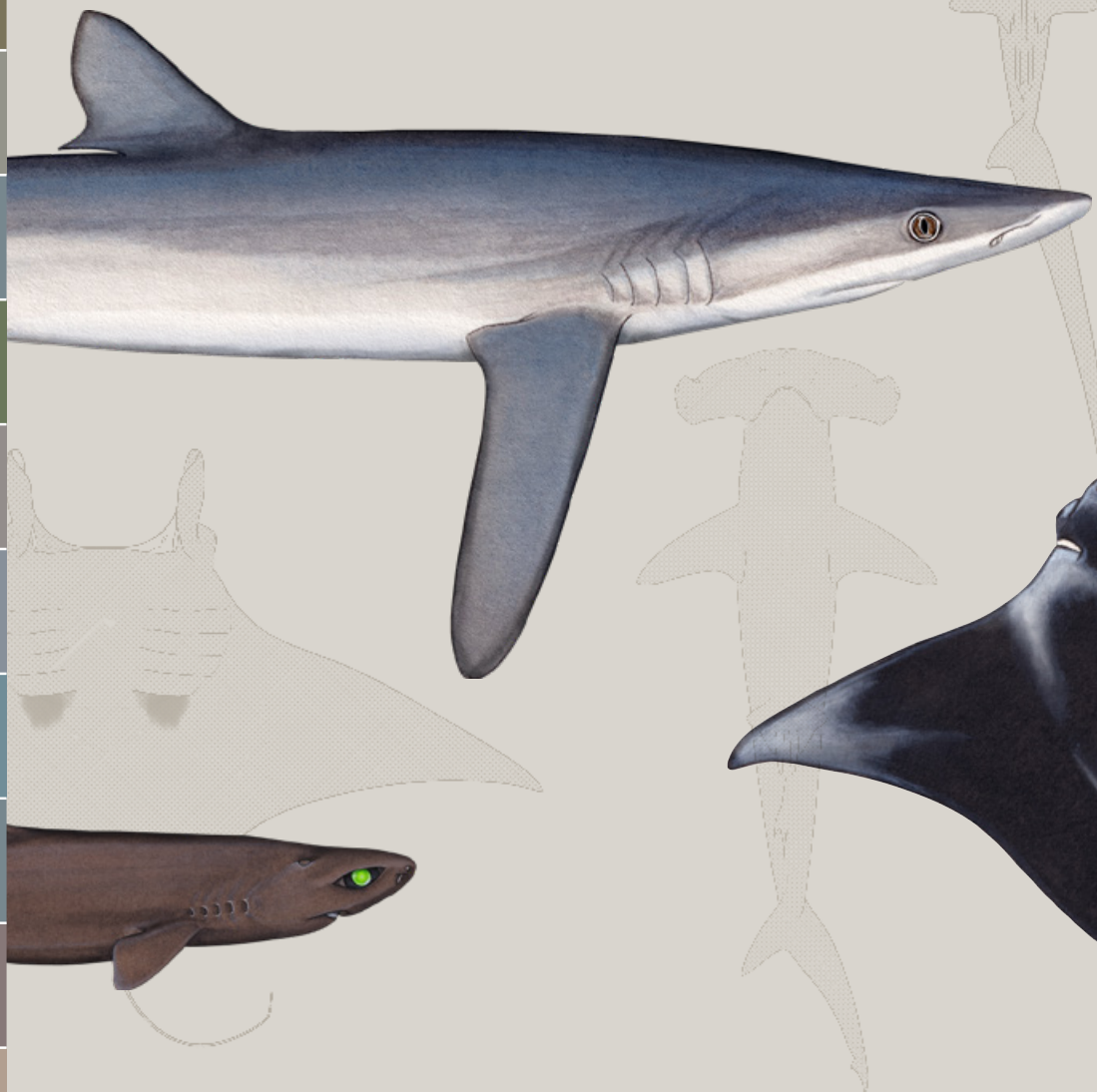
Pacific Community
Communauté du Pacifique

# Shark and ray
## identification manual



for observers and crew of the western and central Pacific tuna fisheries

# Shark and ray identification manual

## for observers and crew of the western and central Pacific tuna fisheries

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Aymeric Desurmont, Boris Colas and Neville Smith

Pacific Community
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# Acknowledgements

Key and species illustrations, including ventral line drawings, are originals created by Dr Lindsay Marshall.

The shark and ray handling guidelines and most of the associated illustrations were agreed to by the Western and Central Pacific Fisheries Commission (WCPFC) and reproduced with the authorisation of the International Seafood Sustainability Foundation.

Additional figures, as required, were designed in-house at the Pacific Community (SPC) by Boris Colas.

Common names for each species were provided by Dr Nan Yao (Cantonese and Mandarin), Dr Yukio Takeuchi and Dr Ken Okaji (Japanese), Dr Seonjae Hwang (Korean), and extracted from the FAO ASFIS list of species (English, French and Spanish).

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# Introduction

The SPC *Shark and ray identification manual for observers and crew of the western and central Pacific tuna fisheries* has been developed to improve the identification of shark and ray species encountered in the tropical and subtropical tuna fisheries of the Western and Central Pacific Ocean (WCPO), as well as informing on correct methods for their handling and release. The manual is designed to be a concise field guide for use by fisheries observers and fishers who collect the operational data and whose reports are the principal sources of catch information for fisheries management in the world's largest tuna fishery.

Although sharks and rays are an incidental bycatch of pelagic tuna fisheries, these fisheries are accredited with causing significant declines in the populations of some shark and ray species. The 44 shark and ray species in this guide include those with adaptations to being pinnacle predators, huge planktonic feeders or small parasitic predators of large pelagic fish and mammals. These species are included because they are caught incidentally, or are set on because of their association with tuna, or interact with fishing operations through their depredation of the catch in the WCPO tropical and subtropical tuna fisheries.

Because pelagic shark and ray populations are adversely affected by tuna fisheries, the Western and Central Pacific Fisheries Commission (WCPFC) has designated 14 shark species and six mobulid species as **Key Shark Species** (for data provision) in the WCPO. Vessels fishing in the WCPO and fisheries observers are required to report their catch for each of the 14 Key Shark Species, which are listed below.

- Blue shark (*Prionace glauca*) – since 2008
- Mako sharks (*Isurus oxyrinchus, I. paucus*) – since 2008
- Oceanic whitetip shark (*Carcharhinus longimanus*) – since 2008
- Thresher sharks (*Alopias superciliosus*, *A. pelagicus* and *A. vulpinus*) – since 2008
- Silky shark (*C. falciformis)* – since 2009
- Porbeagle shark (*Lamna nasus*) – (south of 20°S) since 2010
- Hammerhead sharks (*Eusphyra blochii, Sphryna lewini, S. mokarran* and *S. zygaena*) – since 2010
- Whale shark (*Rhincodon typus*) – since 2012

- Manta and mobulid rays (*Mobula* spp.) – since 2017. Note that the manta and mobulid species identified as Key Shark Species by SC13[1] have since undergone a revision of nomenclature, which is reflected in the species listed in this guide (*Mobula alfredi, M. birostris, M. tarapacana, M. mobular, M. thurstoni,* and *M. kuhlii*).

Furthermore, some of these Key Shark Species have been designated as **Species of Special Interest (SSI)**. The shark and ray SSI are the oceanic whitetip, the silky shark, the whale shark and the mobulid rays. These are regulated as no-retention, no-live landing species (OCS, FAL), no-targeted-set by purse-seine vessels (RHN), and all require specific data to be collected by observers, including location, length, sex, fate and condition. Observers should also record their interactions with the primary fishing gear.

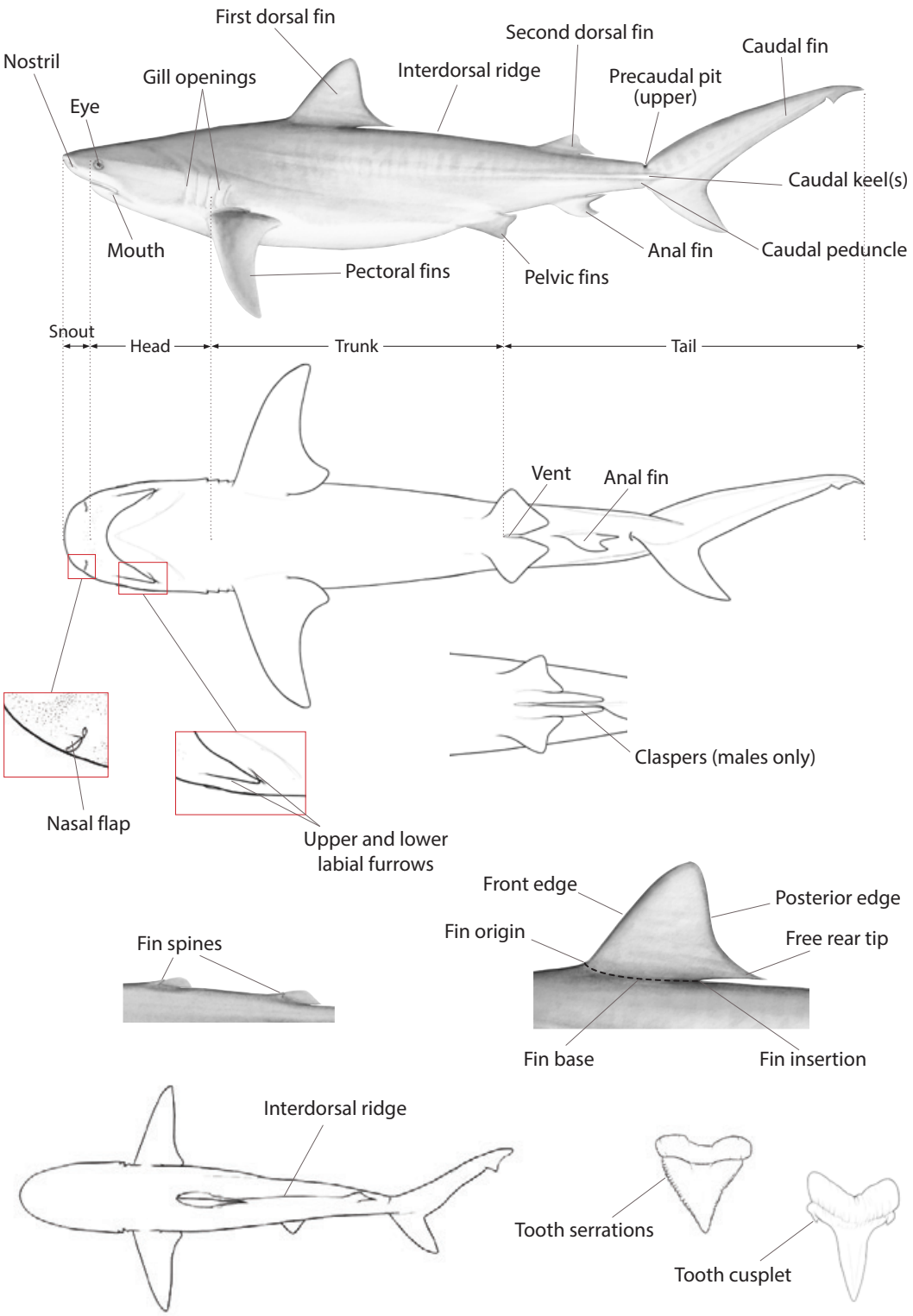
This guide is organised in three tools:

1. The first provides a pathway of 43 identification key steps. It is preceded by illustrated definitions of shark and ray key external features.
2. The second consists of detailed illustrations of the 44 species of sharks and rays to show key features and their natural colouration when alive.
3. The third details the WCPFC best handling guidelines for the safe release of whale sharks and mobulids (since 2018), and other sharks (since 2019) incidentally caught during fishing operations. Reference sources are also provided.

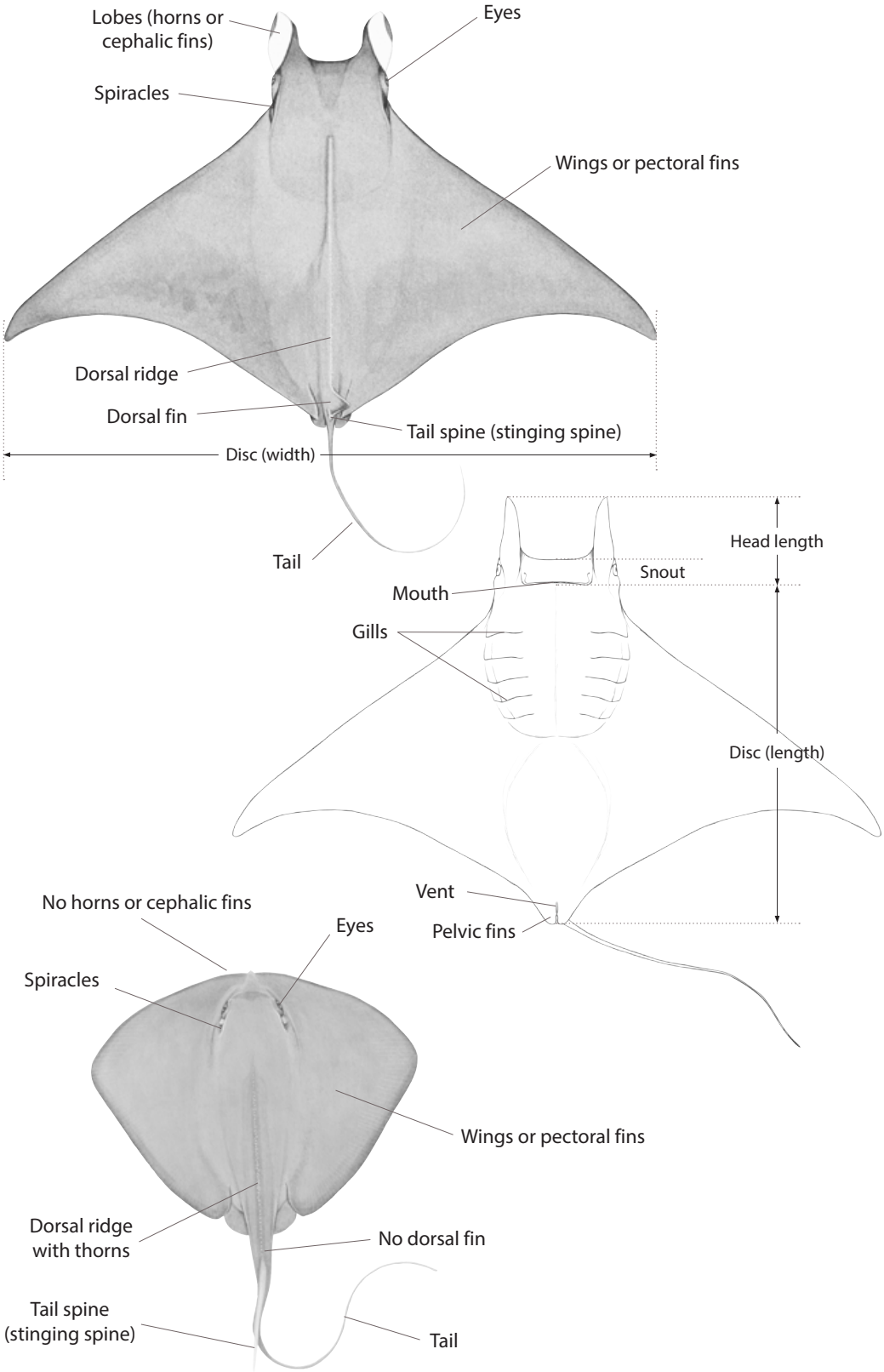
[1] WCPFC-SC13-2017/ST-WP-07

# Main shark and ray external features

# Shark external features



# Ray external features



# Key for shark and ray species identification

To improve identification of the shark and ray species a dichotomous key based on readily seen external features has been developed for field use and observer training.

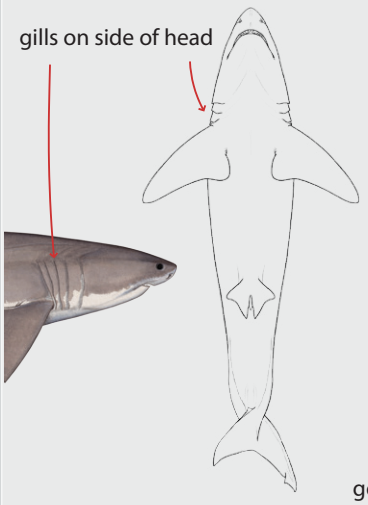
A dichotomous key relies on a pathway of steps of paired alternative descriptions (mutually exclusive couplets) identifying or contrasting features that are reliable (are always found in live and dead forms and both sexes of the species), consistent (are present throughout the year and across the range ) and clear or measurable. Each couplet is a branch that either removes a selection of species or identifies one from the rest (e.g. key step 1, below, used to separate sharks and rays).

This key has been developed to provide a simple standardised process for identifying sharks and rays that are either not already known, or to help distinguish among similar looking species. The key features used in the couplets have been identified and verified as standardised key features by shark scientific experts.

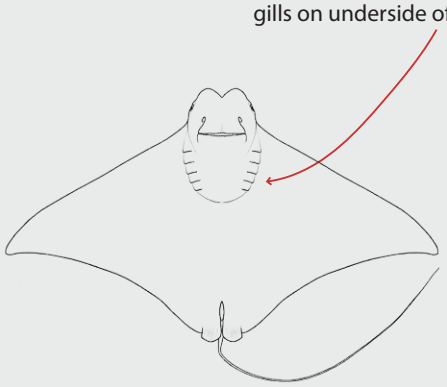
The key couplets identify clear features for identification and so reflect the systematics of sharks, and the identification groups the species in their families. The use of key features also affects the number of steps to identify a species. Where there is only one species of a family, the key quickly identifies the species from the others. Where there are many similar species, such as in the family Carcharhinidae, identification takes up to 26 steps of couplets to distinguish the final species pair.

The key for shark and ray identification has 43 couplet pairs that identify 44 species of pelagic sharks and rays. The key should be used routinely to identify species and the detailed illustrations in the following section can then be used to confirm identification. The use of this key in training will standardise the process followed by observers to identify sharks and rays.

1



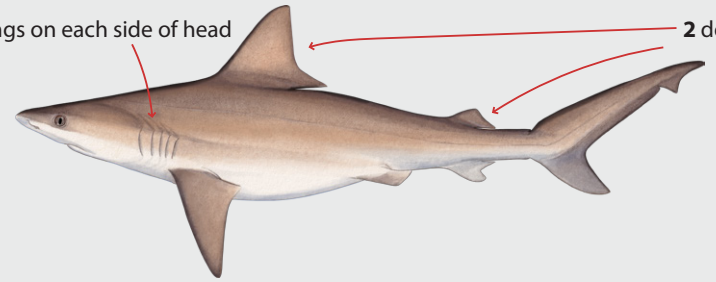

go to **step 2**




go to **step 37**

2

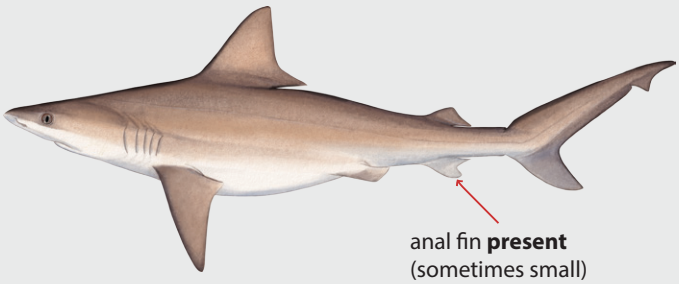

***Hexanchus griseus* (Bluntnose sixgill shark)** p. 24




go to **step 3**

3


go to **step 4**




go to **step 6**

4

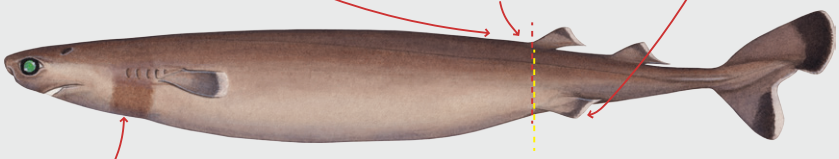

go to **step 5**


***Zameus squamulosus* (Velvet dogfish)** p. 25

5

dorsal fins located well back on body

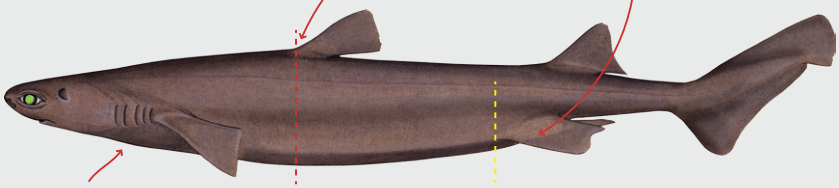
first dorsal over pelvic fins



dark collar around head at gill region

***Isistius brasiliensis* (Cookie-cutter shark)** p. 26

first dorsal well in front of pelvic fin

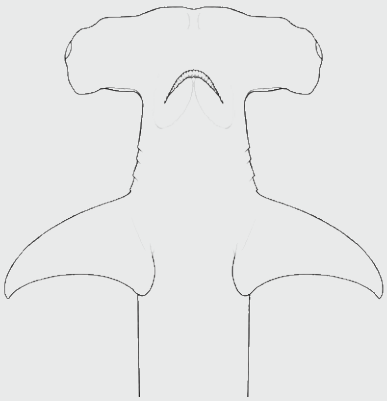


no dark collar around head

***Dalatias licha* (Black shark, Kitefin shark)** p. 27

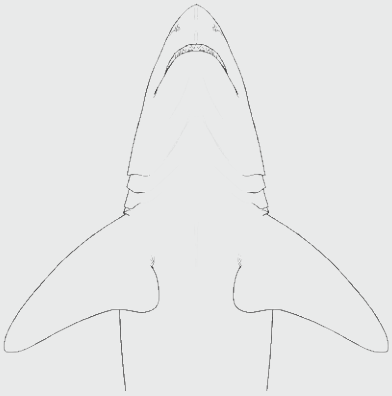
6

head **hammer-shaped**



go to **step 7**

head **not hammer-shaped**

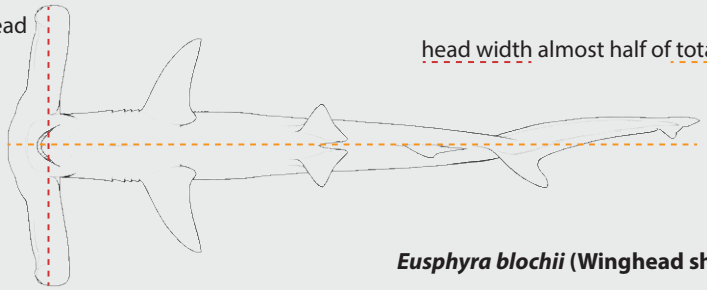


go to **step 10**

7

lateral blades of head very long, narrow and wing-like

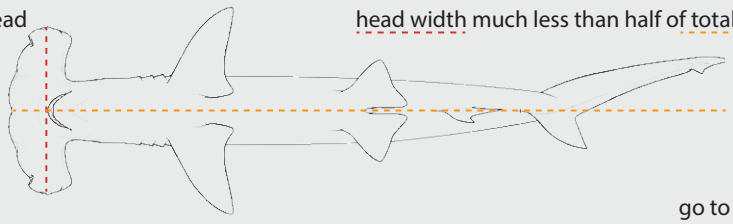
head width almost half of total length



***Eusphyra blochii* (Winghead shark)** p. 28

lateral blades of head relatively broad, shorter and not wing-like

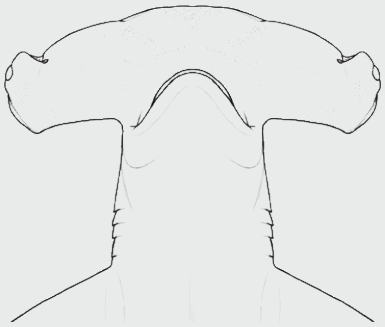
head width much less than half of total length



go to **step 8**

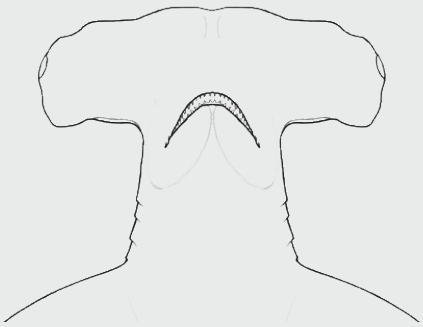
**8**

anterior profile of head
**without** a median indentation



***Sphyrna zygaena* (Smooth hammerhead)** p. 29

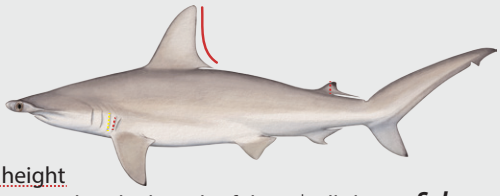
anterior profile of head
**with** a median indentation



go to **step 9**

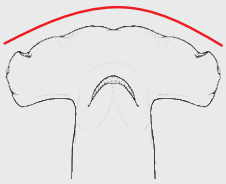
**9**

first dorsal fin semi-falcate, only moderately high



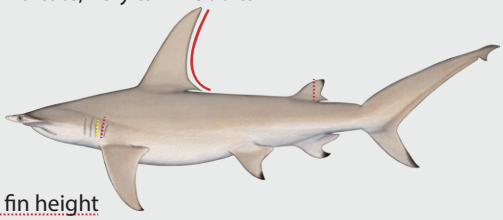
2nd dorsal fin height
smaller than or equal to the length of the 3rd gill slit

anterior profile of head convex



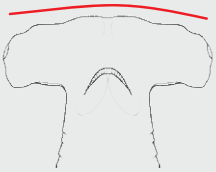
***Sphyrna lewini* (Scalloped hammerhead)** p. 30

first dorsal falcate, very tall in adults



2nd dorsal fin height
greater than the length of the 3rd gill slit

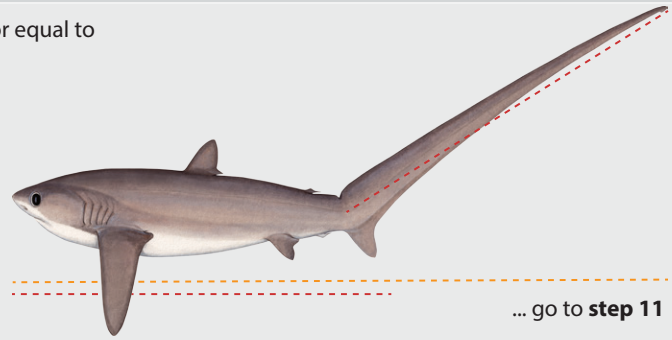
anterior profile of head nearly straight
(slightly convex in small juveniles)



