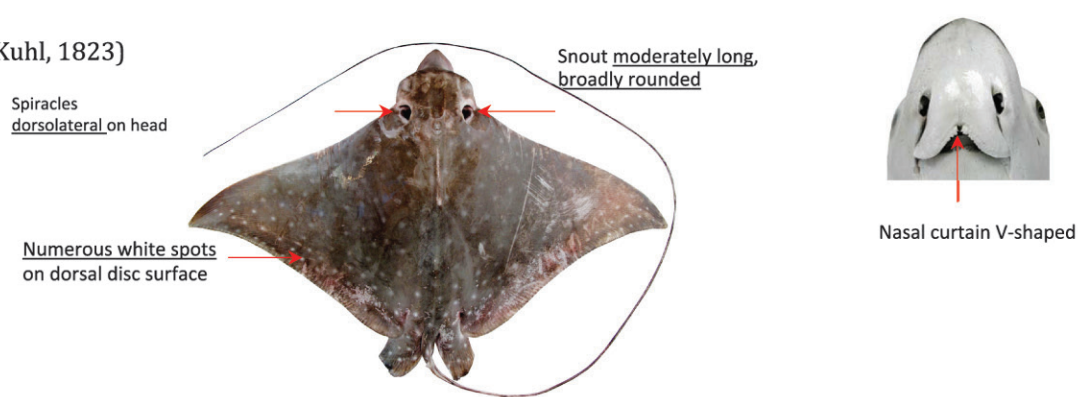
Longhead eagle ray



MYLIOBATIDAE

Aetobatus ocellatus (Kuhl, 1823)

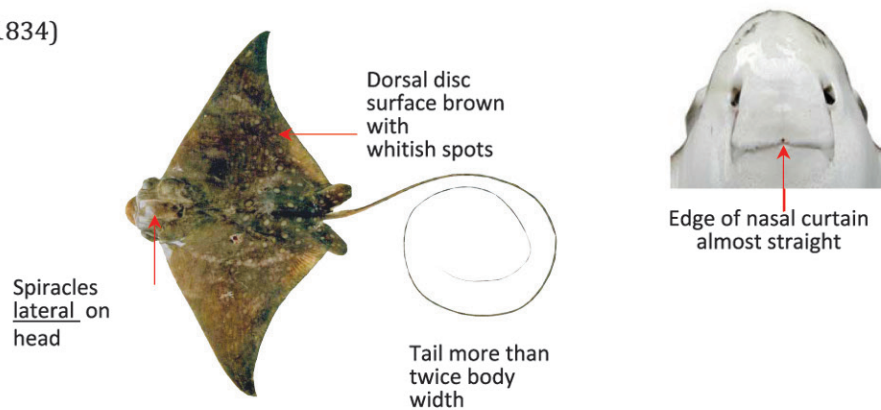
Spotted eagle ray



MYLIOBATIDAE

Aetomylaeus maculatus (Gray, 1834)

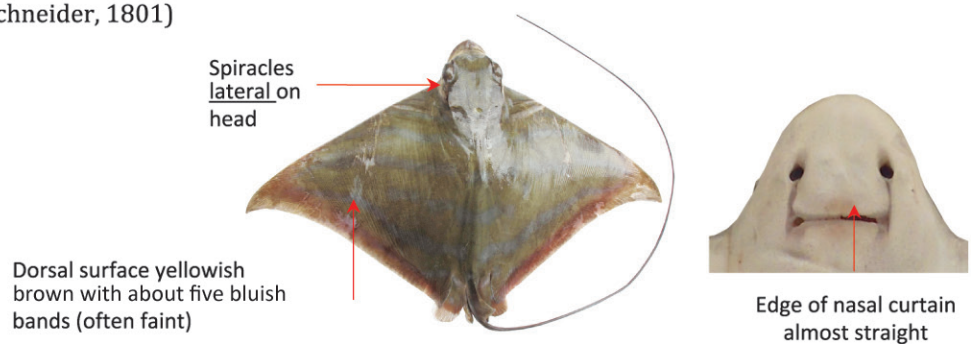
Mottled eagle ray



MYLIOBATIDAE

Aetomylaeus nichofii (Bloch & Schneider, 1801)

Banded eagle ray



IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

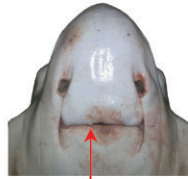
MYLIOBATIDAE

Aetomylaeus vespertilio (Bleeker, 1852)