***Sphyrna mokarran* (Great hammerhead)** p. 31

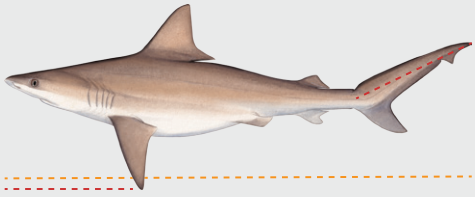
**10**

length of caudal fin greater than or equal to
half of total length



... go to **step 11**

length of caudal fin much less than
half of total length

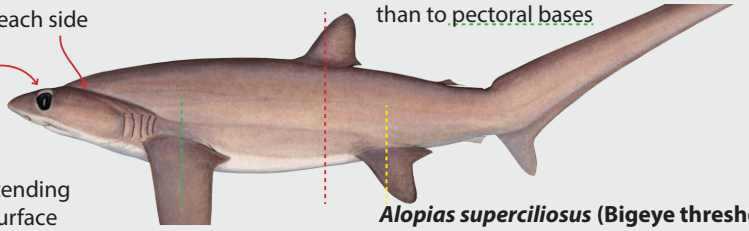


... go to **step 13**

11

head with deep groove
extending around each side

base of first dorsal fin closer to pelvic bases
than to pectoral bases

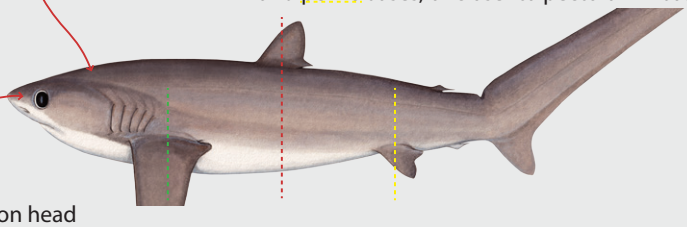


eyes very large, extending
onto dorsal head surface

***Alopias superciliosus* (Bigeye thresher)** p. 33

head without a deep groove

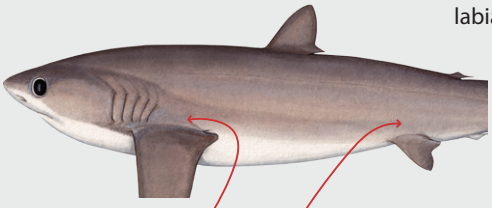
base of first dorsal fin about equidistant between pectoral
and pelvic bases, or closer to pectoral fin bases



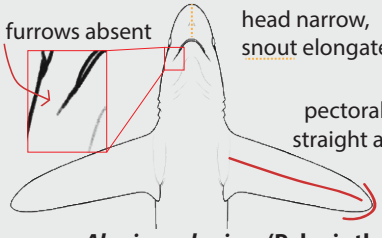
eyes smaller,
with orbits lateral on head

go to **step 12**

12



labial furrows absent

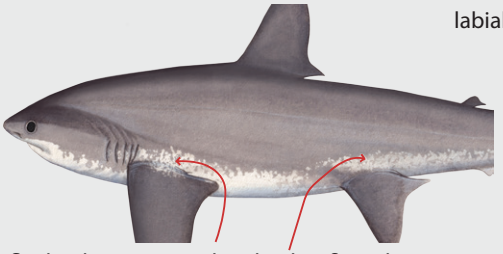


head narrow,
snout elongated

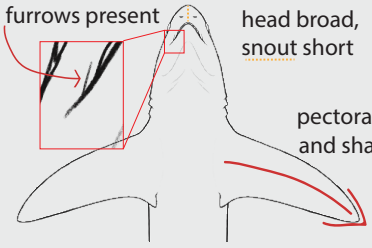
pectoral fins nearly
straight and broadly
pointed

flanks above pectoral and pelvic fins not white

***Alopias pelagicus* (Pelagic thresher)** p. 34



labial furrows present



head broad,
snout short

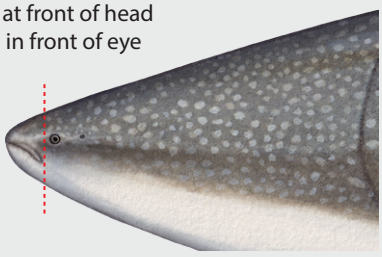
pectoral fins curved
and sharply pointed

flanks above pectoral and pelvic fins white

***Alopias vulpinus* (Thresher shark)** p. 35

13

mouth at front of head
ending in front of eye



checkerboard colour pattern

***Rhincodon typus* (Whale shark)** p. 36

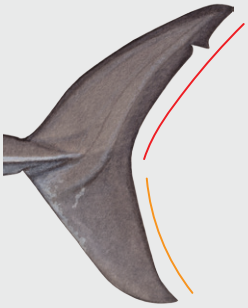
mouth not at front of head
ending below or behind eye

no checkerboard colour pattern

go to **step 14**

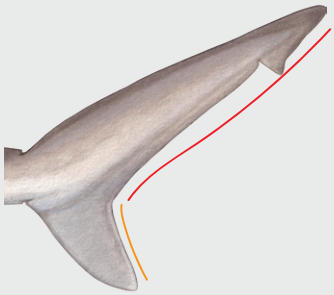
**14**

caudal fin lunate
upper lobe less than 1.5 times
longer than lower lobe



go to **step 15**

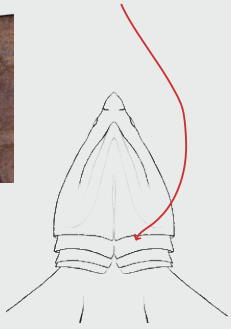
caudal fin heterocercal
upper lobe more than 1.5 times
longer than lower lobe



go to **step 19**

**15**

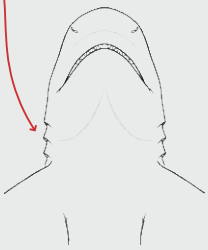
very large gills
extend onto surface of the head
and ventral surface



teeth minute

***Cetorhinus maximus* (Basking shark)** p. 37

gills do not extend onto surface of the
head or ventral surface



teeth blade-like, much larger

go to **step 16**

**16**

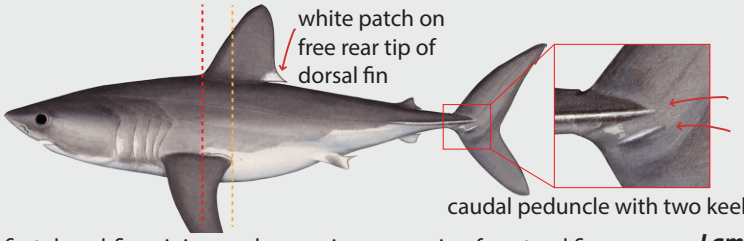
upper teeth broadly triangular,
flattened and strongly serrated

***Carcharodon carcharias* (White shark)** p. 38

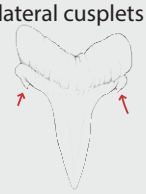
upper teeth long, narrow, and
without serrations

go to **step 17**

17

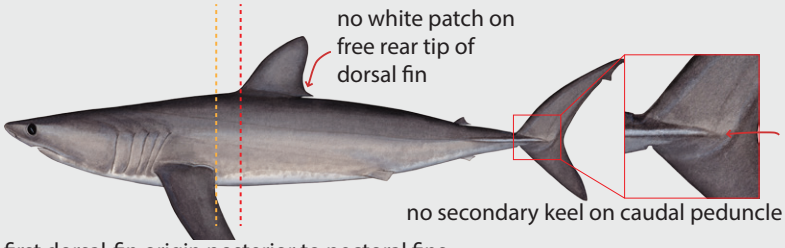



teeth with small lateral cusplets

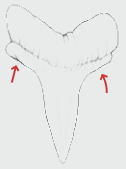


first dorsal-fin origin over base or inner margin of pectoral fins

***Lamna nasus* (Porbeagle)** p. 39




teeth without small lateral cusplets

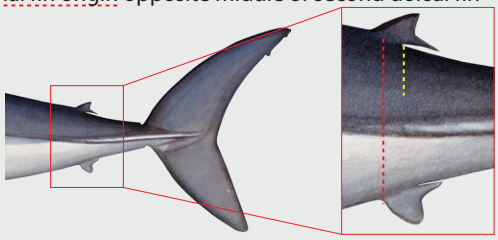


first dorsal-fin origin posterior to pectoral fins

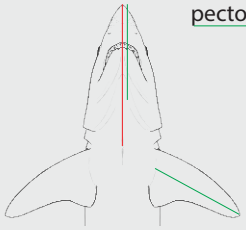
go to **step 18**

18

anal fin origin opposite middle of second dorsal fin

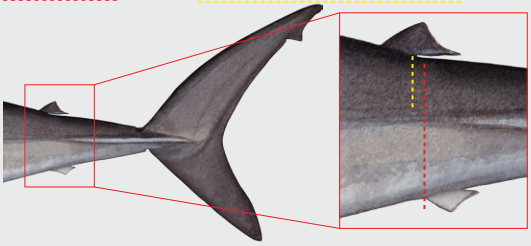


pectoral fins much shorter than head length

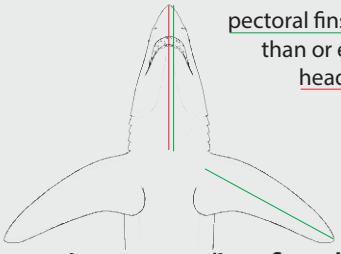


***Isurus oxyrinchus* (Shortfin mako)** p. 40

anal fin origin behind second dorsal fin insertion



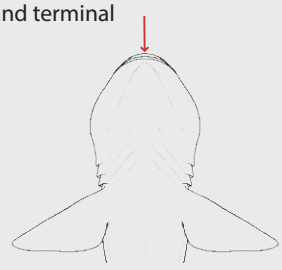
pectoral fins longer than or equal to head length



***Isurus paucus* (Longfin mako)** p. 41

19

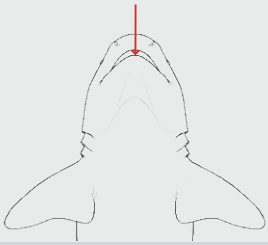
mouth huge and terminal



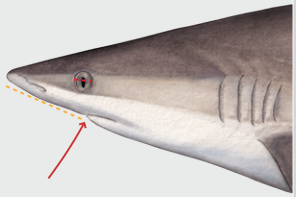
lower jaw extending to snout tip

***Megachasma pelagios* (Megamouth shark)** p. 42

mouth located on undersurface of the head (subterminal)



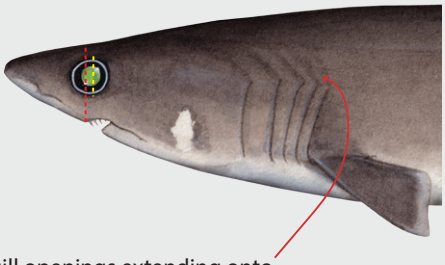
preoral distance distinctly longer than eye diameter



go to **step 20**

**20**

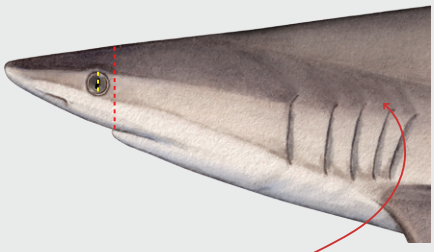
eyes very large,
more than half the greatest height of snout



gill openings extending onto
dorsal surface of head

***Pseudocarcharias kamoharai*** **(Crocodile shark)** p. 43

eyes smaller,
less than half the greatest height of snout



gill openings **not** extending
onto dorsal surface of head

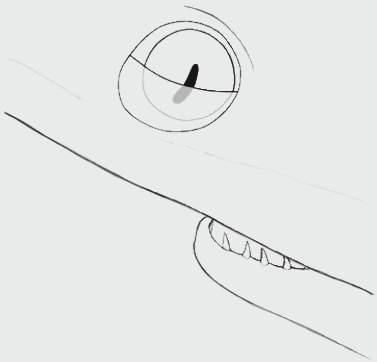
go to **step 21**

**21**

eyelids fixed, not capable of closing over eyes

***Odontaspis noronhai*** **(Bigeye sand tiger)** p. 44

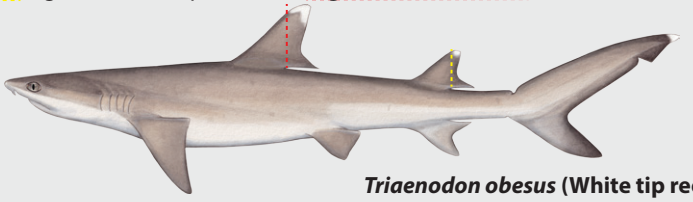
eyelids capable of closing over eye (nictitating)



go to **step 22**

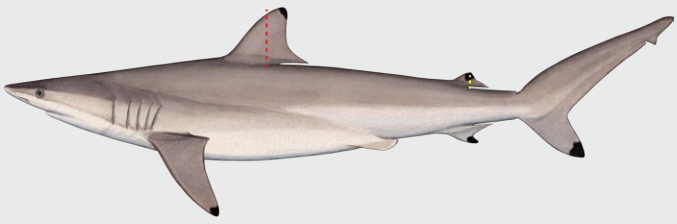
**22**

second dorsal fin higher than or equal to half height of first dorsal fin



***Triaenodon obesus*** **(White tip reef shark)** p. 45

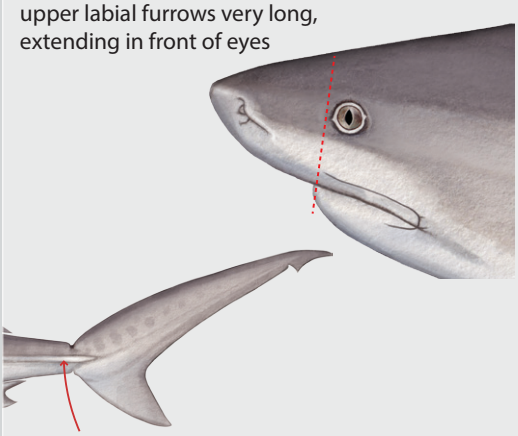
second dorsal fin smaller than half height of first dorsal fin



go to **step 23**

## 23

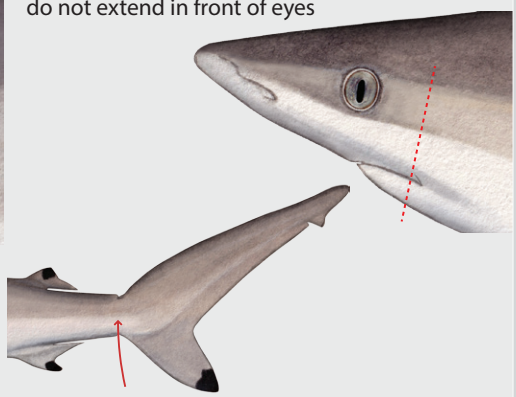
upper labial furrows very long, extending in front of eyes



prominent lateral keels present on caudal peduncle

***Galeocerdo cuvier* (Tiger shark)** p. 46

upper labial furrows do not extend in front of eyes



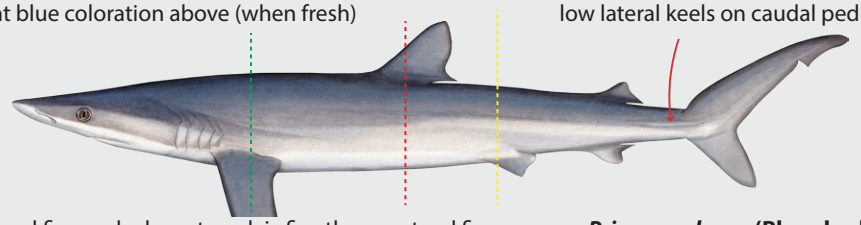
lateral keels absent from caudal peduncle (weak keels present in the Blue shark)

go to **step 24**

## 24

brilliant blue coloration above (when fresh)

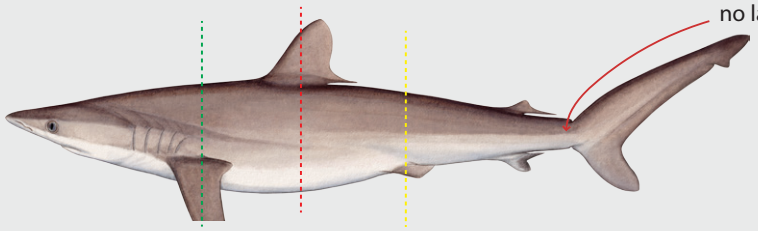
low lateral keels on caudal peduncle



first dorsal fin much closer to pelvic fins than pectoral fins

***Prionace glauca* (Blue shark)** p. 47

no lateral keels

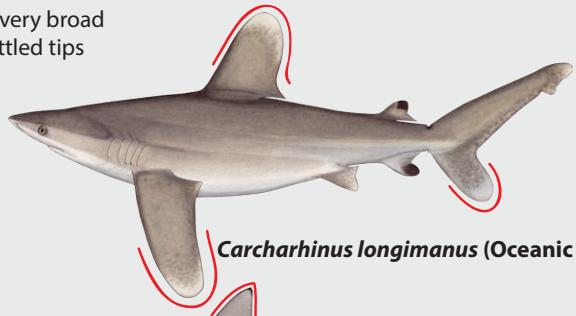


first dorsal fin midway between pectoral and pelvic fins or closer to pectoral fins

go to **step 25**

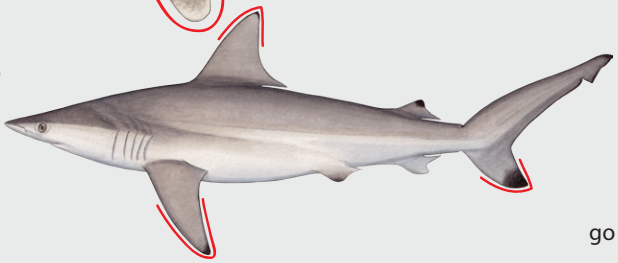
## 25

first dorsal and pectoral fins very broad with rounded and white mottled tips



***Carcharhinus longimanus* (Oceanic whitetip)** p. 48

fins not mottled white; first dorsal and pectoral fins tapering with pointed tips



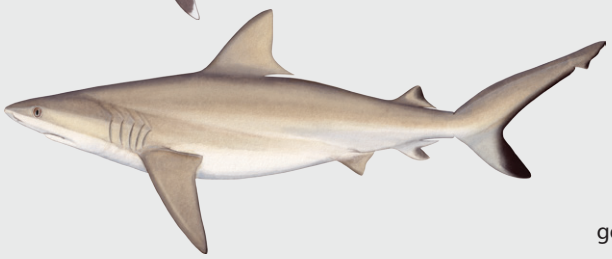
go to **step 26**

**26**

first dorsal fin, pectoral, pelvic and caudal fins **with** conspicuous white tips and posterior edges

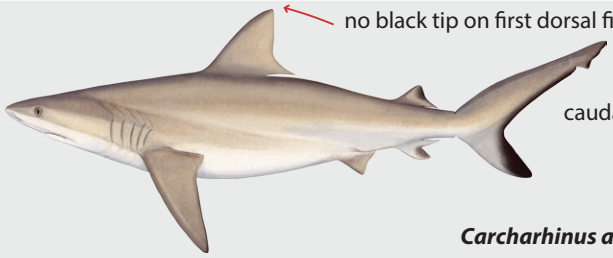
***Carcharhinus albimarginatus* (Silvertip shark)** p. 49

first dorsal fin, pectoral, pelvic and caudal fins **without** white tips

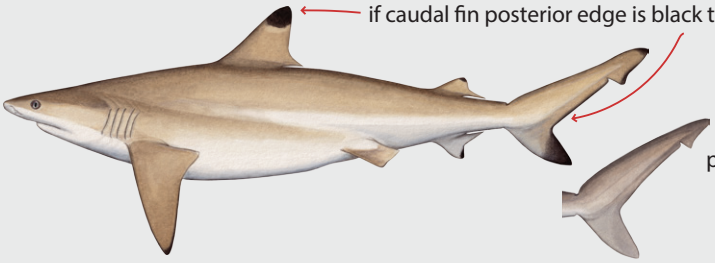


go to **step 27**

**27**



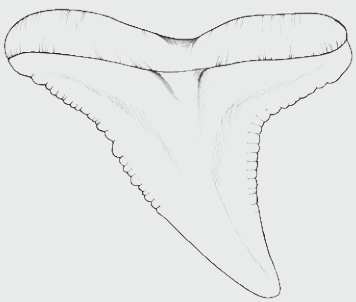

***Carcharhinus amblyrhynchos* (Grey reef shark)** p. 51




go to **step 28**

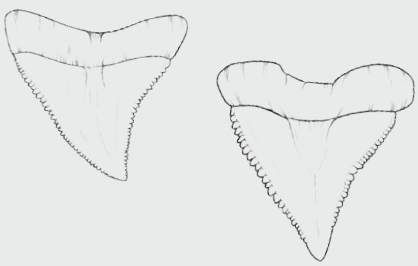
**28**

largest upper teeth with bent, hooked, narrow cusps



***Carcharhinus brachyurus* (Bronze whaler)** p. 52

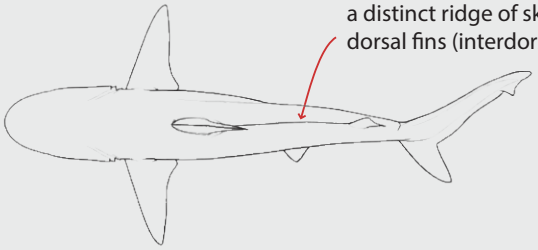
largest upper teeth variably shaped but never with bent, hooked cusps



go to **step 29**

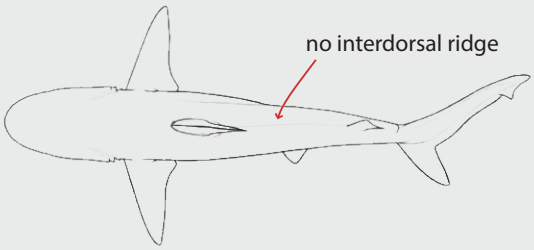
29

a distinct ridge of skin present between dorsal fins (interdorsal ridge)



go to **step 30**

no interdorsal ridge

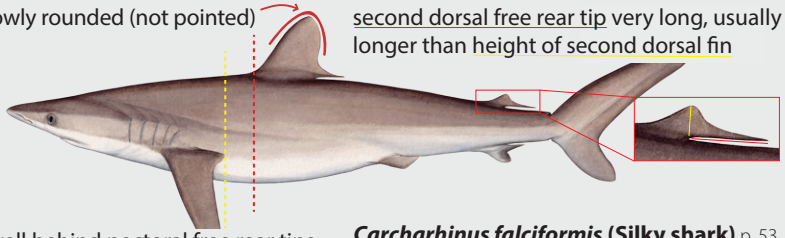


go to **step 34**

30

first dorsal fin tip narrowly rounded (not pointed)

second dorsal free rear tip very long, usually longer than height of second dorsal fin

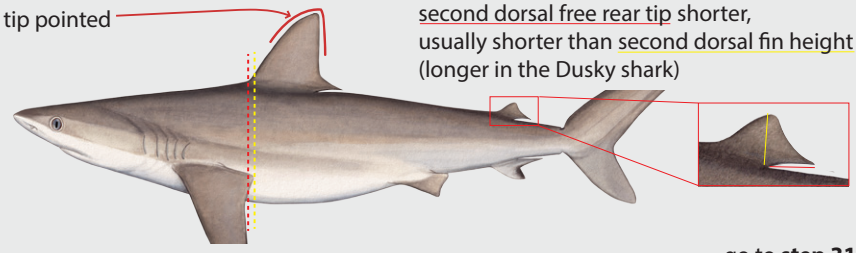


first dorsal fin origin well behind pectoral free rear tips

***Carcharhinus falciformis* (Silky shark)** p. 53

first dorsal-fin tip pointed

second dorsal free rear tip shorter, usually shorter than second dorsal fin height (longer in the Dusky shark)

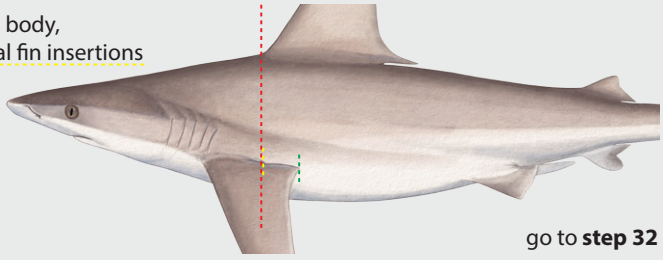


first dorsal-fin origin in front of or over pectoral free rear tips

go to **step 31**

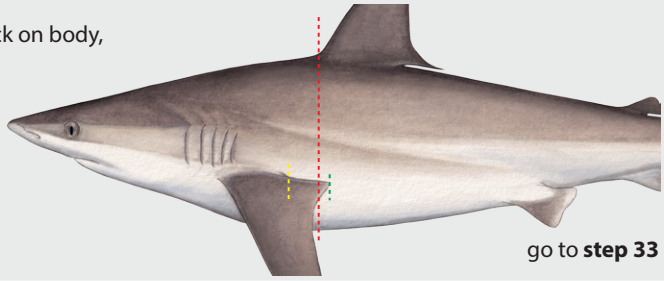
31

first dorsal fin located forward on body, its origin almost opposite pectoral fin insertions



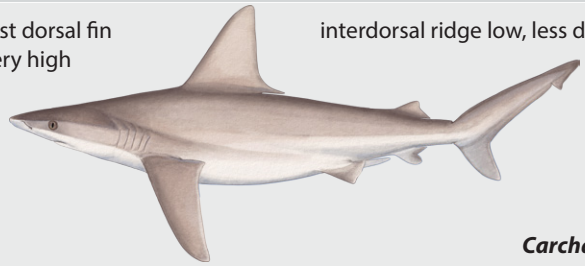
go to **step 32**

first dorsal fin located further back on body, its origin closer to pectoral fin free rear tips than to insertions



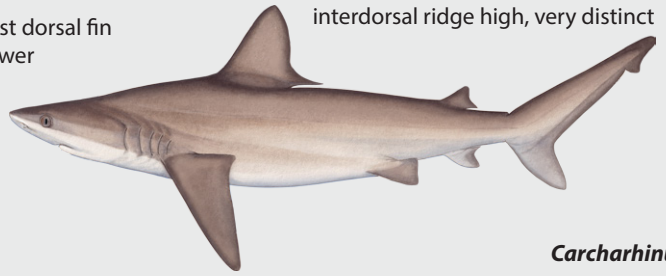
go to **step 33**

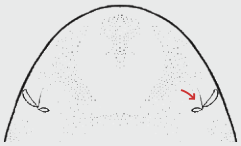
**32**





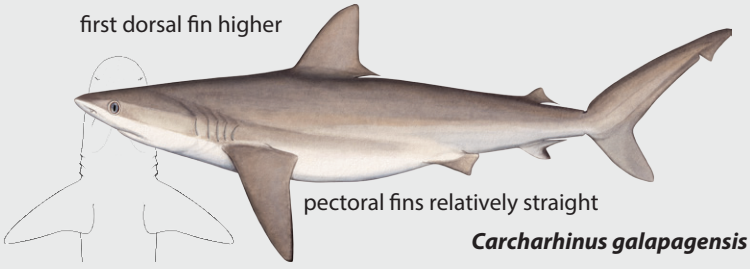
***Carcharhinus plumbeus* (Sandbar shark)** p. 54

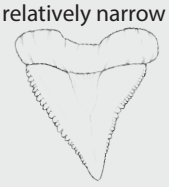


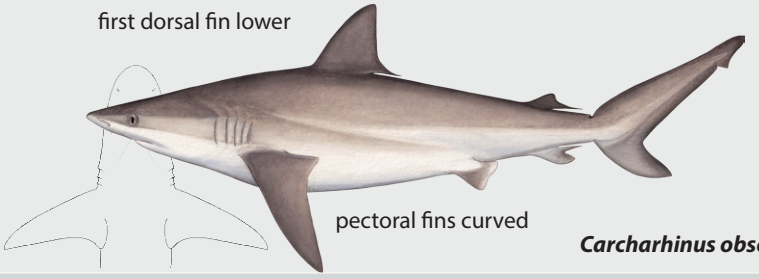

***Carcharhinus altimus* (Bignose shark)** p. 55

**33**



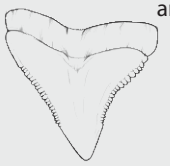

***Carcharhinus galapagensis* (Galapagos shark)** p. 56



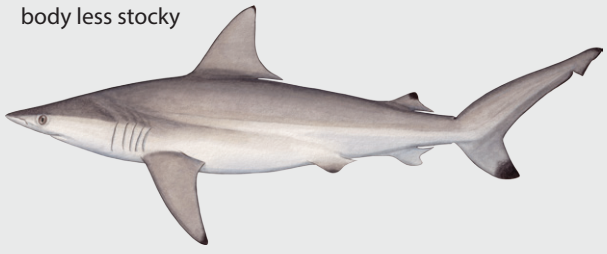


***Carcharhinus obscurus* (Dusky shark)** p. 57

**34**

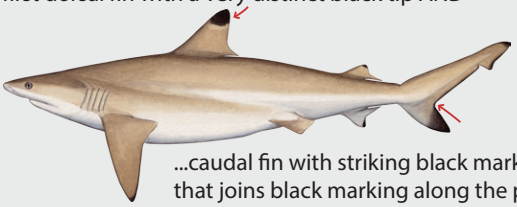

***Carcharhinus leucas* (Bull shark)** p. 58



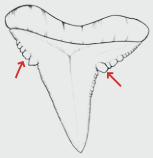


go to **step 35**

first dorsal fin with a very distinct black tip AND



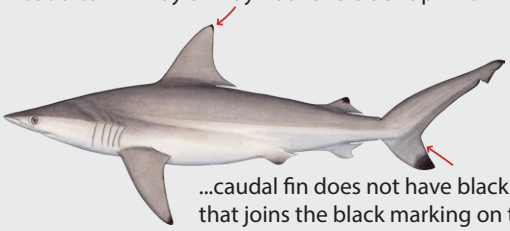
largest upper teeth with coarse basal serrations



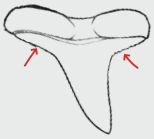
...caudal fin with striking black marking on lower lobe that joins black marking along the posterior margin

***Carcharhinus melanopterus* (Blacktip reef shark)** p. 59

first dorsal fin may or may not have black tip AND



largest upper teeth without coarse basal serrations

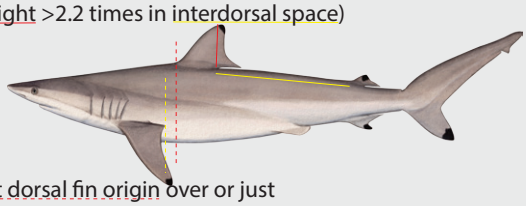


...caudal fin does not have black posterior margin that joins the black marking on the lower lobe

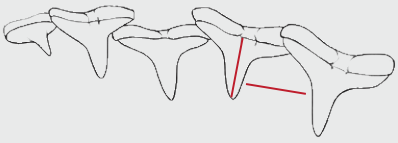
go to **step 36**



first dorsal fin relatively low (height >2.2 times in interdorsal space)



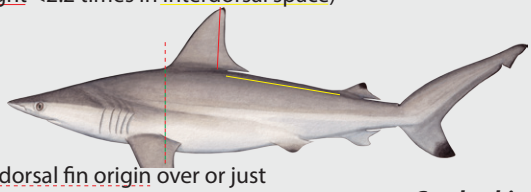
teeth very short, teeth in middle rows usually shorter than distance between teeth



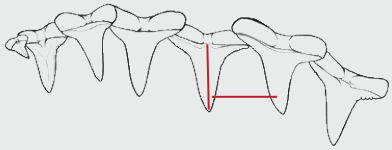
first dorsal fin origin over or just behind pectoral free rear tips

***Carcharhinus brevipinna* (Spinner shark)** p. 60

first dorsal fin taller (height <2.2 times in interdorsal space)



teeth of normal size, teeth in middle rows usually taller than distance between teeth

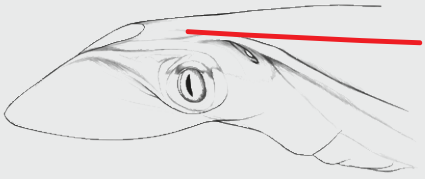


first dorsal fin origin over or just forward of pectoral fin insertions

***Carcharhinus limbatus* (Common blacktip shark)** p. 61



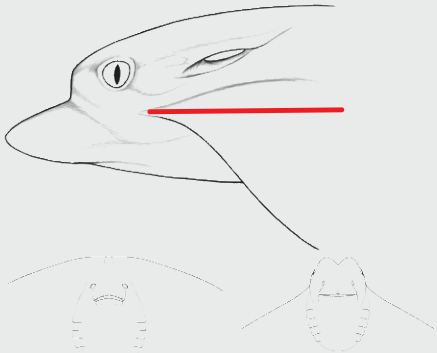
head not elevated above disc



snout modified into a pair of elongate lobes on each side of head

go to **step 38**

head elevated above disc



snout formed as a single, convex, lobe-like process or pair of rounded lobes

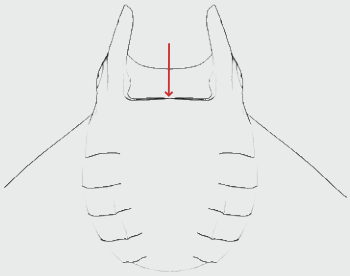
go to **step 43**

**38**

mouth terminal on head

go to **step 39**

mouth subterminal on ventral surface of head

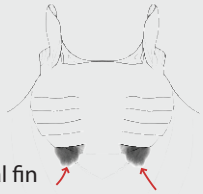


go to **step 40**

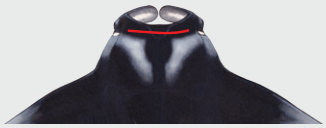
**39**

calcified mass containing an embedded spine present behind dorsal fin

a large, black, semi-circular spot emanating from both of the fifth gill slits

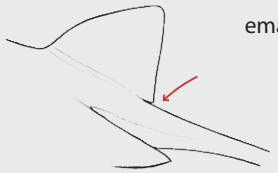


anterior margin of white shoulder patches parallel with front of head

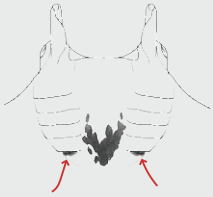


***Mobula birostris* (Giant manta)** p. 62

no calcified mass of spine present behind dorsal fin



a small black semi-circular spot emanating from both of the fifth gill slits

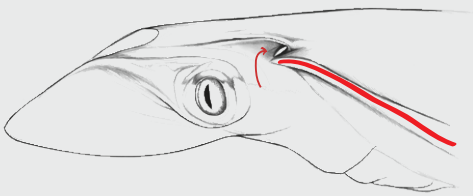


anterior margin of white shoulder patches curving posteriorly

***Mobula alfredi* (Reef manta)** p. 63

**40**

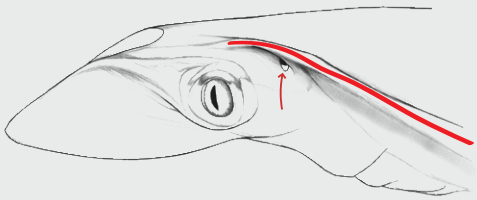
spiracles long, slit-like and dorsal to the plane of the pectoral fins



large animals, reaching well over 2 m disc width

go to **step 41**

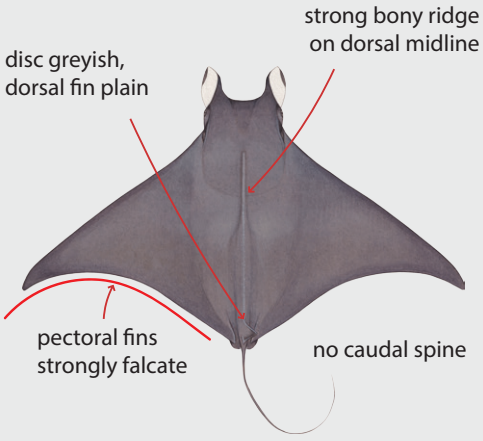
spiracles small, subcircular and ventral to the plane of the pectoral fins



small animals, not reaching 2 m disc width

go to **step 42**

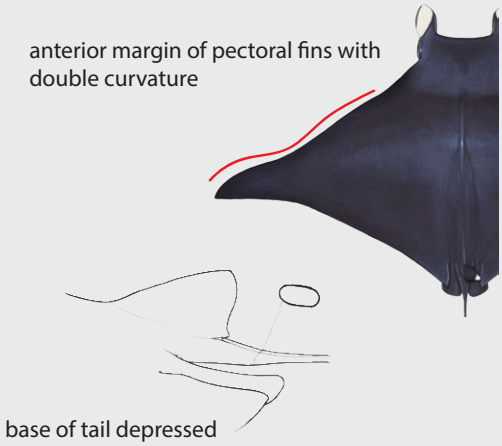
41



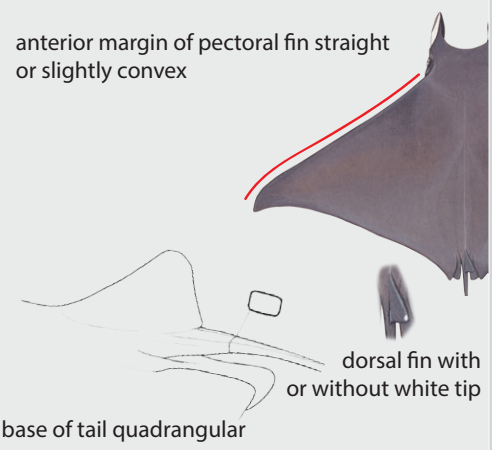

***Mobula tarapacana* (Chilean devilray)** p. 64


***Mobula mobular* (Giant devilray)** p. 65

42

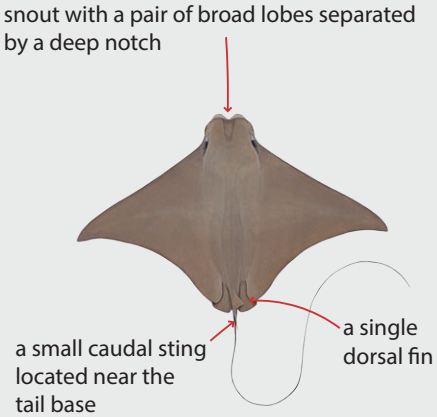



***Mobula thurstoni* (Bentfin devilray)** p. 66

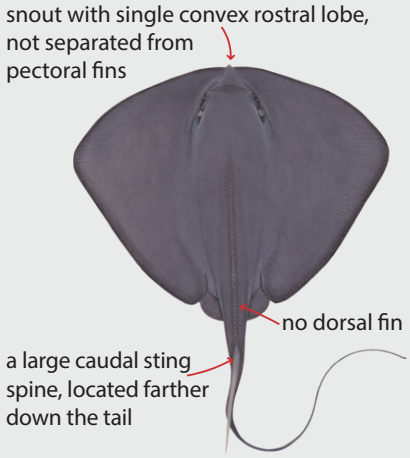



***Mobula kuhlii* (Shortfin devilray)** p. 67

43




***Rhinoptera javanica* (Javan cownose ray)** p. 68




***Pteroplatytrygon violacea* (Pelagic stingray)** p. 69

# Species details and illustrations

The following 44 species of pelagic sharks and rays have been carefully illustrated to show the key features as well as their natural colouration when alive. The species are in the same order as they are identified in the keys. As a result, species are naturally grouped into families, allowing the page edges to be colour-coded for ease of use. The sequence in which the families and species appear is not the one traditionally found in taxonomic guides.

Similarly, the species are arranged with the most similar ones placed on opposing pages to help a visual comparison of characteristic features.

This guide has been developed with the intention of providing illustrations as anatomically and colour correct as possible to facilitate identification in the field.

Each page also provides:

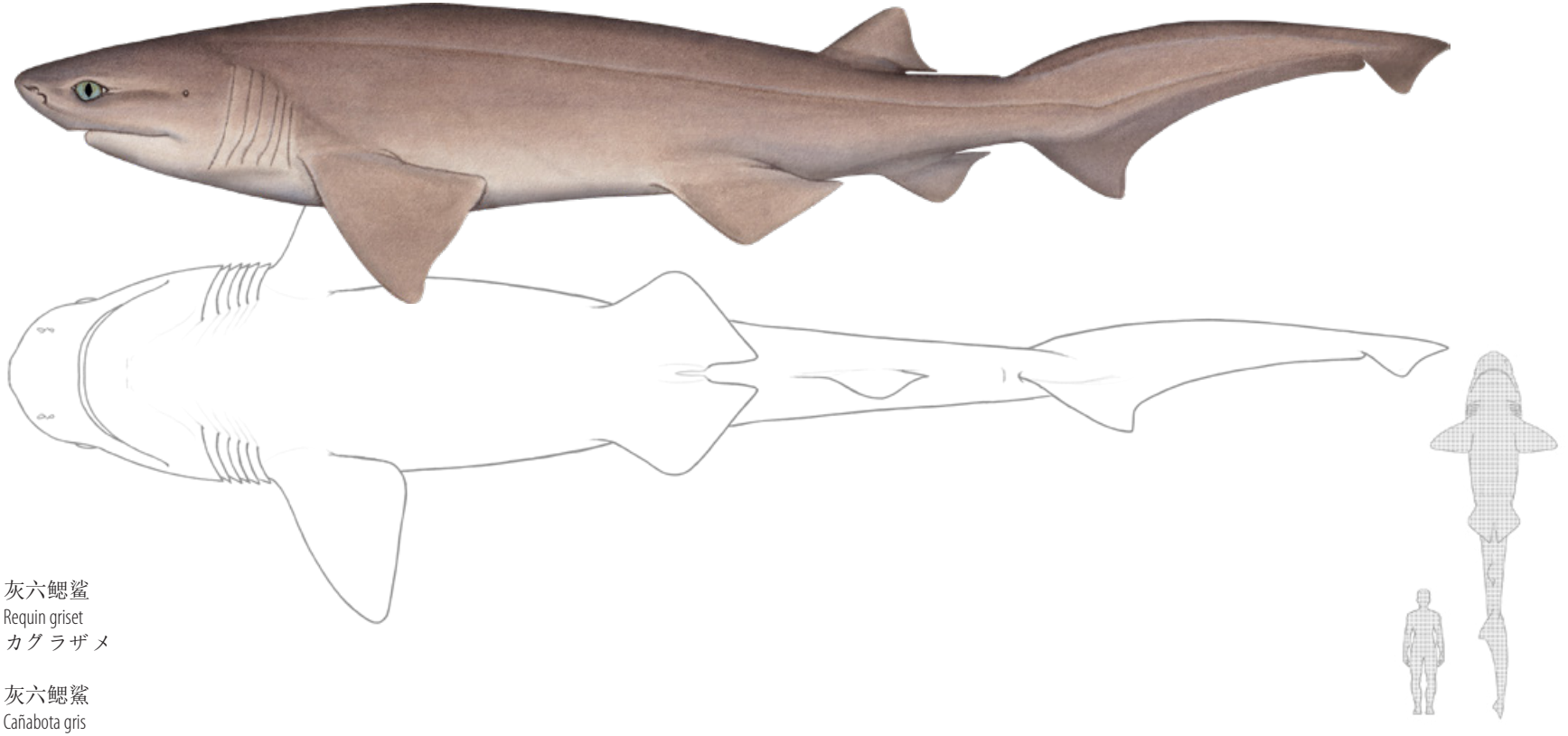
- the scientific and common English names of the species, and of the family it belongs to;
- vernacular names in six other languages – Cantonese, French, Japanese, Korean, Mandarin and Spanish – to facilitate exchanges among observers, crew and other fisheries agency field staff;
- the chain of specific keys used to identify the species – when identification reaches family level, the keys become orange;
- other characteristic features that distinguish similar species; and
- a figure to compare the maximum known size of each species with that of a six-foot tall human being. It is an important feature, as some similar looking species may have significant size differences.

# *Hexanchus griseus*

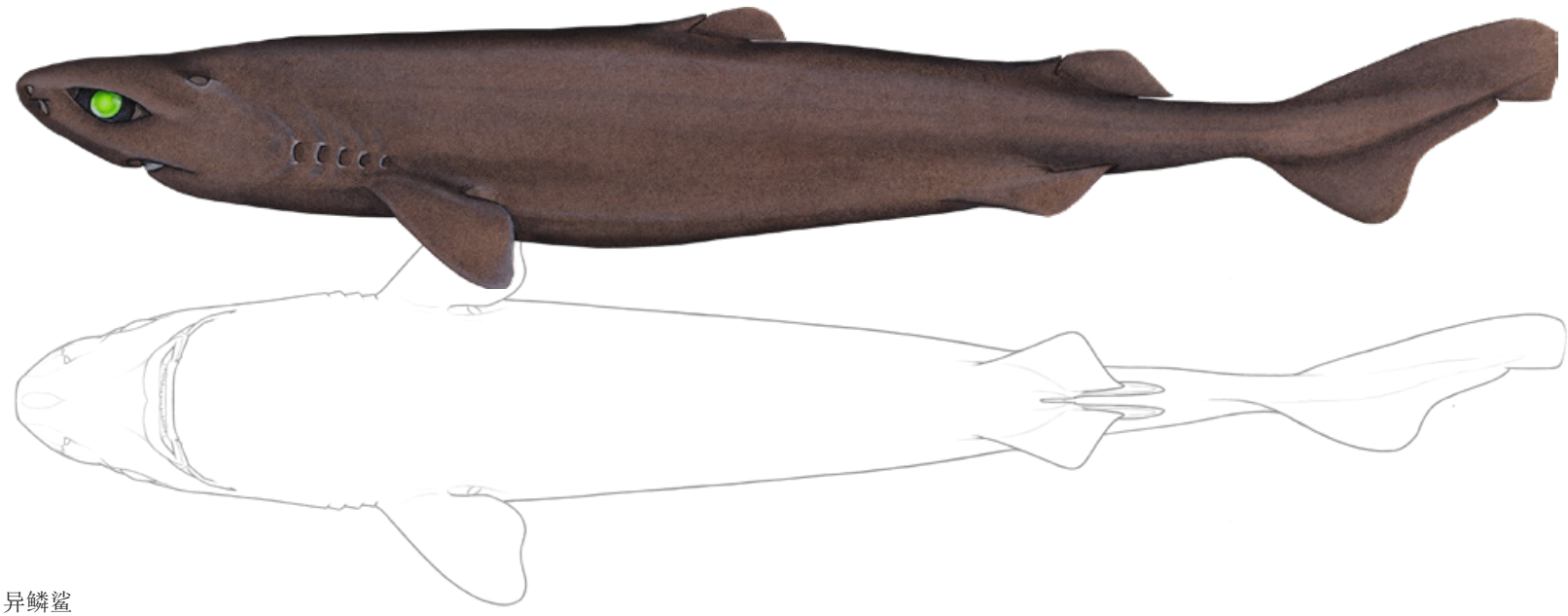
## Bluntnose sixgill shark



Six pairs of gill slits
A single dorsal fin



Cantonese: 灰六鰓鯊
French: Requin griset
Japanese: カグラザメ
Korean:
Mandarin: 灰六鰓鯊
Spanish: Cañabota gris



Cantonese: 异鱗鯊
French: Squale grogneur velouté
Japanese: ビロウドザメ
Korean:
Mandarin: 異鱗鮫（刺鯊）
Spanish: Bruja boca chica

Small spines present on dorsal fins
Second dorsal fin larger than first dorsal fin