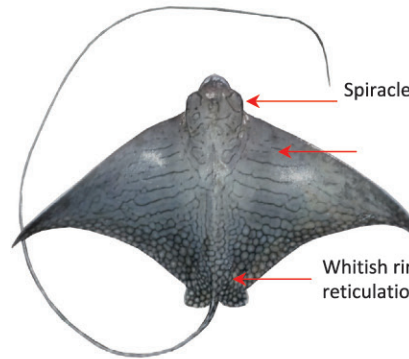
Ornate eagle ray



Top view
(head)



Edge of nasal curtain near
mouth almost straight



Spiracles lateral on head

Upper surface greenish
brown with thin dark
transverse lines anteriorly

Whitish rings and dark
reticulation posteriorly

MYLIOBATIDAE

Myliobatis hamlyni Ogilby, 1911

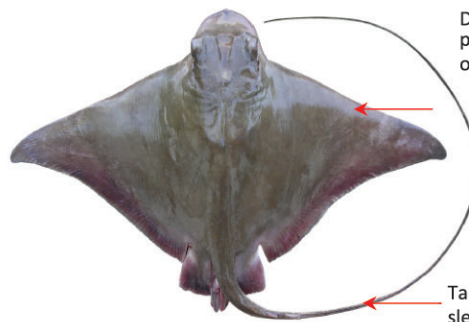
Purple eagle ray



Snout connected to edge of
head by fleshy ridge



Edge of nasal curtain almost
straight



Dorsal surface uniformly
purplish brown; no spots
of blotches

Tail very long,
slender, whip like

Identified as *Myliobatis tobijei* Bleeker, 1854 (Ahmad *et al.*, 2014)

RHINOPTERIDAE

Rhinoptera javanica Müller and Henle, 1841

Javan cownose ray

Dorsal fin origin distinctly behind
pectoral fin insertion

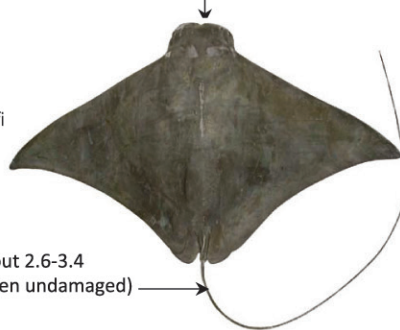


Posterior margin of dorsal fin
strongly concave

Sting base behind
dorsal fin inner margin

Tail long, about 2.6-3.4
times DL (when undamaged)

Snout strongly notched
medially forming two lobes



Rostral flap short,
its fleshy posterior
edge not reaching
mouth

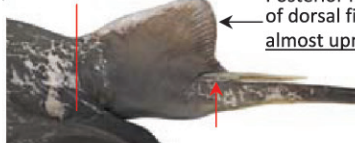


RHINOPTERIDAE

Rhinoptera jayakari Boulenger, 1895

Short-tail cownose ray

Dorsal fin origin
over or slightly forward of
pectoral fin insertion

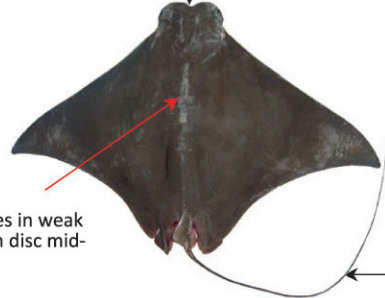


Posterior margin
of dorsal fin
almost upright

Sting base beneath
dorsal-fin inner margin

Denticles in weak
band on disc mid-
line

Snout strongly notched
medially forming two lobes



Rostral flap long,
its fleshy posterior
edge extending past
mouth



Tail short, about 1.4-1.8 times DL
(when undamaged)

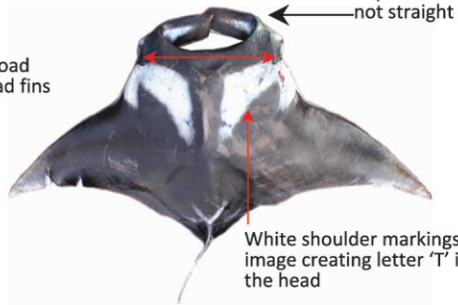
IDENTIFICATION GUIDE TO SHARKS, RAYS & SKATES OF THE SOUTHEAST ASIAN REGION

MOBULIDAE

Manta birostris (Walbaum, 1792)