# *Zameus squamulosus*

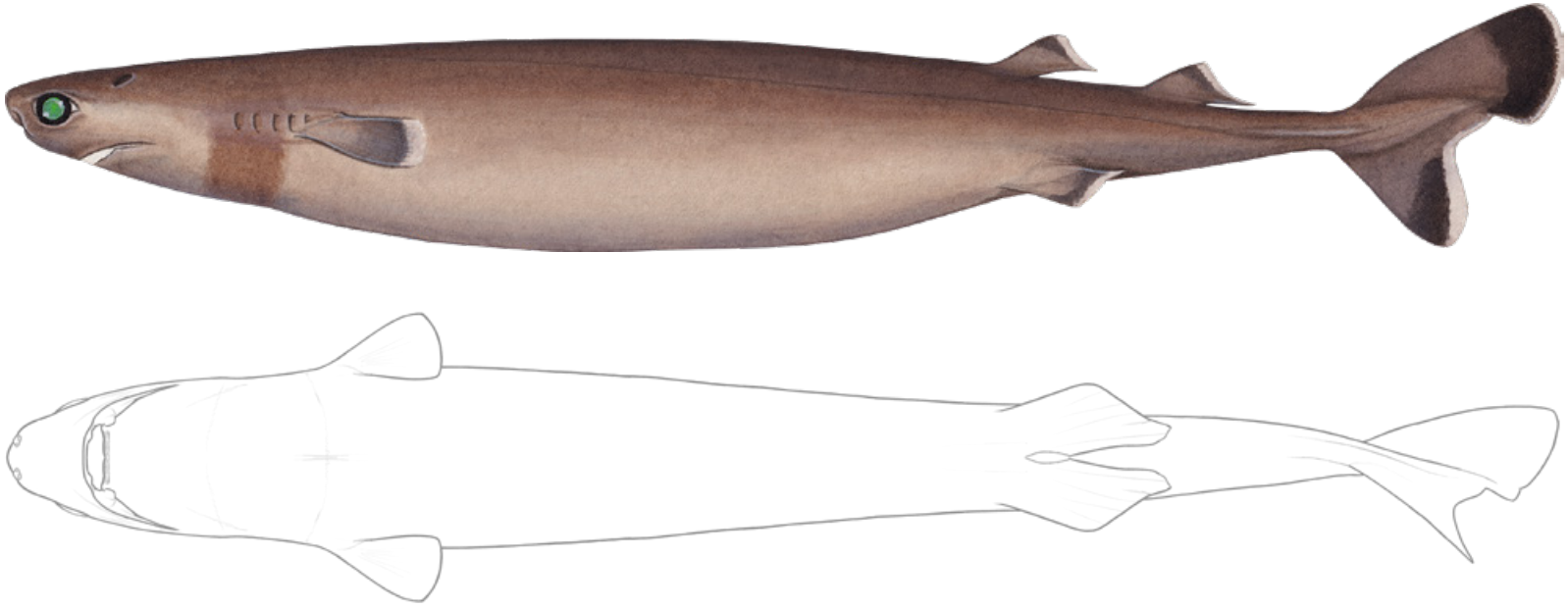
## Velvet dogfish

Somniosidae: Sleeper sharks

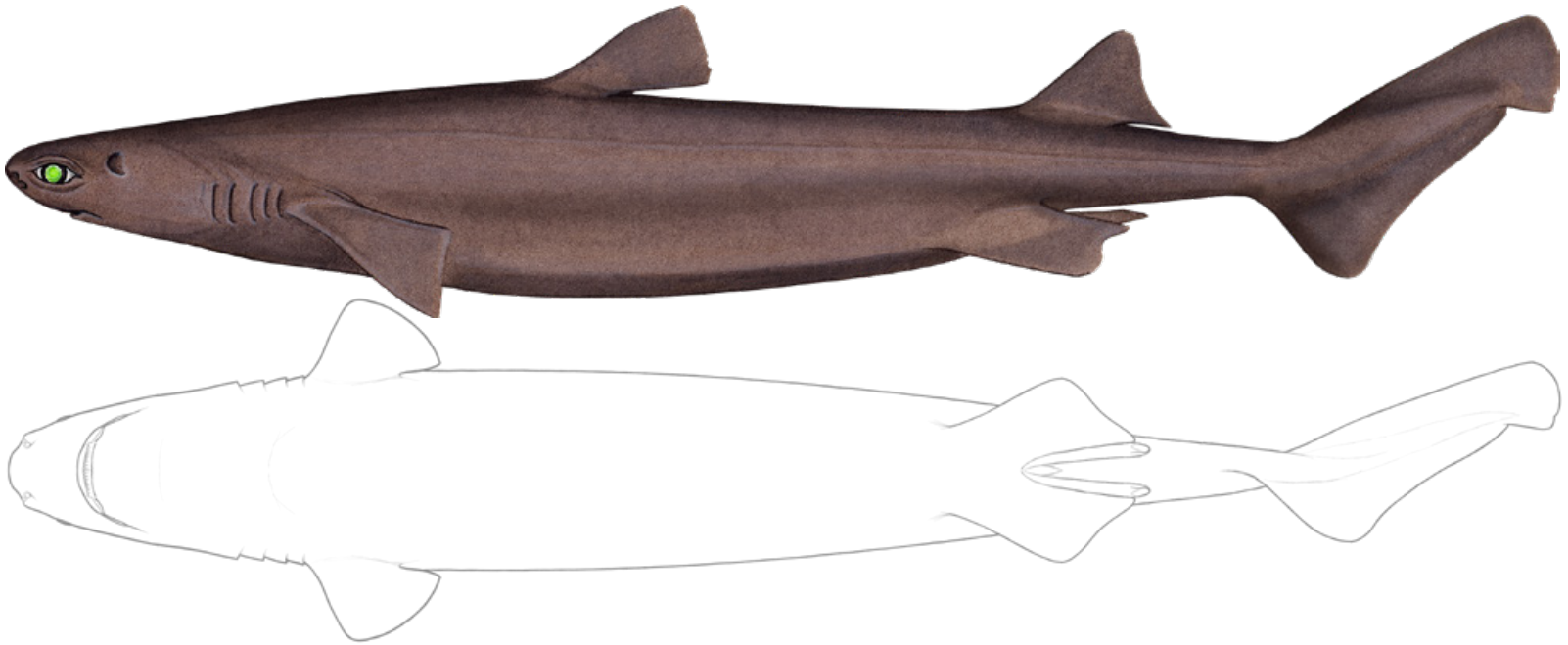
# *Isistius brasiliensis* Cookie-cutter shark



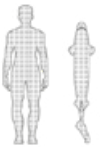
Dark collar around head at gill
First dorsal fin base over pelvic fin origin



Cantonese: 巴西达摩鲨
French: Squalelet féroce
Japanese: ダルマザメ
Korean:
Mandarin: 雪茄鲛（巴西達摩鯊）
Spanish: Tollo cigarro



Cantonese: 铠鲨
French: Squale liche
Japanese: ヨロイザメ
Korean:
Mandarin: 黑鲛（黑豬罐）
Spanish: Carocho



No dark collar around head
First dorsal well in front of pelvic fin
Dorsal fins of equal size without spines



# *Dalatias licha*

Black shark, kitefin shark

Dalatiidae: Kitefin sharks

# *Eusphyra blochii*

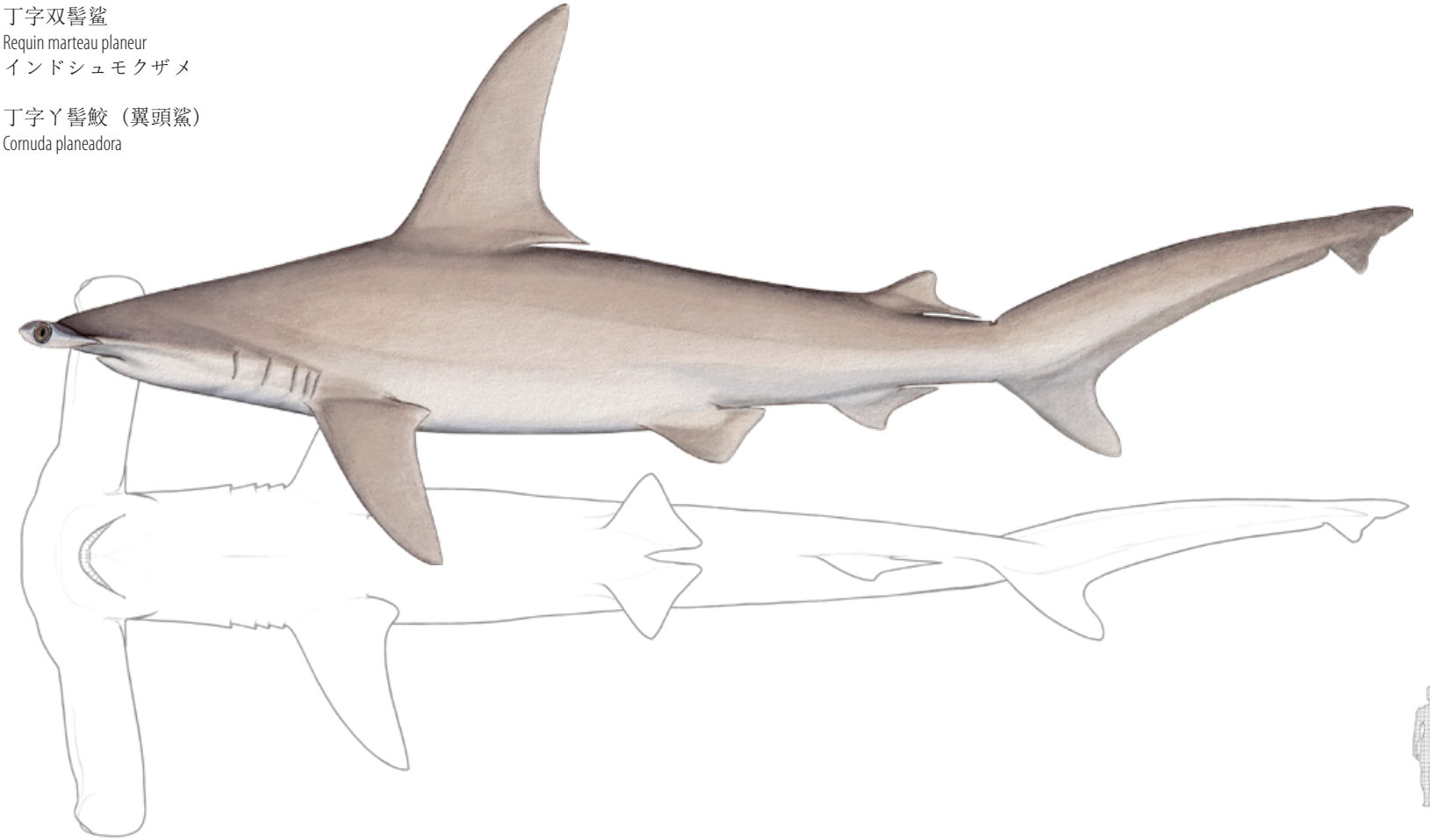
## Winghead shark

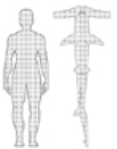


Identification keys **1 2 3 6 7**

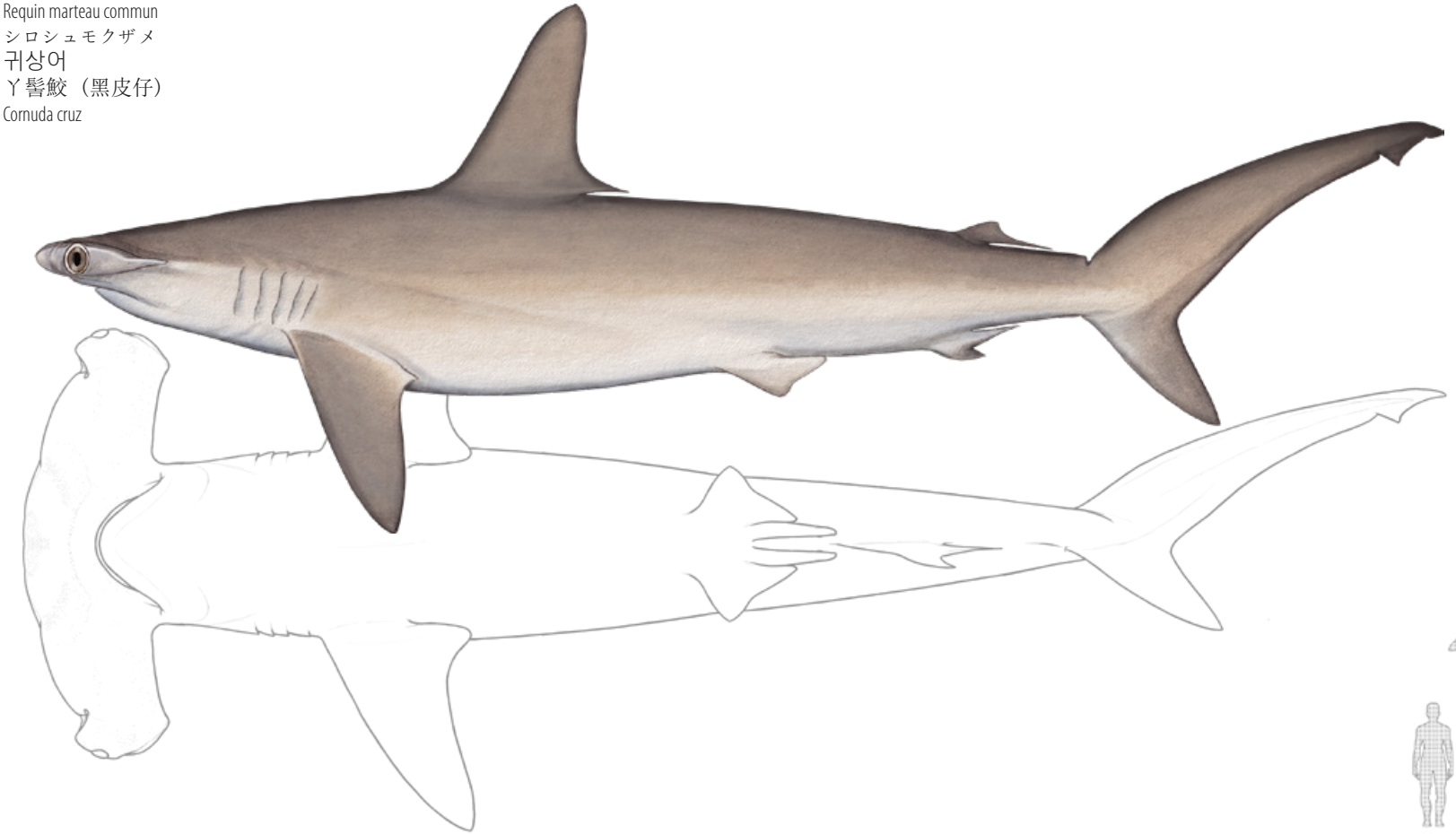
Lateral blades of head very long, narrow and wing-like
Head width almost half of total length

Cantonese: 丁字双髻鲨
French: Requin marteau planeur
Japanese: インドシュモクザメ
Korean:
Mandarin: 丁字丫髻鮫（翼頭鯊）
Spanish: Cornuda planeadora





Cantonese: 锤头双髻鲨
French: Requin marteau commun
Japanese: シロシュモクザメ
Korean: 귀상어
Mandarin: 丫髻鲛（黑皮仔）
Spanish: Cornuda cruz



Front profile of head convex with lateral indentations and no middle indentation



Identification keys **1 2 3 6 7 8**

SPZ

*Sphyrna zygaena* Smooth hammerhead

Sphyrnidae: Hammerhead sharks

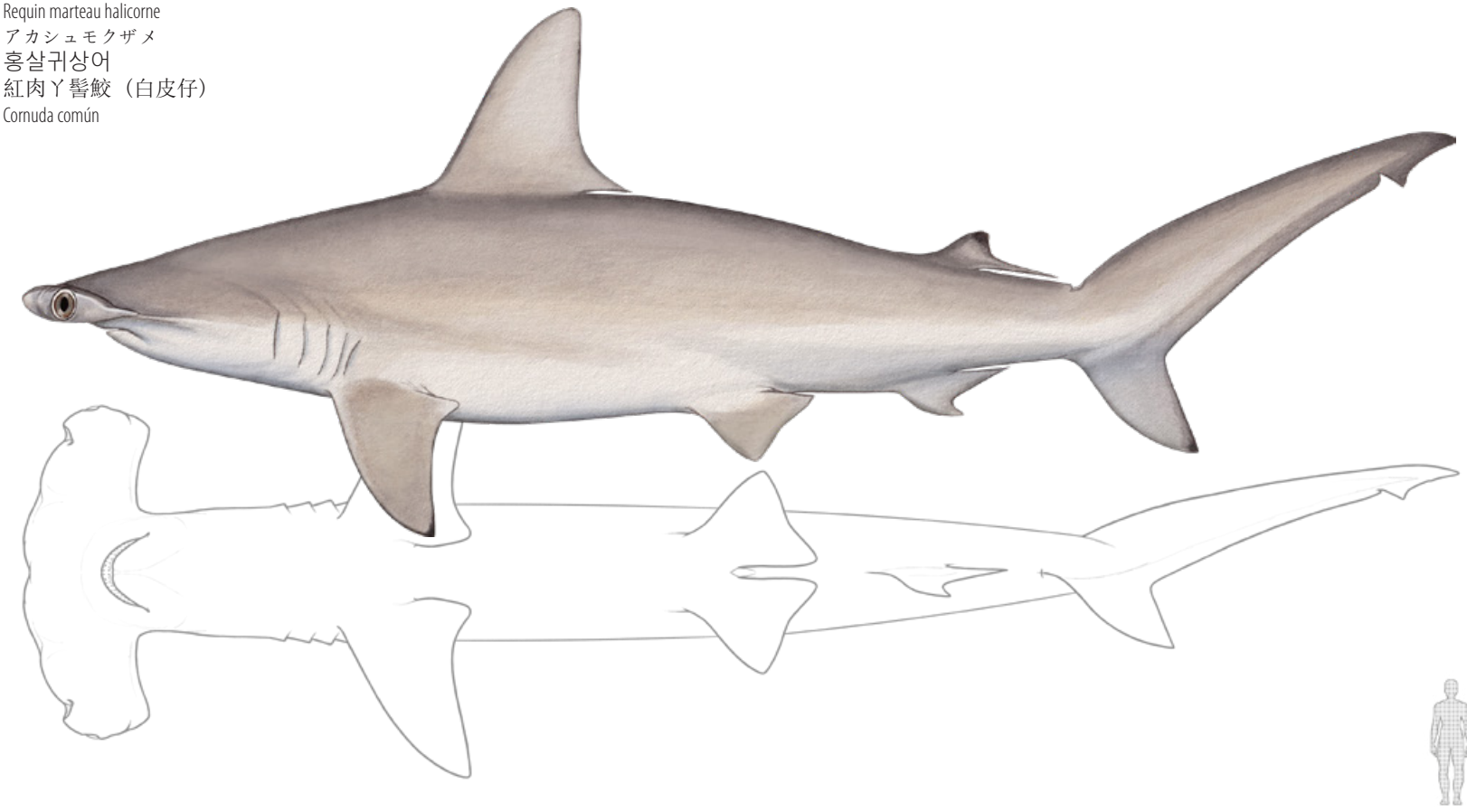
# *Sphyrna lewini*

## Scalloped hammerhead

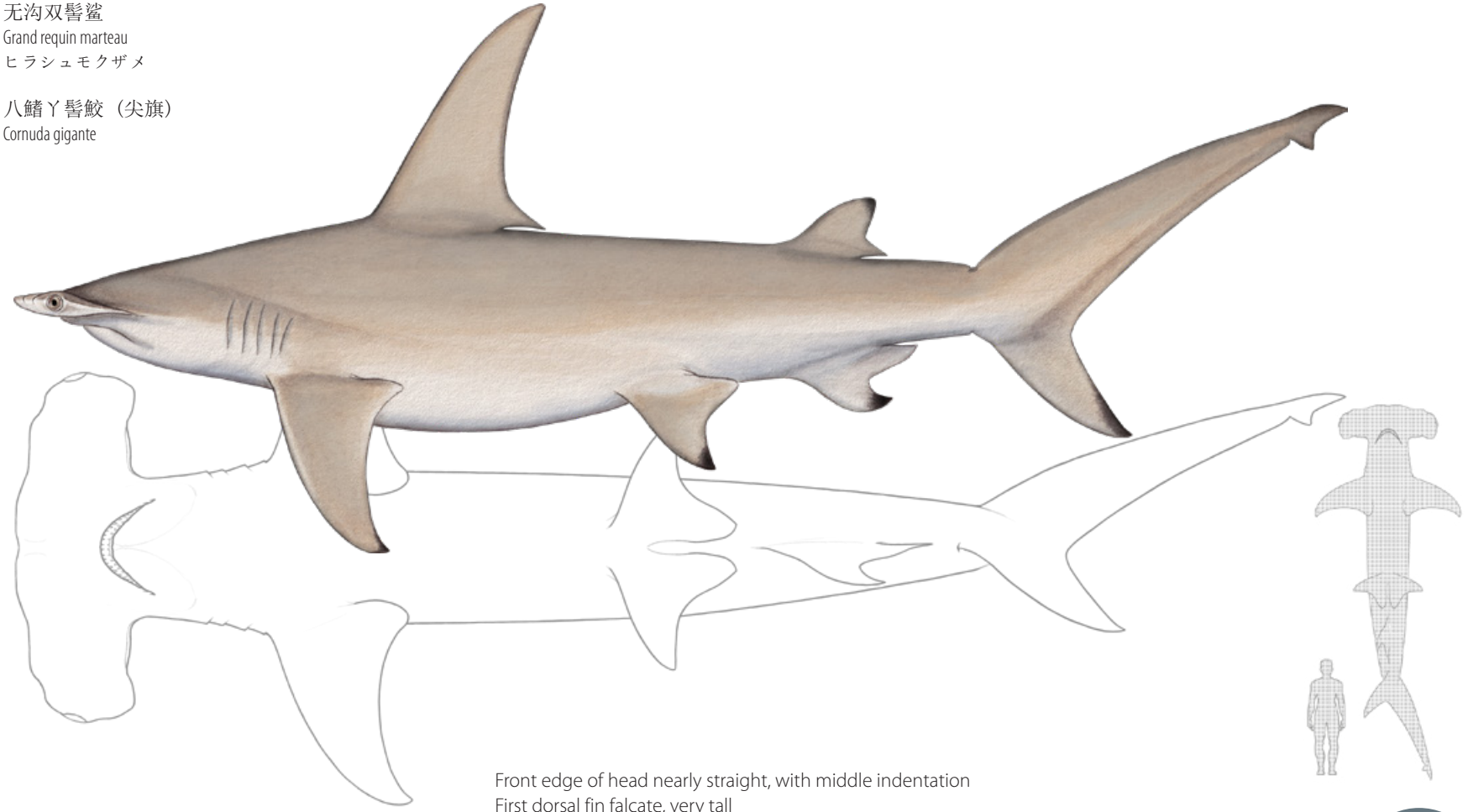


Cantonese: 路氏双髻鲨
French: Requin marteau halicorne
Japanese: アカシュモクザメ
Korean: 홍살귀상어
Mandarin: 紅肉丫髻鮫（白皮仔）
Spanish: Cornuda común

Front of head convex with a middle and paired lateral indentations
First dorsal fin semi-falcate, only moderately high
Pelvic fins with straight posterior edges



Cantonese: 无沟双髻鲨
French: Grand requin marteau
Japanese: ヒラシュモクザメ
Korean:
Mandarin: 八鳝丫髻鮫（尖旗）
Spanish: Cornuda gigante



Front edge of head nearly straight, with middle indentation
First dorsal fin falcate, very tall
Pelvic fins with concave posterior edges



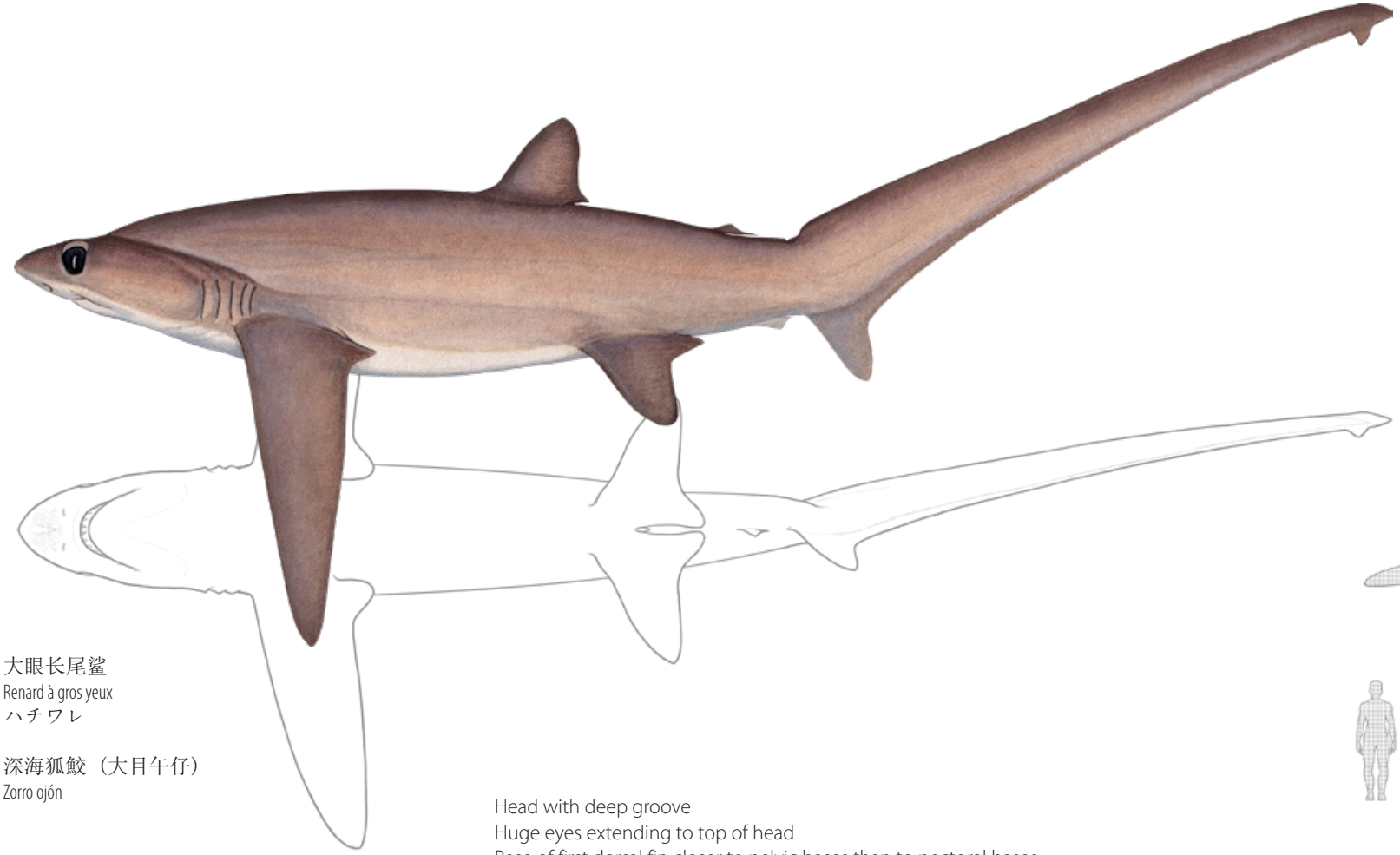
Identification keys 1 2 3 6 7 8 9

SPK

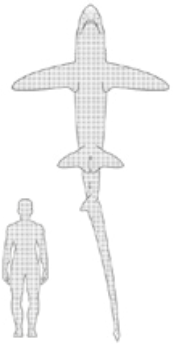
# *Sphyrna mokarran*

## Great hammerhead

Sphyrnidae: Hammerhead sharks



Cantonese: 大眼长尾鲨
French: Renard à gros yeux
Japanese: ハチワレ
Korean:
Mandarin: 深海狐鲛（大目午仔）
Spanish: Zorro ojón



Head with deep groove
Huge eyes extending to top of head
Base of first dorsal fin closer to pelvic bases than to pectoral bases



# *Alopias superciliosus*

## Bigeye thresher

Alopiidae: Thresher sharks

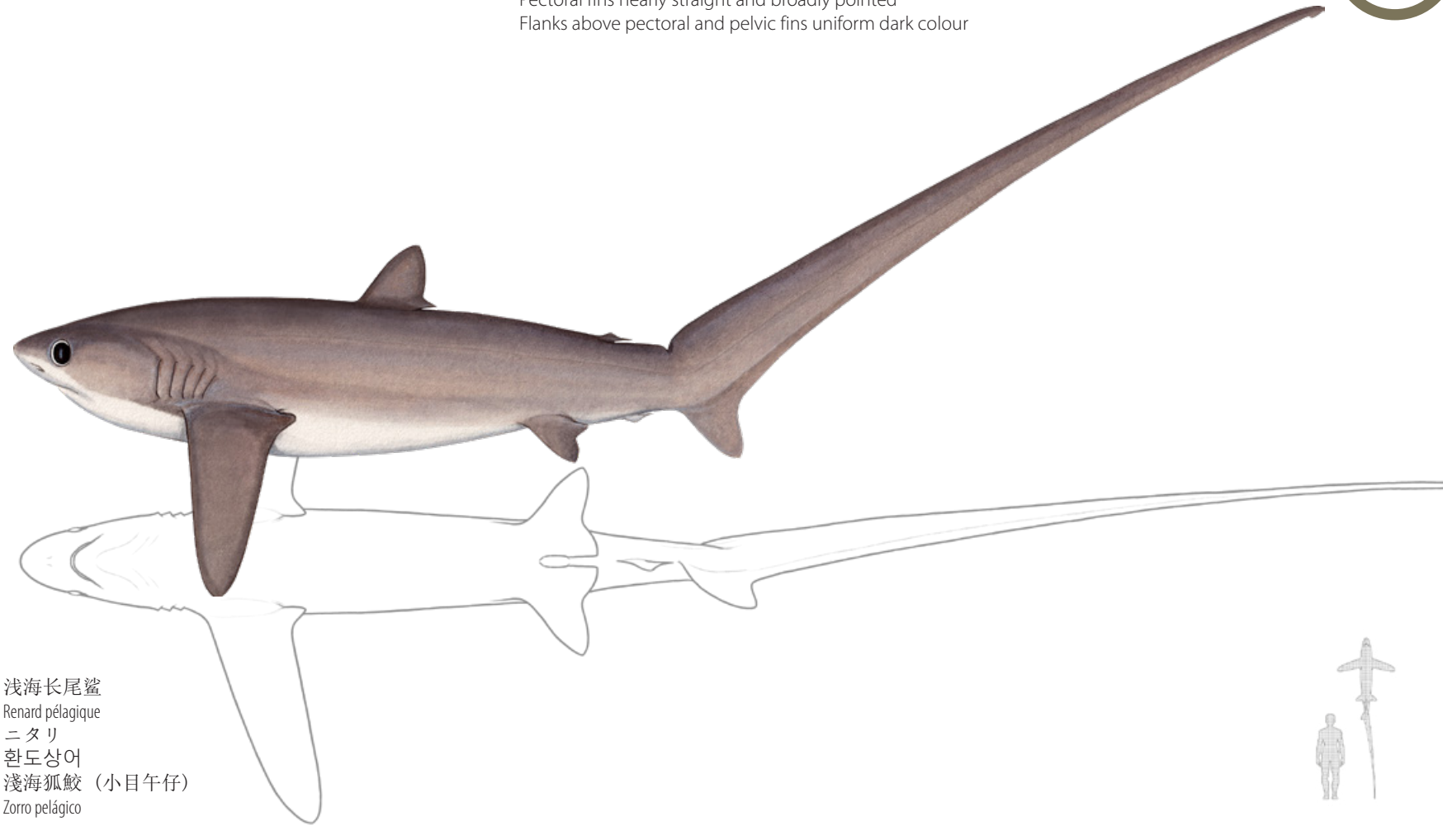
# *Alopias pelagicus*

## Pelagic thresher



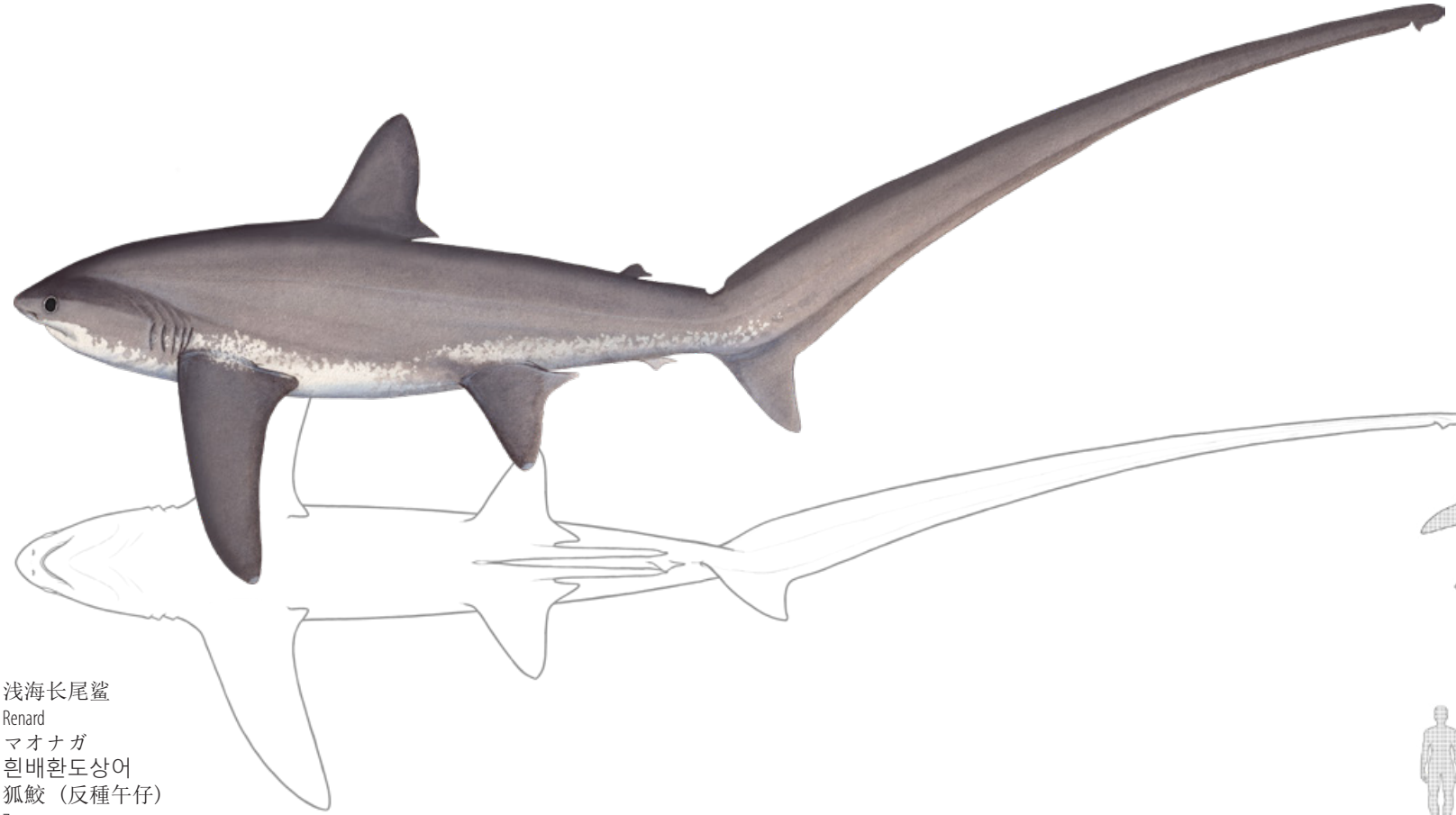
Identification keys **1** **2** **3** **6** **10** **11** **12**

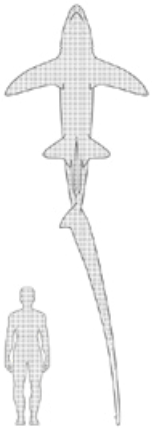
Pectoral fins nearly straight and broadly pointed
Flanks above pectoral and pelvic fins uniform dark colour





Cantonese: 浅海长尾鲨
French: Renard pélagique
Japanese: ニタリ
Korean: 환도상어
Mandarin: 淺海狐鮫（小目午仔）
Spanish: Zorro pelágico





Cantonese: 浅海长尾鲨
French: Renard
Japanese: マオナガ
Korean: 흰배환도상어
Mandarin: 狐鲛（反種午仔）
Spanish: Zorro

Pectoral fins curved and sharply pointed
White ventral colour extends to flanks above pectoral and pelvic fins base



# *Alopias vulpinus*

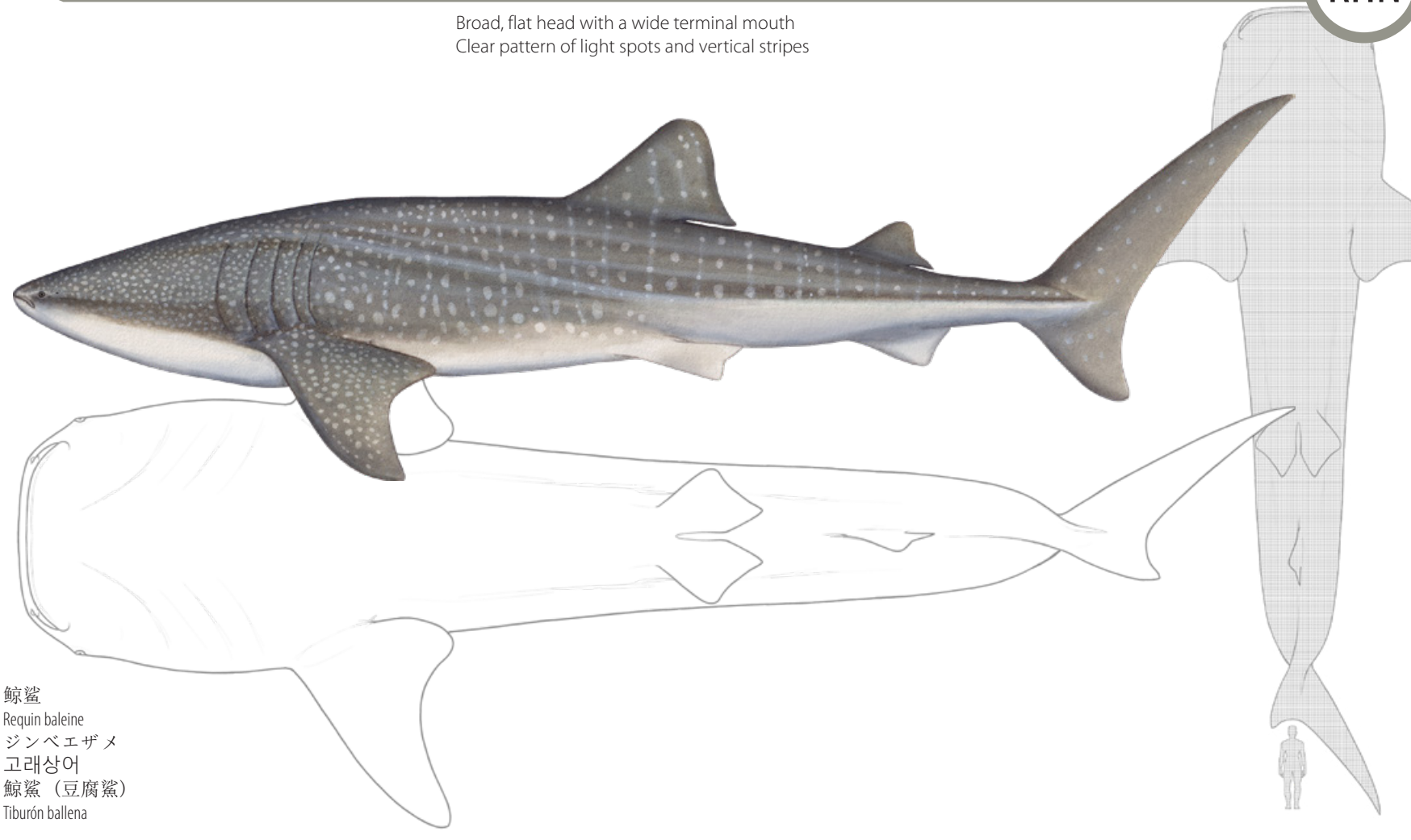
## Thresher shark

# *Rhincodon typus* Whale shark

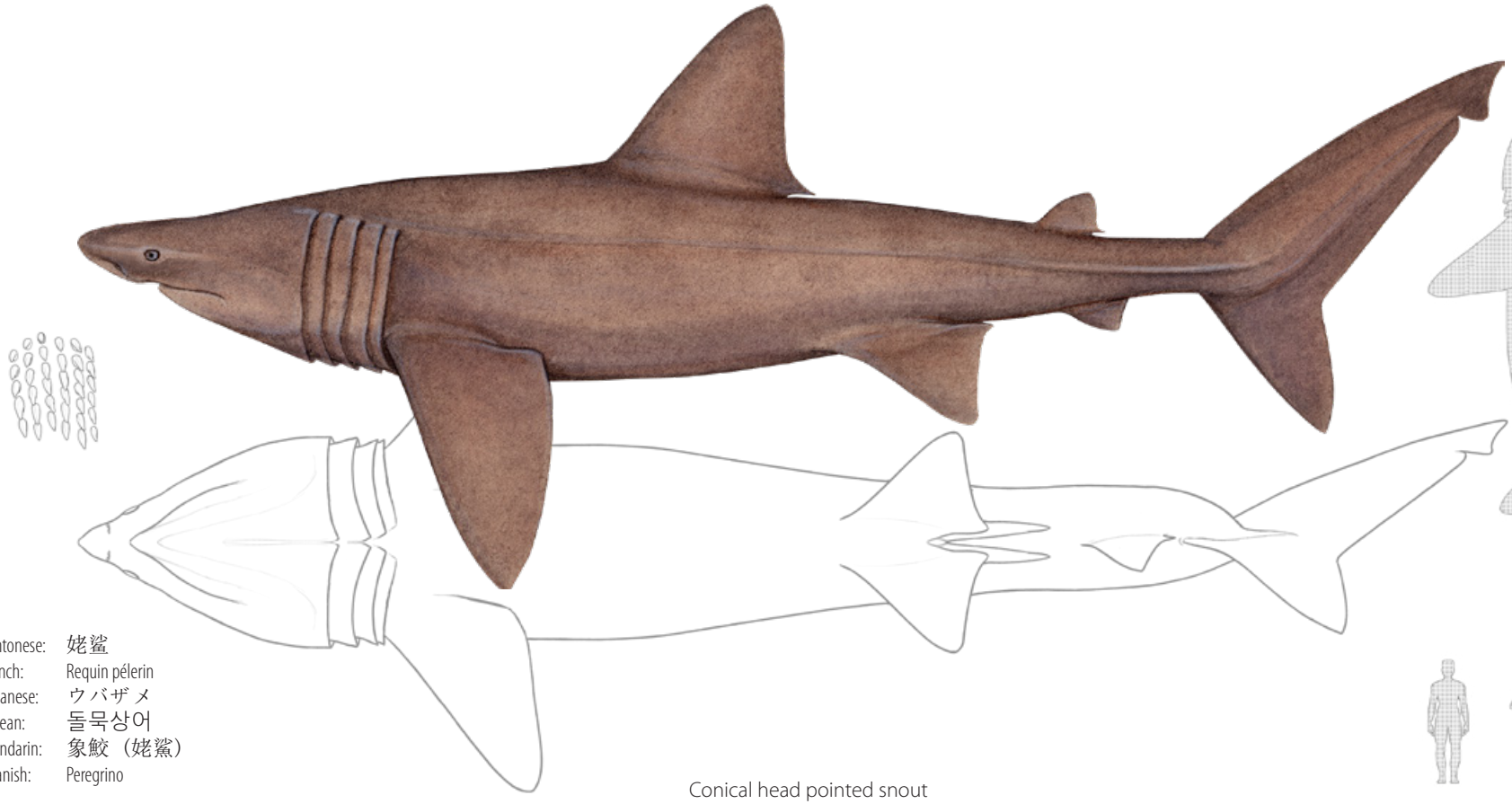


Identification keys **1 2 3 6 10 13**

Broad, flat head with a wide terminal mouth
Clear pattern of light spots and vertical stripes



Cantonese: 鯨鯊
French: Requin baleine
Japanese: ジンベエザメ
Korean: 고래상어
Mandarin: 鯨鯊（豆腐鯊）
Spanish: Tiburón ballena



Cantonese: 姥鯊
French: Requin pélerin
Japanese: ウバザメ
Korean: 돌묵상어
Mandarin: 象鮫（姥鯊）
Spanish: Peregrino

Conical head pointed snout
Very small teeth
Huge gill slits extending almost around head



# *Cetorhinus maximus*

## Basking shark

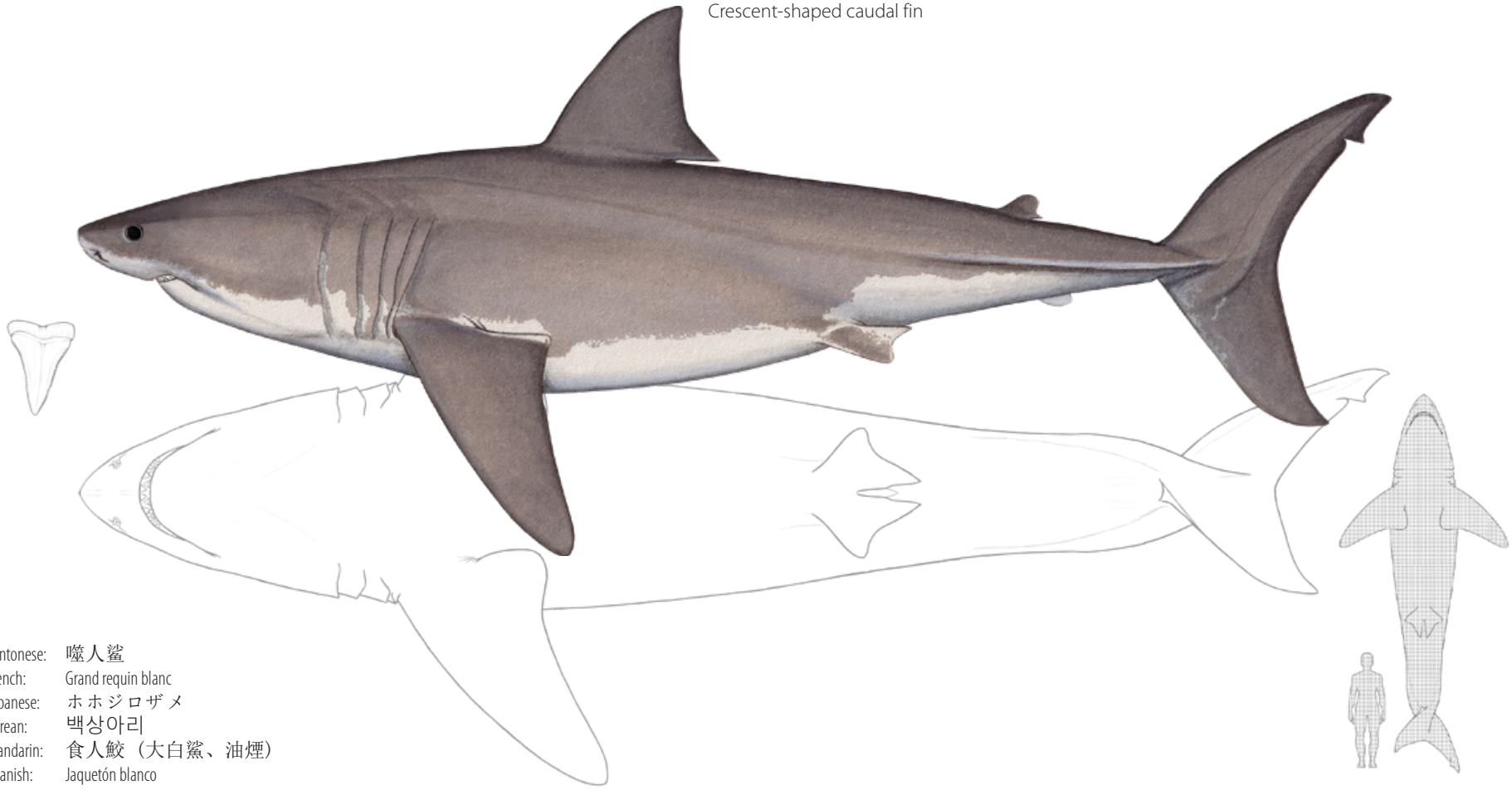
Cetorhinidae: Basking sharks

# *Carcharodon carcharias*

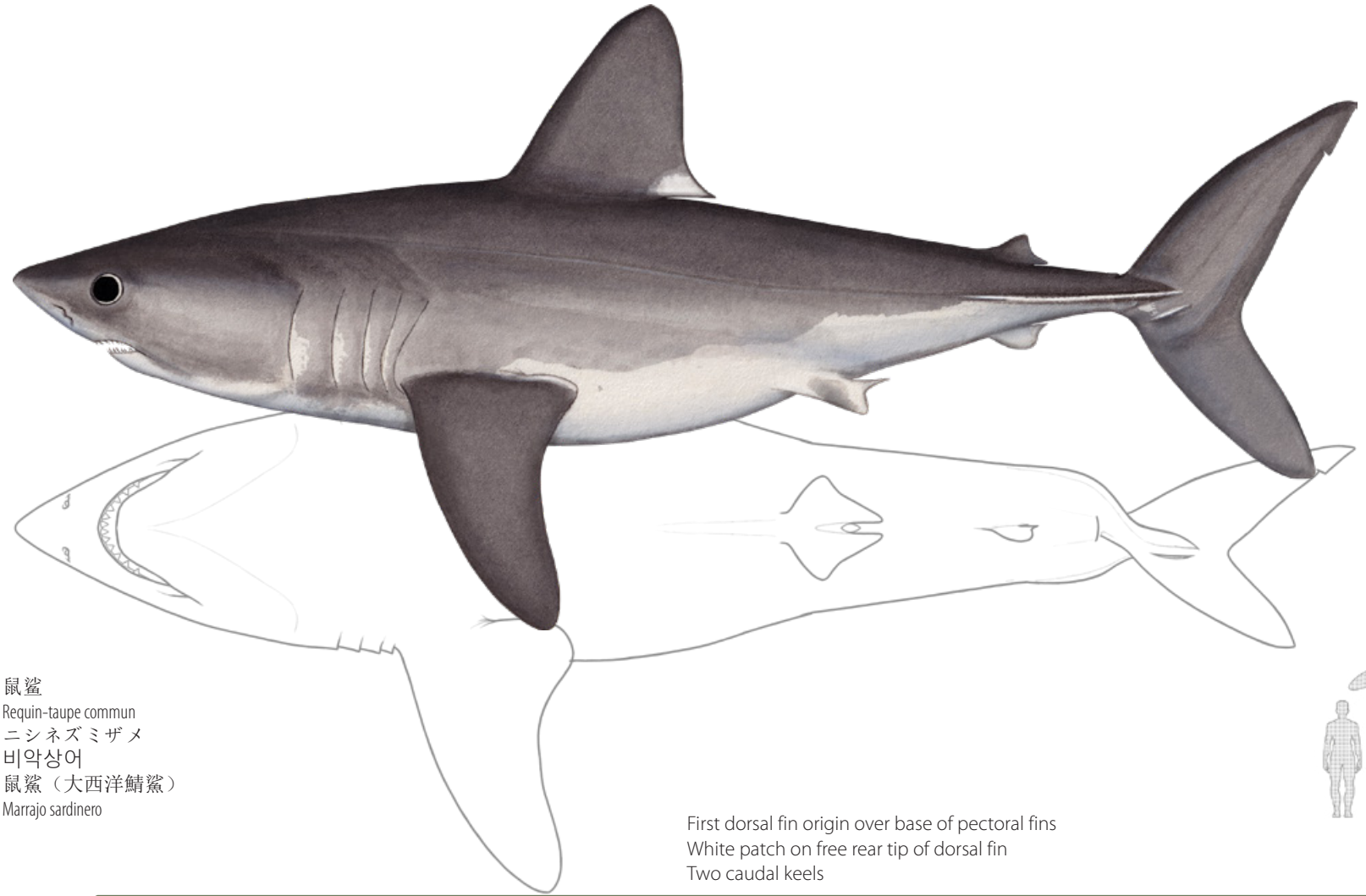
## Great white shark



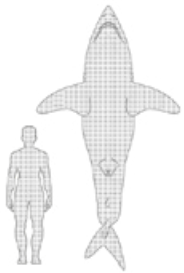
Large serrated triangular teeth
Grey dorsal colour with distinct change to white below
Crescent-shaped caudal fin



Cantonese: 噬人鯊
French: Grand requin blanc
Japanese: ホホジロザメ
Korean: 백상아리
Mandarin: 食人鮫（大白鯊、油煙）
Spanish: Jaquetón blanco



Cantonese: 鼠鯊
French: Requin-taupe commun
Japanese: ニシネズミザメ
Korean: 비악상어
Mandarin: 鼠鯊（大西洋鯖鯊）
Spanish: Marrajo sardinero



First dorsal fin origin over base of pectoral fins
White patch on free rear tip of dorsal fin
Two caudal keels