Manta ray

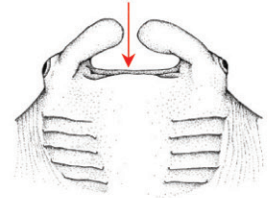
Head very broad with long head fins



Cephalic fins not straight

White shoulder markings form two mirror image creating letter 'T' in black across top of the head

Mouth terminal, located at end of snout tip



MOBULIDAE

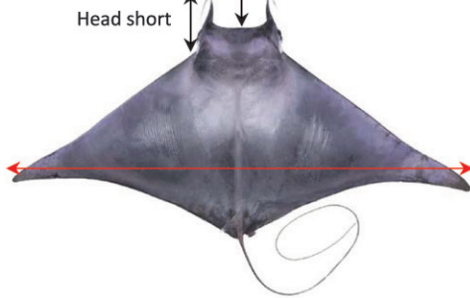
Mobula japonica (Müller & Henle, 1841)

Giant devilray

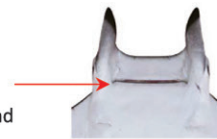
Anterior margin of snout almost straight and wide

Head short

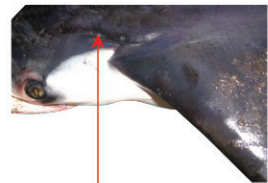
Disc broad and slightly falcate



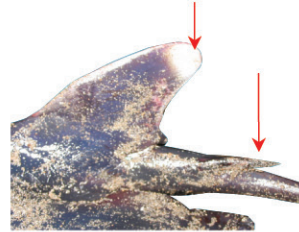
Mouth subterminal, located on underside of head



Dorsal fin white tipped



Spiracles slit-like and elliptical, located above disc edge



Small sting present on tail base; tail base rounded

MOBULIDAE

Mobula thurstoni (Lloyd, 1908)

Bentfin devilray

Anterior margin of snout slightly concave. Cephalic lobes relatively short, 12-14% DW

Outer anterior margin of pectoral fin with distinct concavity



Dorsal fin white tipped. No sting on tail base. Tail depressed



Spiracles subcircular, located underneath disc edge

MOBULIDAE

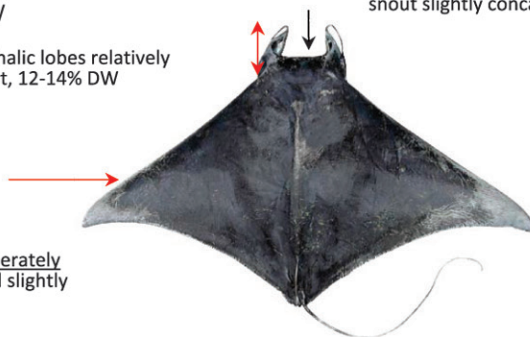
Mobula kuhlii (Müller and Henle, 1841)

Kuhl's devilray

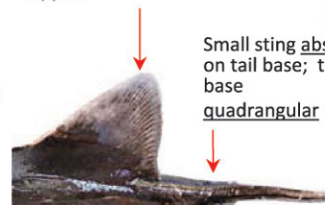
Cephalic lobes relatively short, 12-14% DW