# *Lamna nasus*

Porbeagle shark

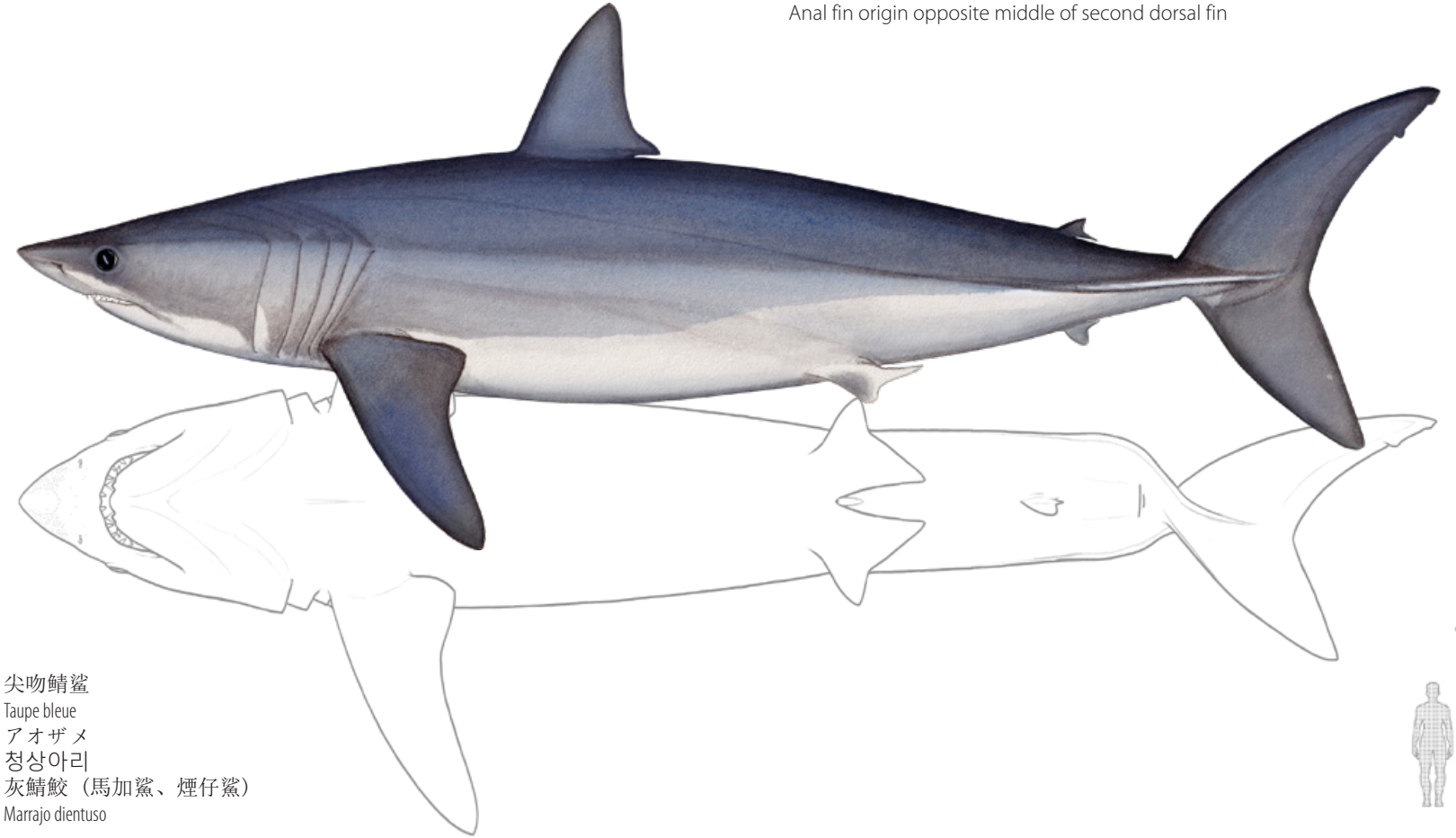
Lamnidae: Mackerel sharks

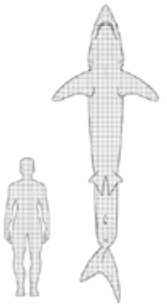
# *Isurus oxyrinchus*

## Shortfin mako shark

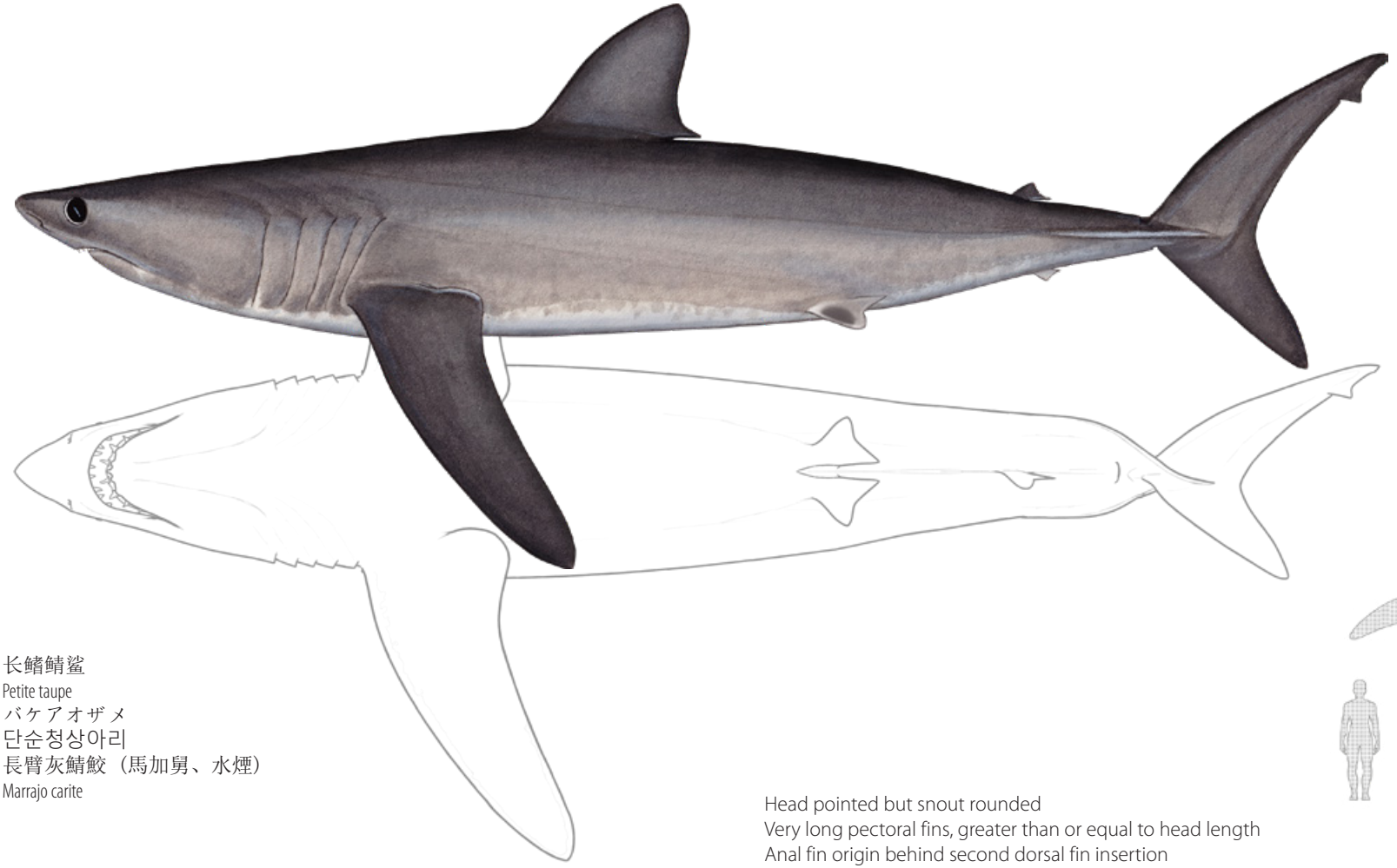


Head and snout pointed
Brilliant blue above and silvery sides
Pectoral fins shorter than head length
Anal fin origin opposite middle of second dorsal fin

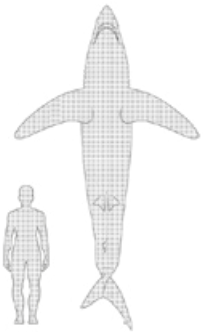




Cantonese: 尖吻鮭鯊
French: Taupe bleue
Japanese: アオザメ
Korean: 청상아리
Mandarin: 灰鮭鮫（馬加鯊、煙仔鯊）
Spanish: Marrajo dientuso



Cantonese: 长鳍鲭鲨
French: Petite taupe
Japanese: バケアオザメ
Korean: 단순청상아리
Mandarin: 長臂灰鯖鮫（馬加舅、水煙）
Spanish: Marrajo carite



Head pointed but snout rounded
Very long pectoral fins, greater than or equal to head length
Anal fin origin behind second dorsal fin insertion



Identification keys 1 2 3 6 10 13 14 15 16 17 18

LMA

# *Isurus paucus*

Longfin mako shark

Lamnidae: Mackerel sharks

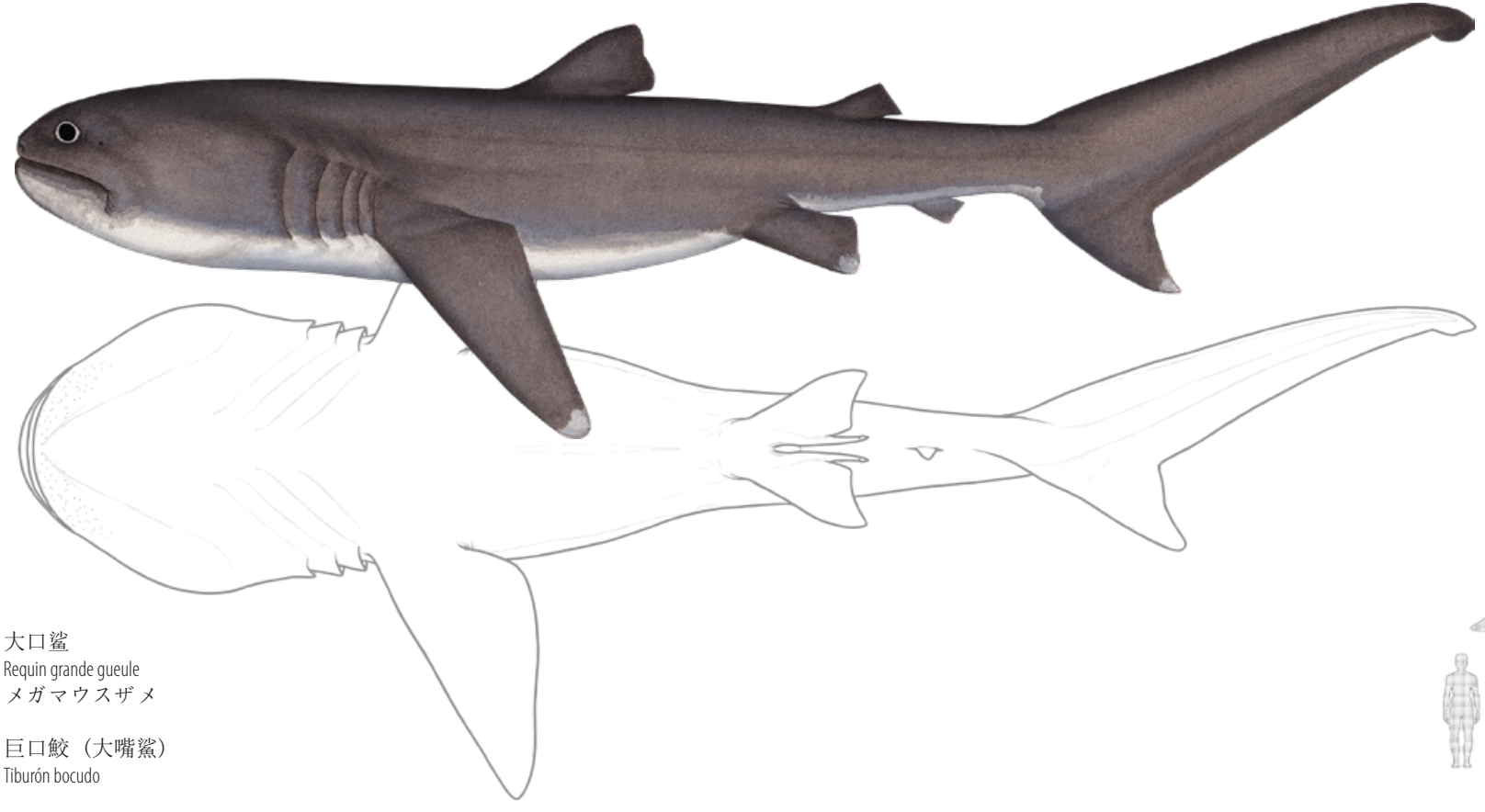
# *Megachasma pelagios*

## Megamouth shark

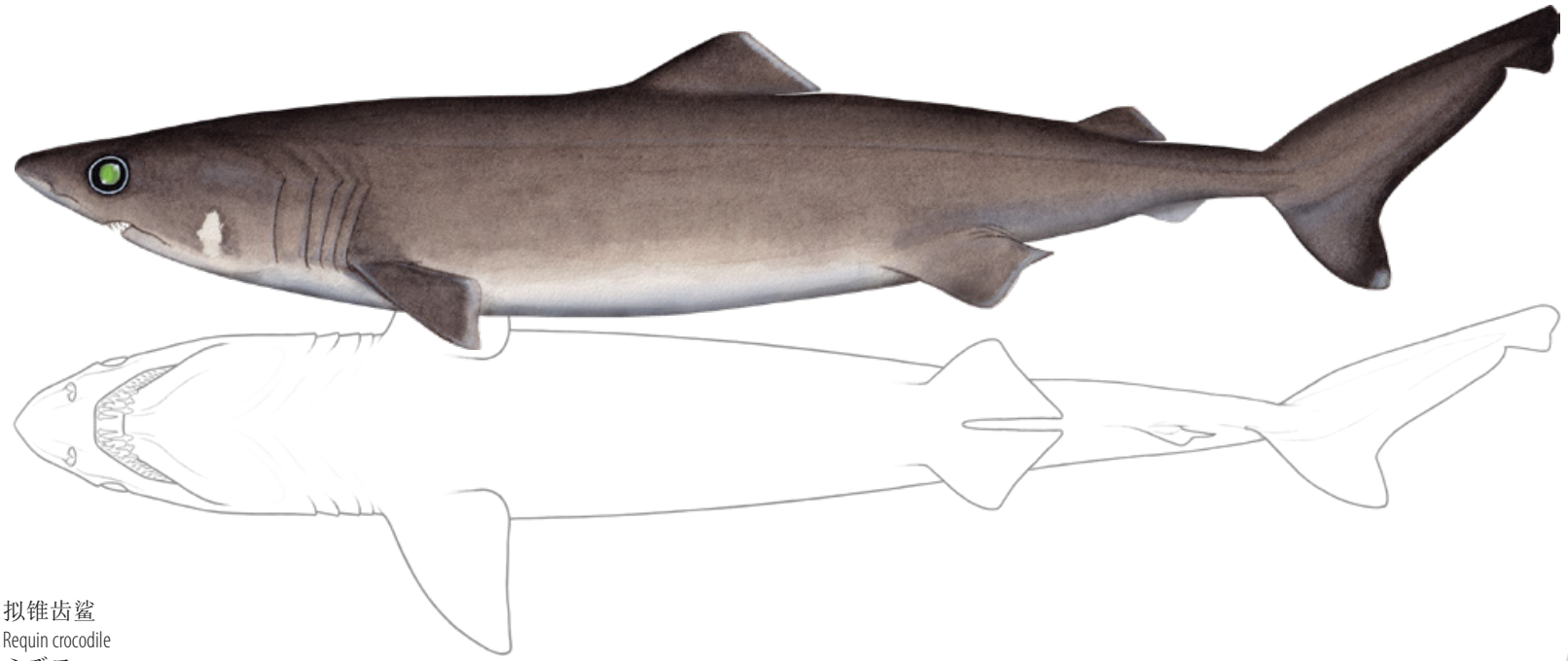


Identification keys 1 2 3 6 10 13 14 19

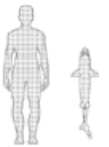
Large soft head with short, broadly rounded snout
Mouth extending from snout tip to behind eye



Cantonese: 大口鯊
French: Requin grande gueule
Japanese: メガマウスザメ
Korean:
Mandarin: 巨口鮫（大嘴鯊）
Spanish: Tiburón bocudo



Cantonese: 拟锥齿鲨
French: Requin crocodile
Japanese: ミズワニ
Korean: 강남상어
Mandarin: 蒲原氏擬錐齒鮫（貓公、鱷鮫）
Spanish: Tiburón cocodrilo



Eyes very large
Long gill slits extending onto dorsal surface of head
Prominent slender teeth and protrusible jaw



# *Pseudocarcharias kamoharai*

## Crocodile shark

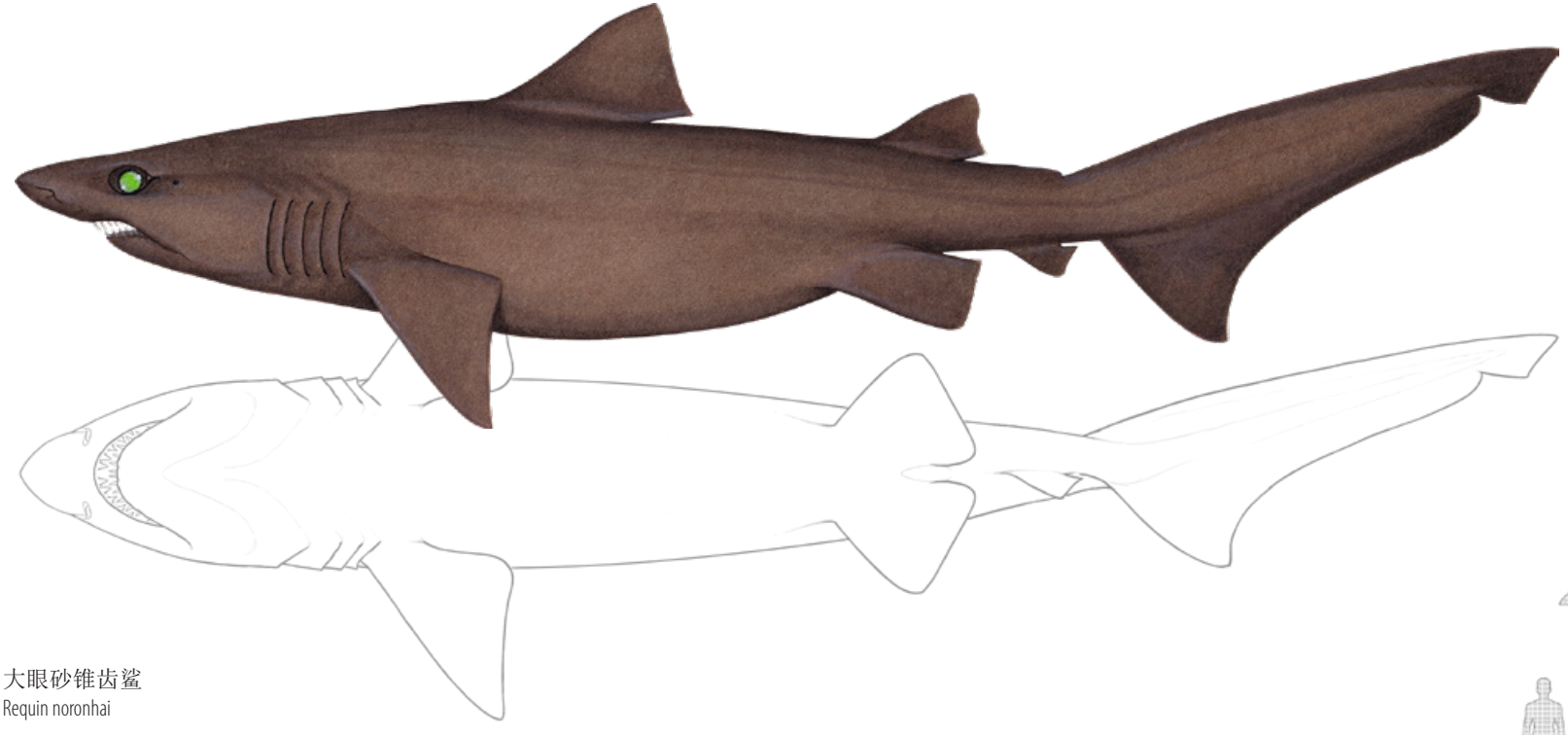
Pseudocarchariidae: Crocodile sharks

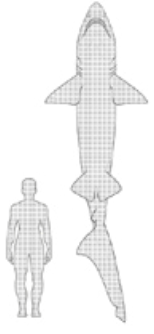
# *Odontaspis noronhai*

## Bigeye sandtiger shark

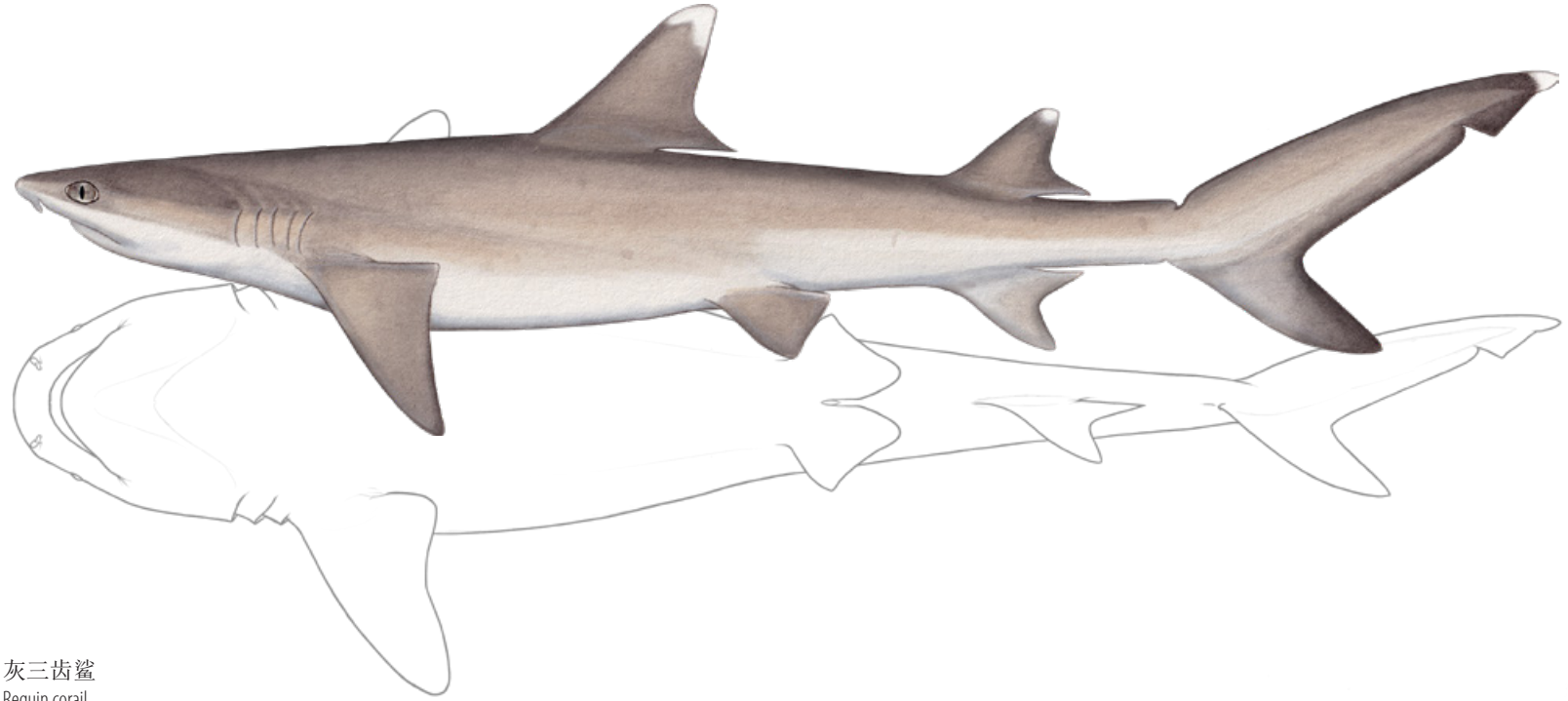


Large eyes, no nictitating membrane
First dorsal close to pectoral fin
Second dorsal fin origin over pelvic fin

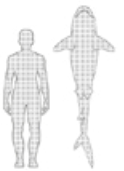




Cantonese: 大眼砂锥齿鲨
French: Requin noronhai
Japanese:
Korean:
Mandarin: 大眼砂錐齒鯊（漾牙）
Spanish: Solrayo ojigrande



Cantonese: 灰三齿鲨
French: Requin corail
Japanese: ネムリブカ
Korean:
Mandarin: 黧鮫（白翅尾仔）
Spanish: Tiburón coralero ñato



Dorsal fins and upper caudal fin with white tips
Height of second dorsal fin greater than or equal to half of first dorsal fin



# *Triaenodon obesus*

White tip reef shark

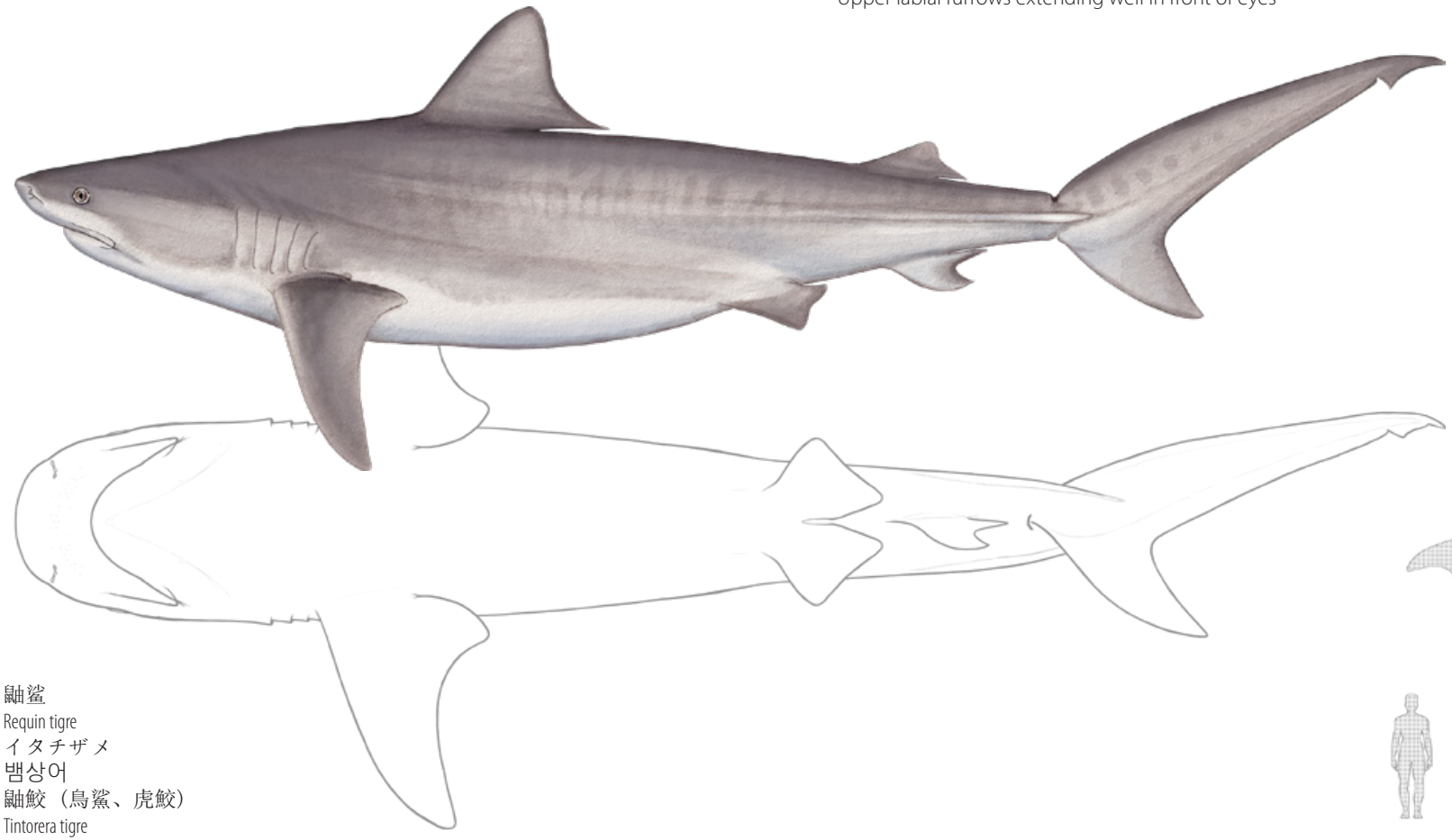
Carcharhinidae: Requiem sharks

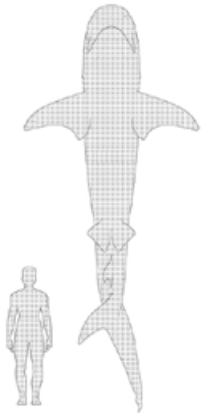
# *Galeocerdo cuvier*

## Tiger shark

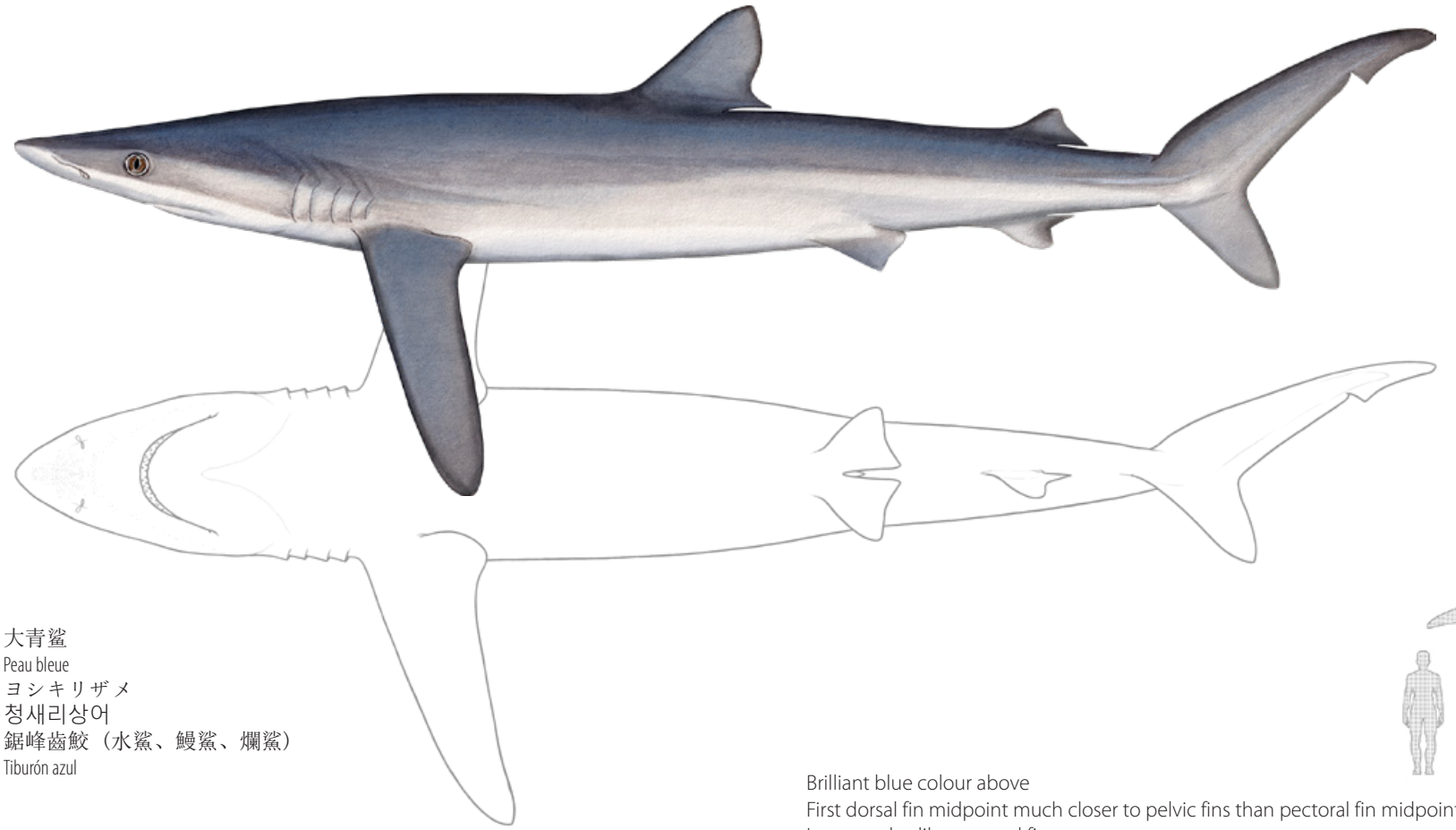


Tiger-stripe markings, faded in adults
Large broad head; short, broad, rounded snout
Upper labial furrows extending well in front of eyes

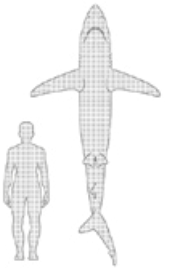




Cantonese: 鼬鯊
French: Requin tigre
Japanese: イタチザメ
Korean: 뱀상어
Mandarin: 鼬鮫（鳥鯊、虎鮫）
Spanish: Tintorera tigre



Cantonese: 大青鯊
French: Peau bleue
Japanese: ヨシキリザメ
Korean: 청새리상어
Mandarin: 鋸峰齒鮫（水鯊、鰻鯊、爛鯊）
Spanish: Tiburón azul



Brilliant blue colour above
First dorsal fin midpoint much closer to pelvic fins than pectoral fin midpoint
Long scythe-like pectoral fins



Identification keys 1 2 3 6 10 13 14 19 20 21 22 23 24

BSH

# *Prionace glauca*

Blue shark

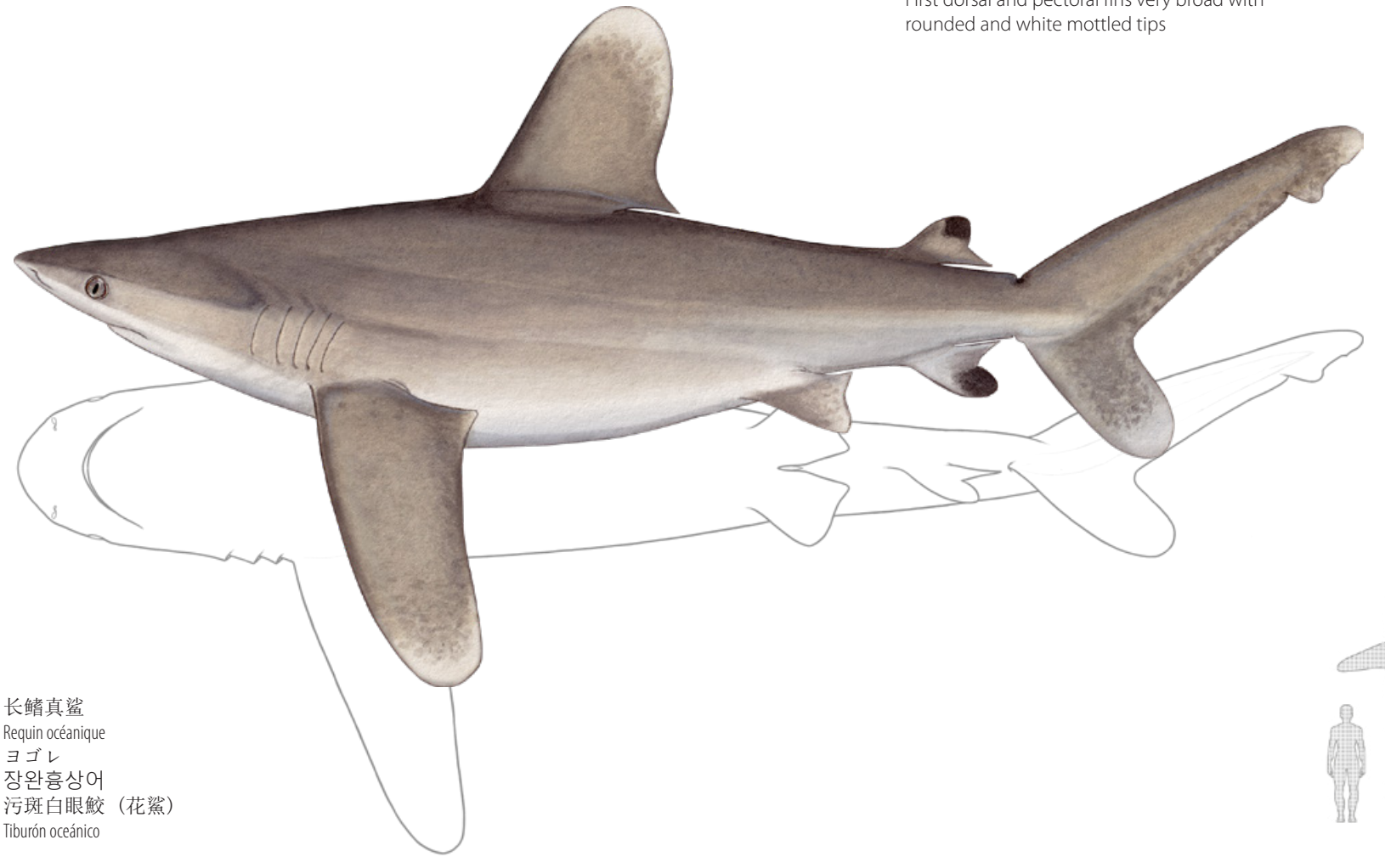
Carcharhinidae: Requiem sharks

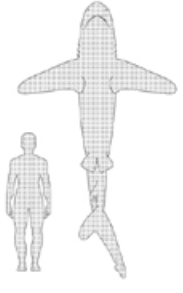
# *Carcharhinus longimanus*

## Oceanic whitetip shark

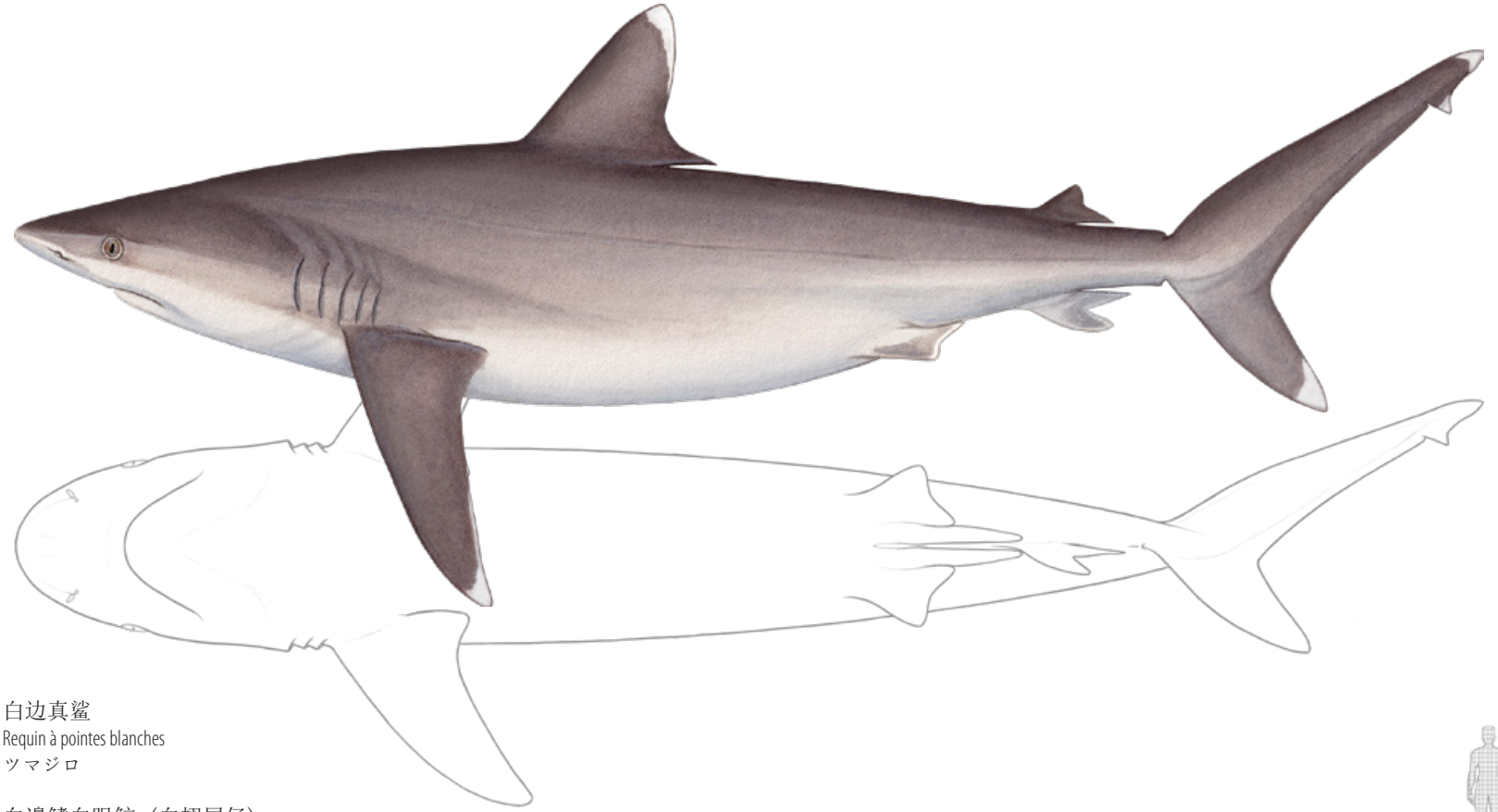


First dorsal and pectoral fins very broad with rounded and white mottled tips

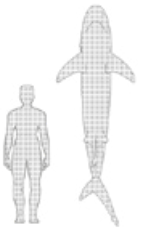




Cantonese: 长鳍真鲨
French: Requin océanique
Japanese: ヨゴレ
Korean: 장완흉상어
Mandarin: 污斑白眼鲛（花鲨）
Spanish: Tiburón oceánico



Cantonese: 白边真鲨
French: Requin à pointes blanches
Japanese: ツマジロ
Korean:
Mandarin: 白邊鰭白眼鮫（白翅尾仔）
Spanish: Tiburón puntas blancas



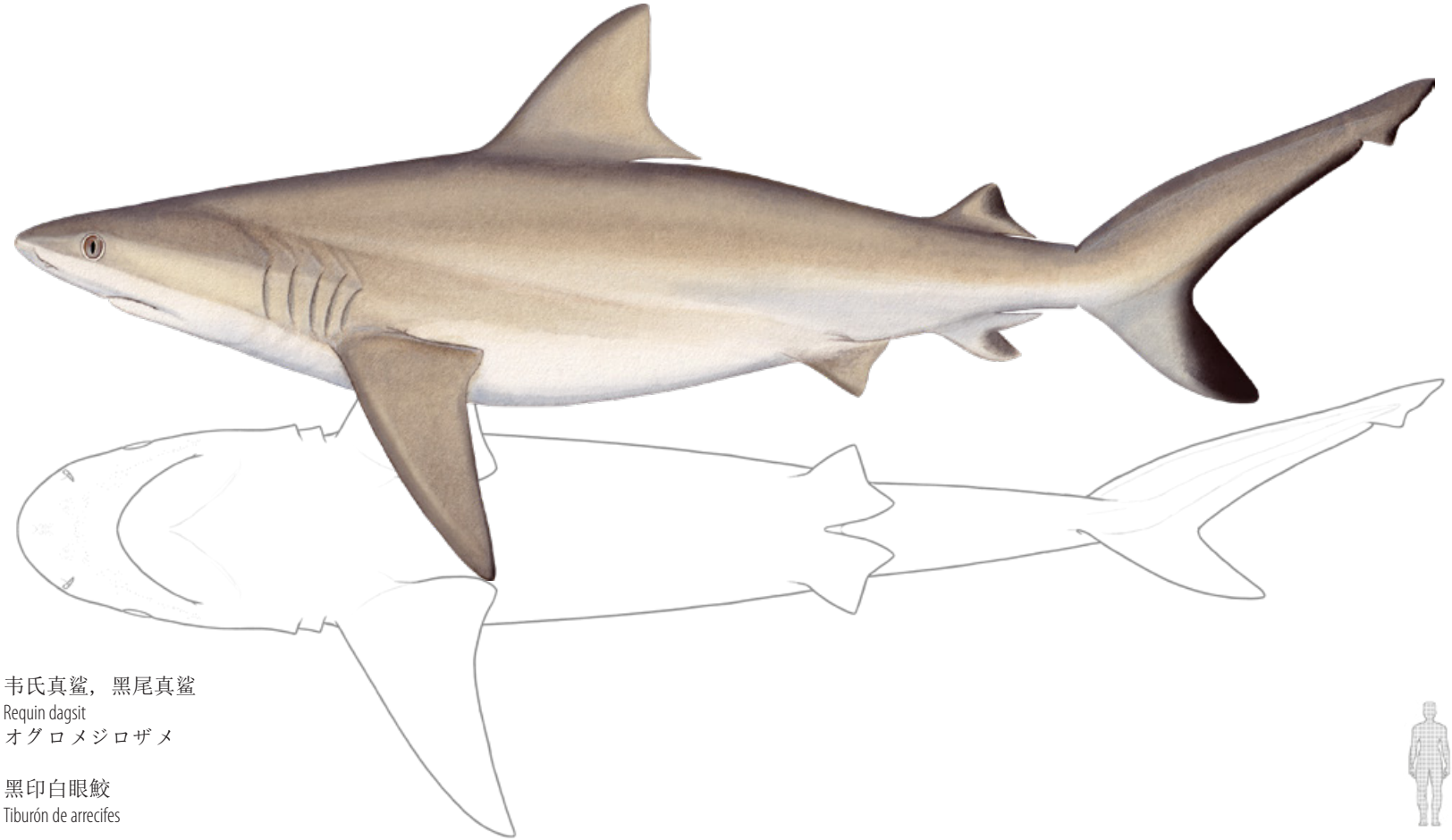
First dorsal fin, pectoral, pelvic and caudal fins with conspicuous white tips
Interdorsal ridge present



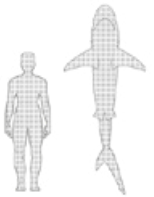
# *Carcharhinus albimarginatus*

Silvertip shark

Carcharhinidae: Requiem sharks



Cantonese: 韦氏真鲨，黑尾真鲨
French: Requin dagsit
Japanese: オグロメジロザメ
Korean:
Mandarin: 黑印白眼鲛
Spanish: Tiburón de arrecifes



No black tip on first dorsal fin
Caudal fin with prominent posterior black edges



# *Carcharhinus amblyrhynchos*

Grey reef shark

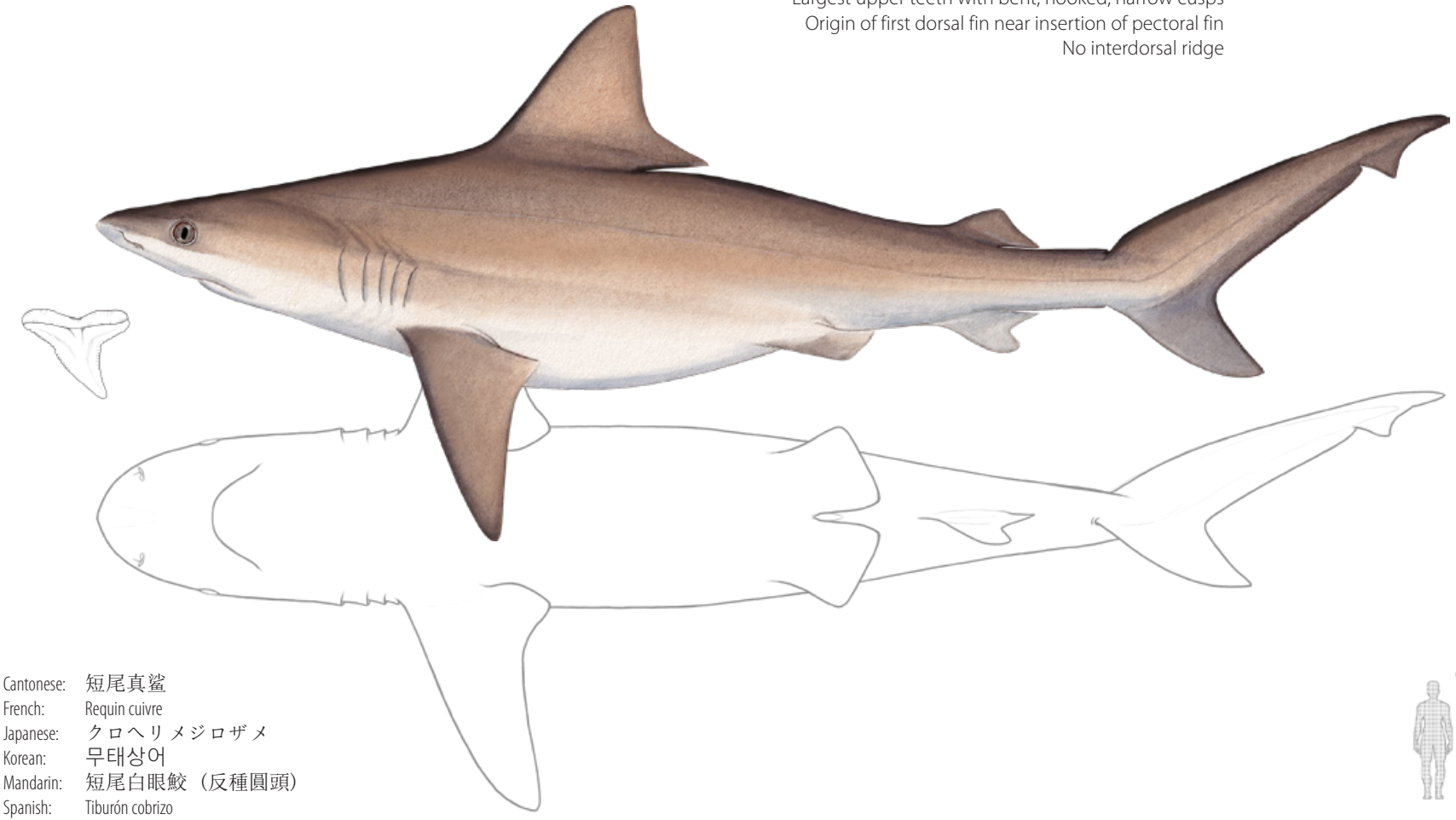
Carcharhinidae: Requiem sharks

# *Carcharhinus brachyurus*

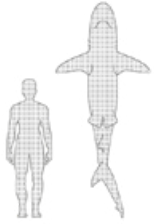
## Bronze whaler

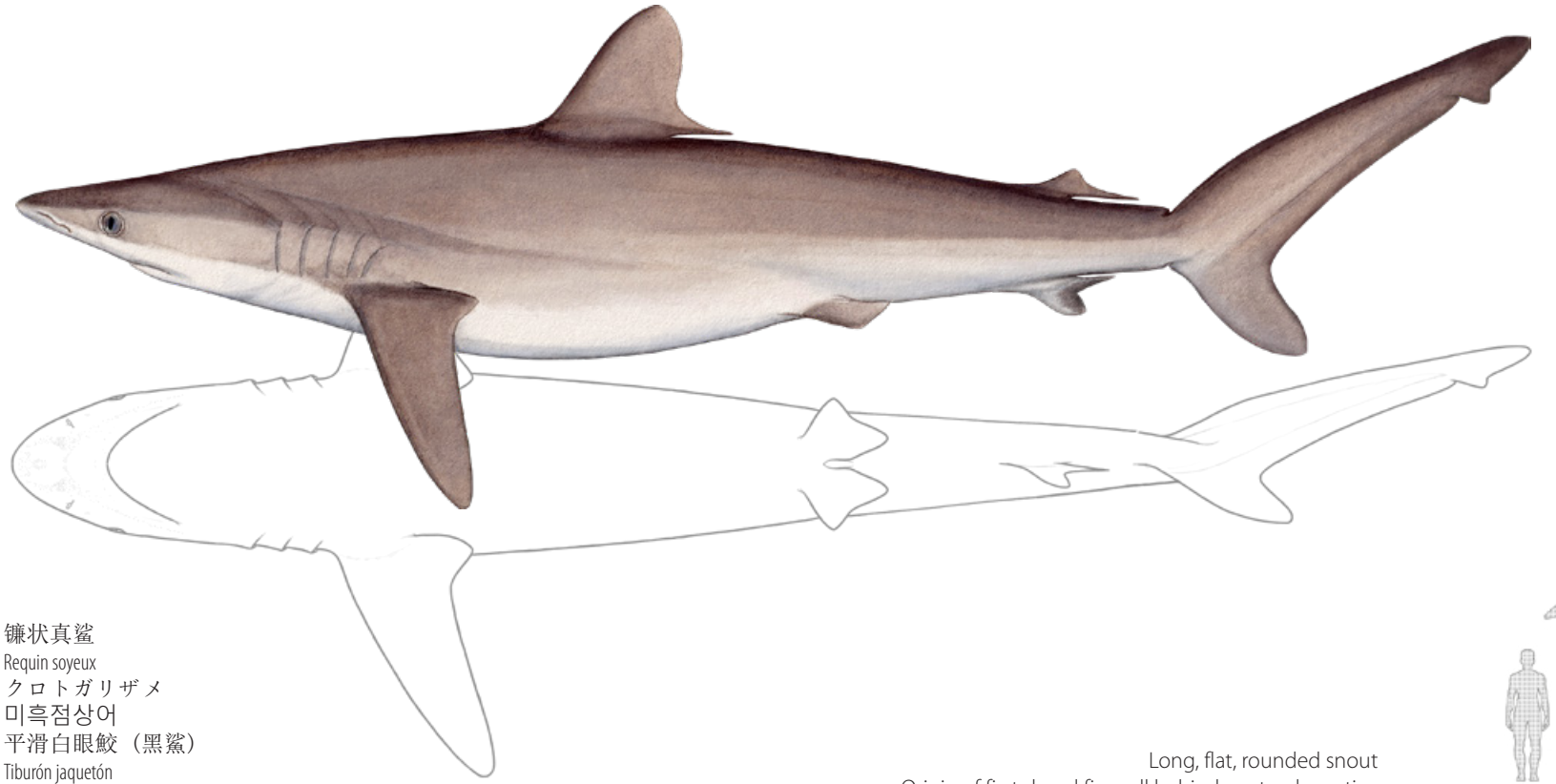


Bluntly pointed broad snout
Largest upper teeth with bent, hooked, narrow cusps
Origin of first dorsal fin near insertion of pectoral fin
No interdorsal ridge