Anterior margin of snout slightly concave

Disc moderately broad and slightly falcate



Dorsal fin not white tipped



Small sting absent on tail base; tail base quadrangular



Spiracles subcircular, located underneath disc edge

References

- Ahmad, A., Lim, A.P.K., Fahmi, Dharmadi, Tassapon, K. (2014). Field Guide to Rays, Skates and Chimaeras of the Southeast Asian Region. SEAFDEC/MFRDMD/SP/25: 287 pp
- Ahmad, A., Lim, A.P.K., Fahmi and Dharmadi. (2013). Field Guide to Look-alike Sharks and Rays of the Southeast Asian Region. Kuala Terengganu: SEAFDEC/MFRDMD/SP/22: 107 pp.
- Ahmad, A. and Lim, A.P.K. (2010). Field Guide to Sharks of the Southeast Asian Region. Kuala Terengganu: SEAFDEC/MFRDMD/SP/18: 210 pp.
- Last, P.R., White, W.T. and Pogonoski, J.J. (2008). Descriptions of New Australian Chondrichthyans. CSIRO Marine and Atmospheric Research Paper 022. 358 pp.
- Last, P.R., White, W.T. and Pogonoski, J.J. (2010). Descriptions of New Sharks and Rays from Borneo. CSIRO Marine and Atmospheric Research Paper 032, 165 pp.
- Last, P.R., Seret, B. and Naylor G.J.P. (2016). A New Species of Guitarfish, *Rhinobatos borneensis* sp. nov. with a Redefinition of the Family-level Classification in the Order Rhinopristiformes (Chondrichthyes: Batoides). *Zootaxa* **4117**(4), 451-475
- Last, P.R., White, W.T., Caira, J.N., Dharmadi, Fahmi, Jensen, K., Lim, A.P.K., Manjaji-Matsumoto B.M., Naylor, G.J.P., Pogonoski, J.J., Stevens, J.D. and Yearsley, G.K. (2010). Sharks and Rays of Borneo. CSIRO Publishing, Melbourne. 290 pp
- Last, P.R., White, W.T. and Naylor, G.J.P. (2006). Three New Stingrays (Myliobatiformes: Dasyatidae) from the Indo-West Pacific. *Zootaxa* **4147**(4), 377-402.
- Last, P.R., White, W.T. and Seret, B. (2016). Taxonomic Status of Maskrays of the *Neotrygon kuhlii* Species Complex (Myliobatoidei: Dasyatidae) with the Description of Three New Species from the Indo-West Pacific. *Zootaxa* **4083**(4), 533-561.
- Last, P.R., Manjaji, B.M. and Yearsley, G.K. (2005). *Pastinachus solocirostris* sp. nov., a New Species of Stingray (Elasmobranchii: Myliobatiformes) from the Indo-Malay Archipelago. *Zootaxa* 1040: 1-16
- Last, P.R., White, W.T. and Fahmi. (2006). *Rhinobatos jimbaranensis* and *R. penggali*, Two New Shovelnose Rays (Batoidea: Rhinobatidae) from Eastern Indonesia. *Cybium* 2006, 30(3):261-271
- Last, P.R., William, W.T., Marcelo, R., Seret, B., Matthias, F.W.S. and Naylor, G.J.P. (2016). Rays of the World. CSIRO Publishing. 790 pp
- White, W.T. and Last, P.R. (2006). Description of Two New Species of Smooth-hounds, *Mustelus widodoi* and *M. ravidus* (Carcharhiniformes: Triakidae) from the Western Central Pacific. *Cybium* 30(3): 235-246
- White, W.T., Last, P.R., Naylor, G.J.P. and Harris, M. (2010). Resurrection and Redescription of the Borneo Broadfin Shark *Lamiopsis tephrodes* (Fowler, 1905) (Carcharhiniformes: Carcharhinidae). In: Last, P.R., White, W.T. and Pogonoski, J.J. (eds). Descriptions of New Sharks and Rays from Borneo. CSIRO Marine and Atmospheric Research Paper 032.
- White, W.T., Last, P.R., Naylor, G.J.P., Caira, J.N. and Jensen, K. (2010). Clarification of *Aetobatus ocellatus* (Kuhl, 1823) as a Valid Species, and a Comparison with *Aetobatus narinari* (Euphrasen, 1790)(Rajiformes: Myliobatidae). In: Last, P.R., White, W.T. and Pogonoski, J.J. (eds). Descriptions of New Sharks and Rays from Borneo. CSIRO Marine and Atmospheric Research Paper 032.
- Yano, K., Ahmad, A., Gambang, A.C., Idris, A.H., Solahuddin, A.R. and Aznan, Z. (2005). Sharks and Rays of Malaysia and Brunei Darussalam. SEAFDEC/MFRDMD/SP,12. Kuala Terengganu 557 pp.

AUTHORS



AHMAD BIN ALI (Ph.D) 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.



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. FAHMI (M. Sc) is a Senior Researcher of Research Centre for Oceanography, Indonesian Institute of Science (LIPI), Jakarta. He is a member of IUCN Shark Specialist Group for Southeast Asian Region and one of key researcher on elasmobranch in Indonesia. He is also an author and co-authored of many books and papers on chondrichthyans published in Indonesia and international. He is a PhD candidate in Biological Science at University of Queensland, Australia.



MR. DHARMADI (M. Sc) is a Senior Researcher of Research Centre for Fisheries Management and Conservation (RFMC) Jakarta, Indonesia. He is a member of IUCN Shark Specialist Group for Southeast Asian Region and an author and co-authors of many books and papers on chondrichthyans mostly published in Indonesia and international. He is a well know chondrichthyans taxonomist in Indonesia.



MR. TASSAPON KRAJANGDARA (M. Sc) 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.

ISBN 978-983-9114-69-0



9 789839 114690