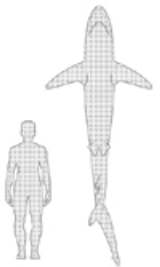


Cantonese: 短尾真鯊
French: Requin cuivre
Japanese: クロヘリメジロザメ
Korean: 무태상어
Mandarin: 短尾白眼鮫（反種圓頭）
Spanish: Tiburón cobrizo





Cantonese: 鐮状真鯊
French: Requin soyeux
Japanese: クロトガリザメ
Korean: 미흑점상어
Mandarin: 平滑白眼鮫（黑鯊）
Spanish: Tiburón jaquetón



Long, flat, rounded snout
Origin of first dorsal fin well behind pectoral rear tips
Narrow interdorsal ridge
Second dorsal free rear tip very long



# *Carcharhinus falciformis*

Silky shark

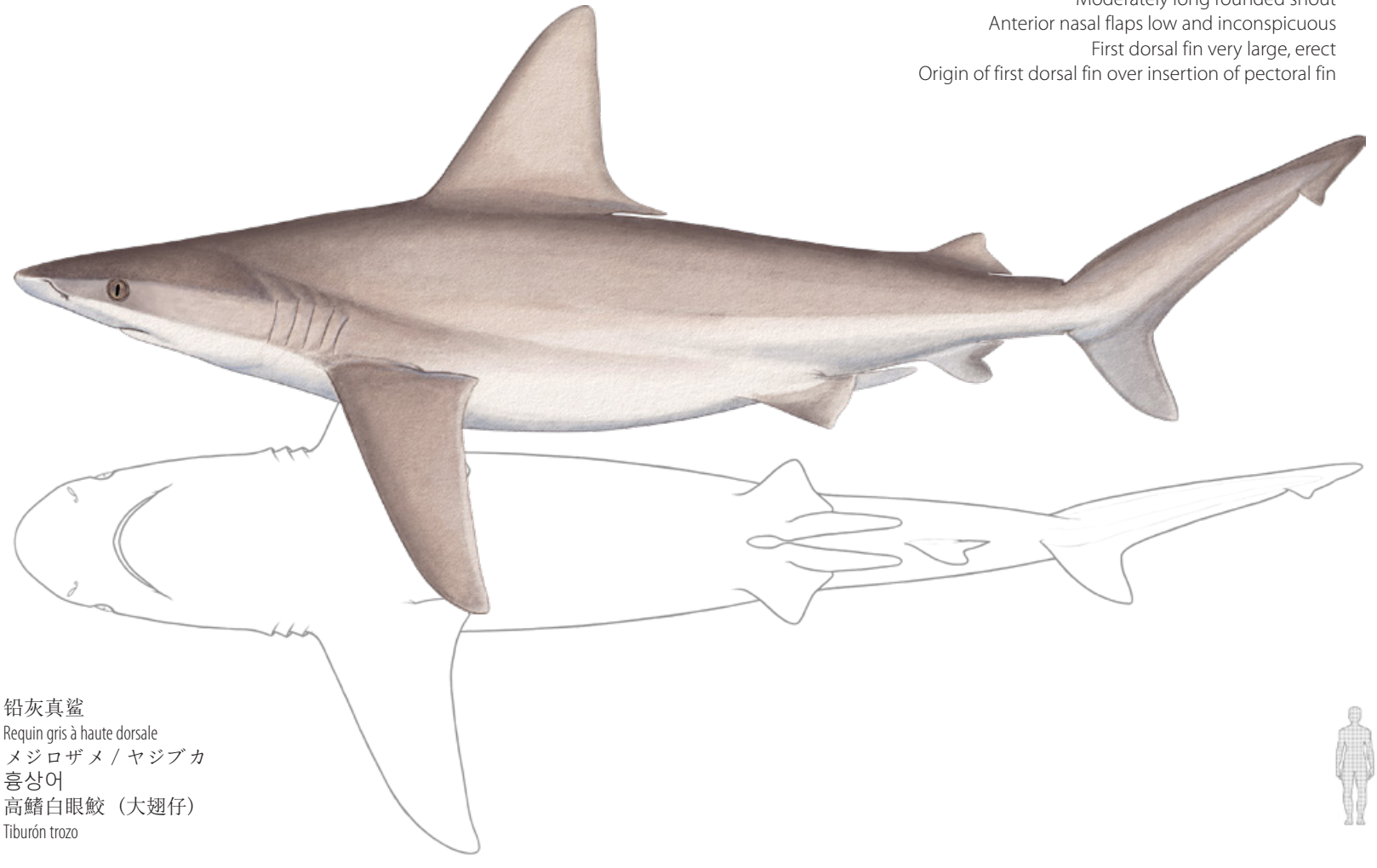
Carcharhinidae: Requiem sharks

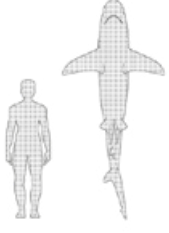
# *Carcharhinus plumbeus*

Sandbar shark

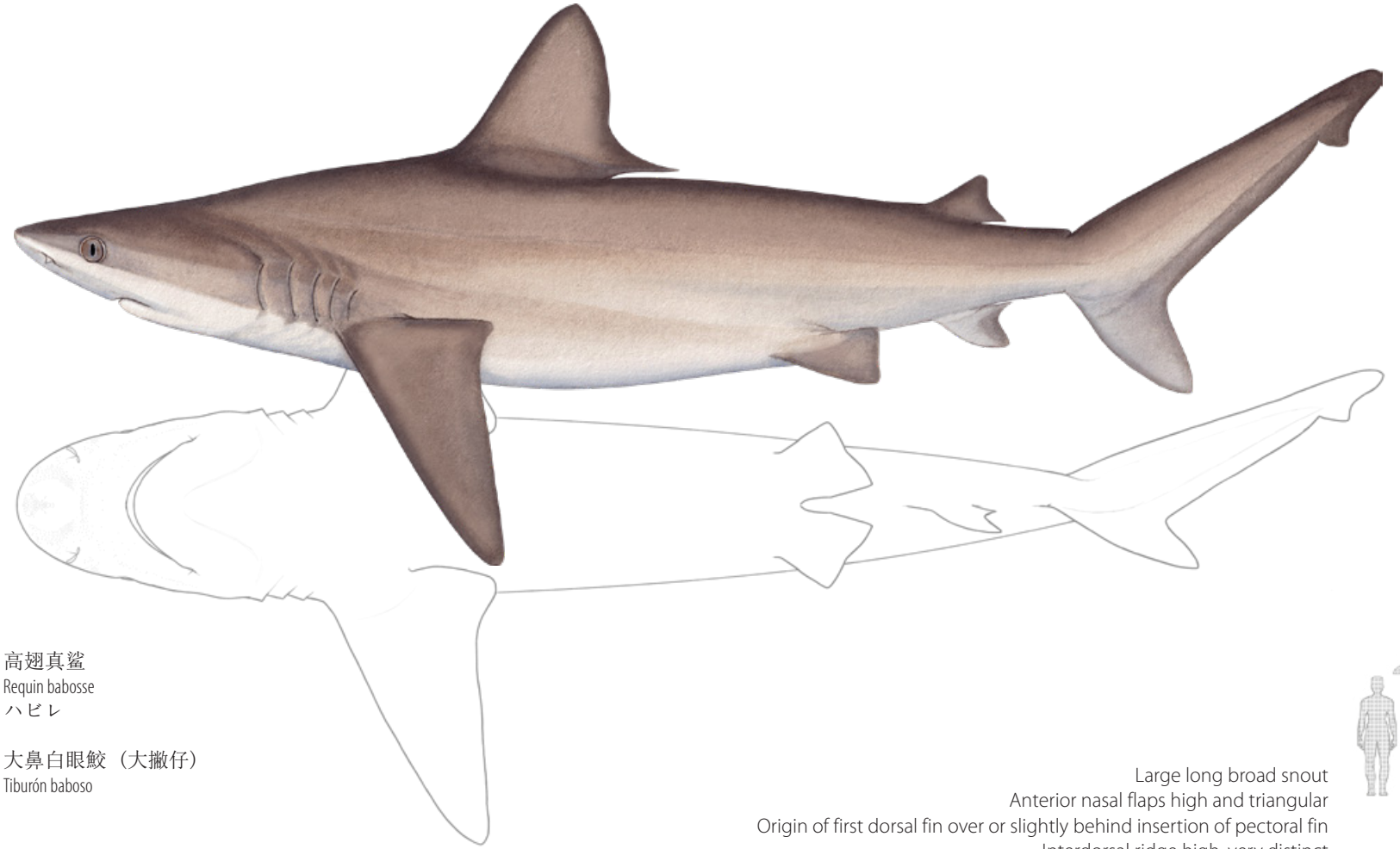


Moderately long rounded snout
Anterior nasal flaps low and inconspicuous
First dorsal fin very large, erect
Origin of first dorsal fin over insertion of pectoral fin

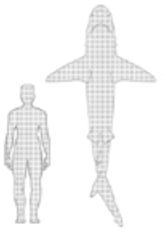




Cantonese: 铅灰真鲨
French: Requin gris à haute dorsale
Japanese: メジロザメ / ヤジブカ
Korean: 흉상어
Mandarin: 高鳍白眼鮫（大翅仔）
Spanish: Tiburón trozo



Cantonese: 高翅真鯊
French: Requin babosse
Japanese: ハビレ
Korean:
Mandarin: 大鼻白眼鮫（大撇仔）
Spanish: Tiburón baboso



Large long broad snout
Anterior nasal flaps high and triangular
Origin of first dorsal fin over or slightly behind insertion of pectoral fin
Interdorsal ridge high, very distinct



# *Carcharhinus altimus*

Bignose shark

Carcharhinidae: Requiem sharks

# *Carcharhinus galapagensis*

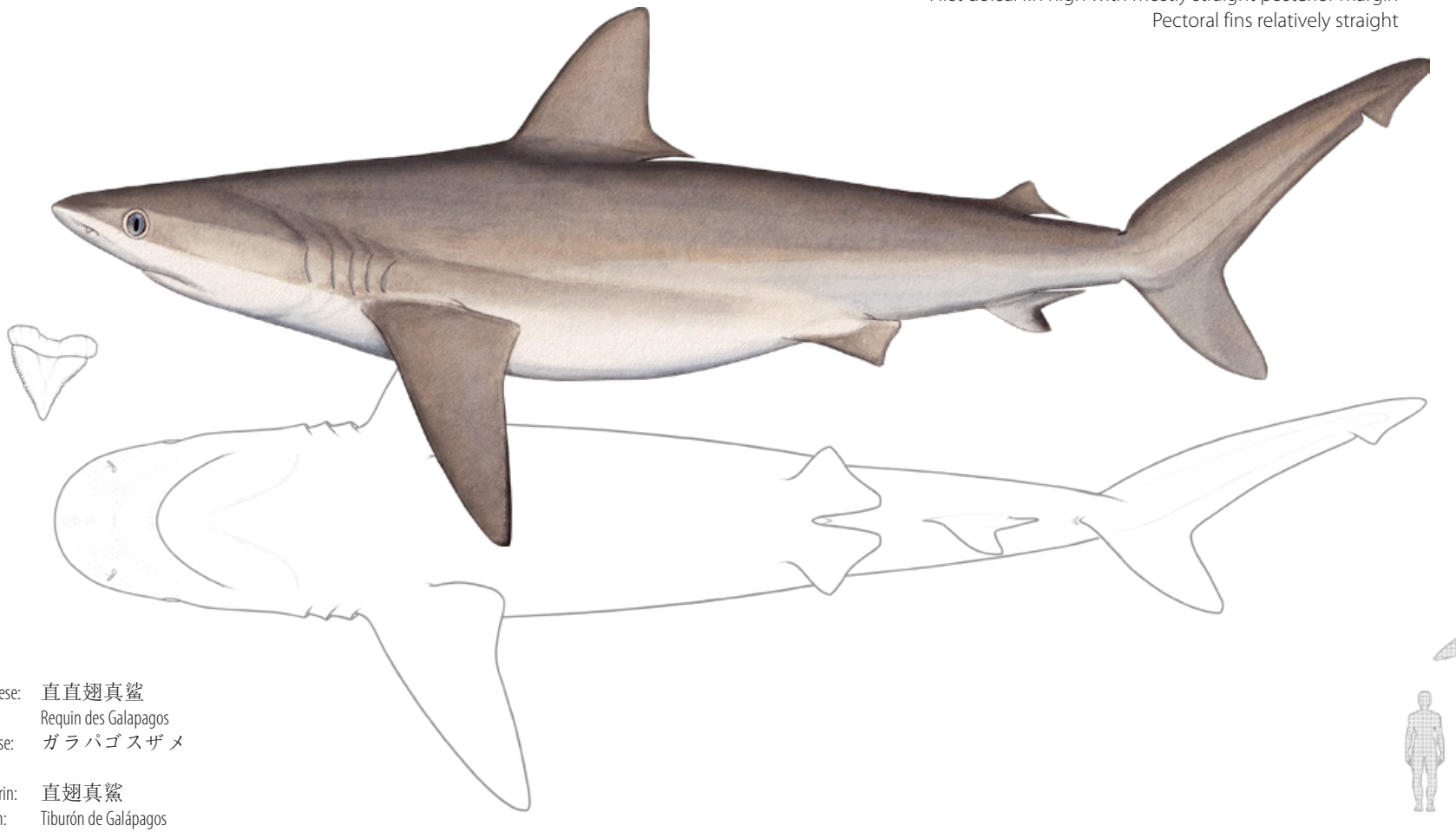
## Galapagos shark

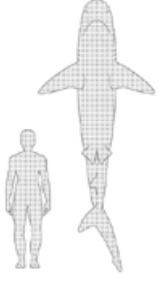
Carcharhinidae: Requiem sharks

CCG

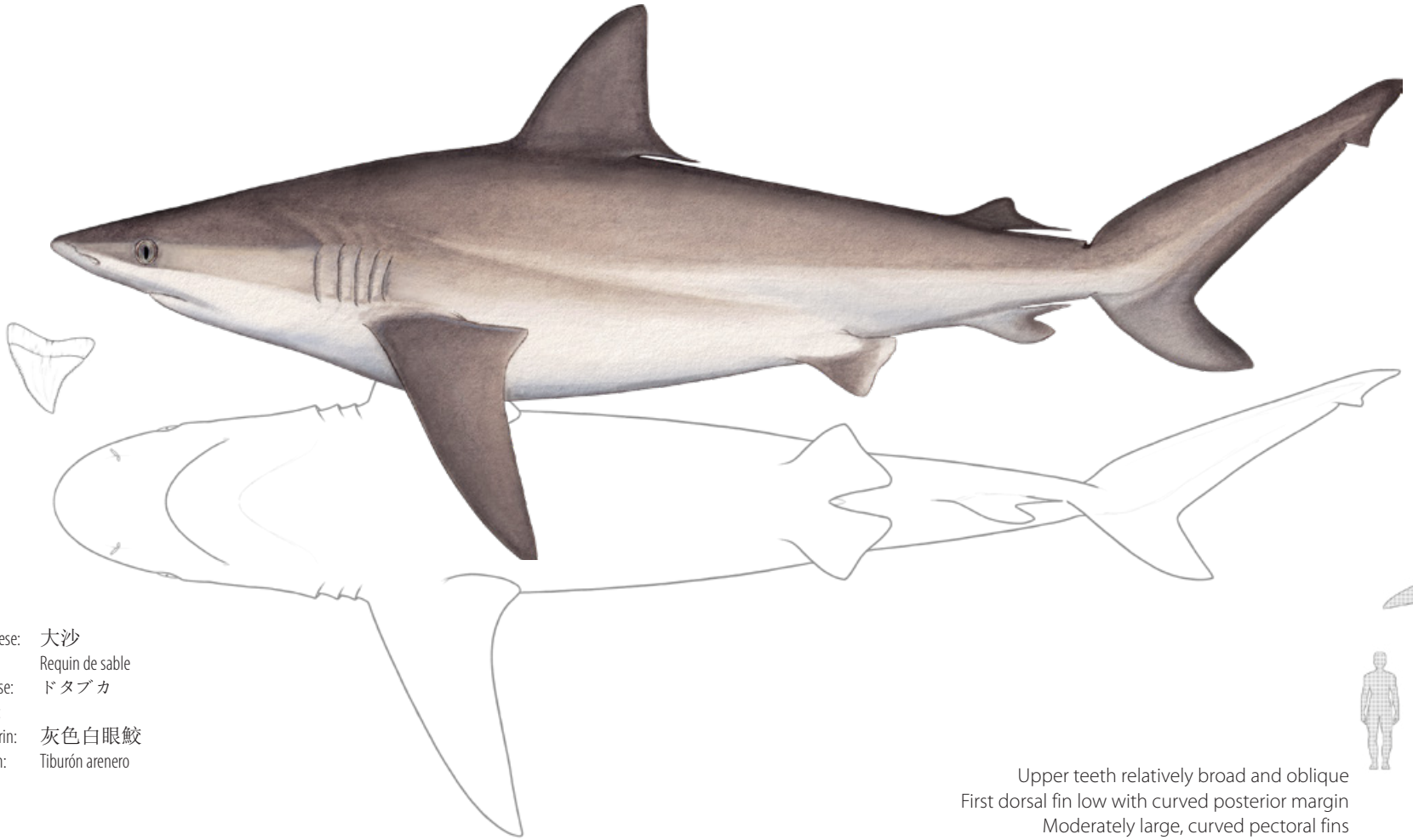


Upper teeth relatively narrow
First dorsal fin high with mostly straight posterior margin
Pectoral fins relatively straight

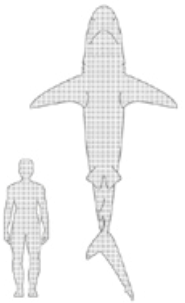




Cantonese: 直直翅真鯊
French: Requin des Galapagos
Japanese: ガラパゴスザメ
Korean:
Mandarin: 直翅真鯊
Spanish: Tiburón de Galápagos



Cantonese: 大沙
French: Requin de sable
Japanese: ドタブカ
Korean:
Mandarin: 灰色白眼鲛
Spanish: Tiburón arenero



Upper teeth relatively broad and oblique
First dorsal fin low with curved posterior margin
Moderately large, curved pectoral fins



Identification keys 1 2 3 6 10 13 14 19 20 21 22 23 24 25 26 27 28 29 30 31 33

DUS

*Carcharhinus obscurus*

Dusky shark

Carcharhinidae: Requiem sharks

# *Carcharhinus leucas*

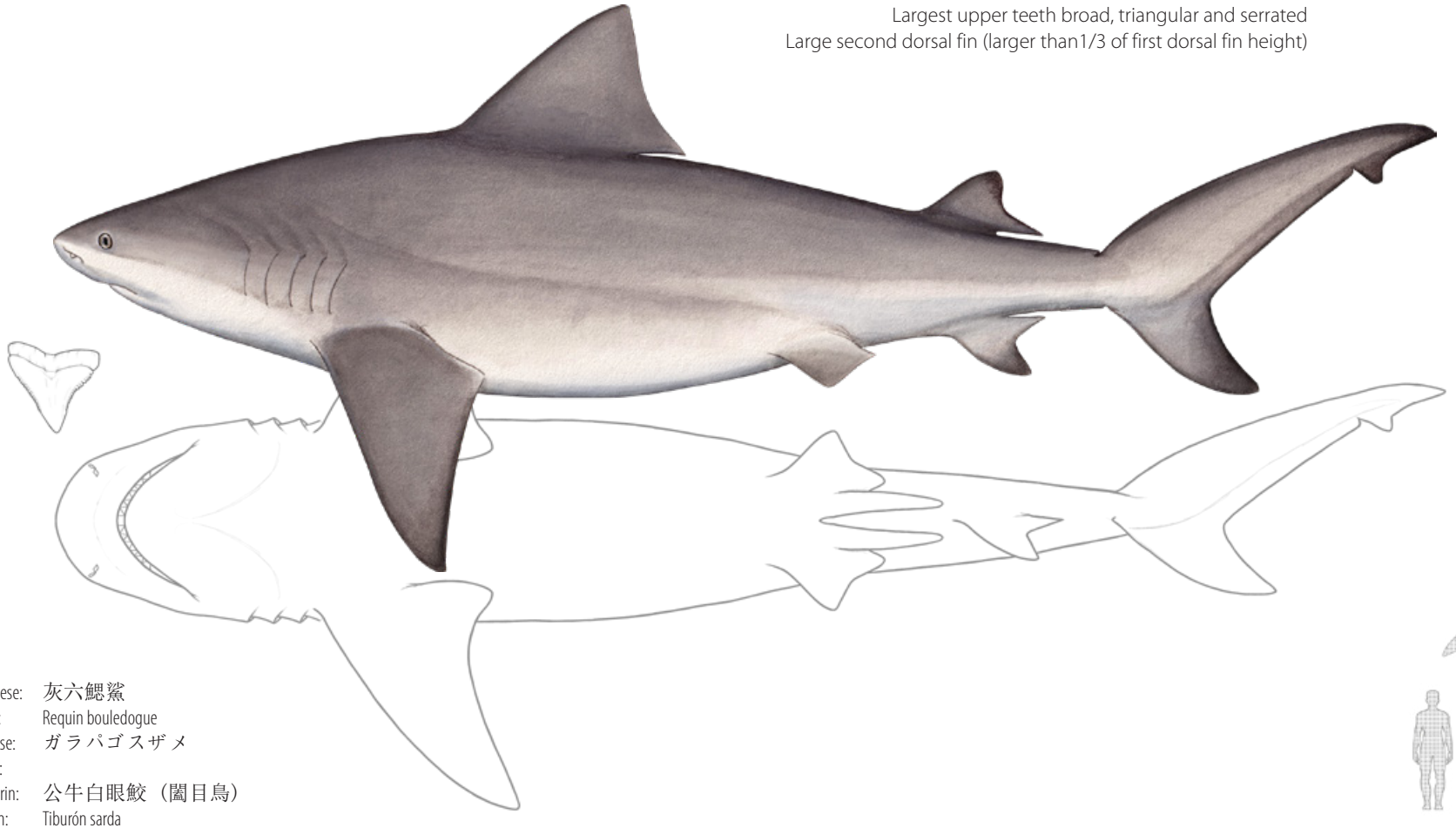
Bull shark

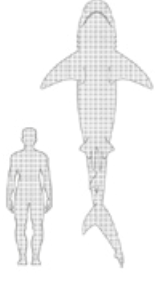
Carcharhinidae: Requiem sharks

CCE

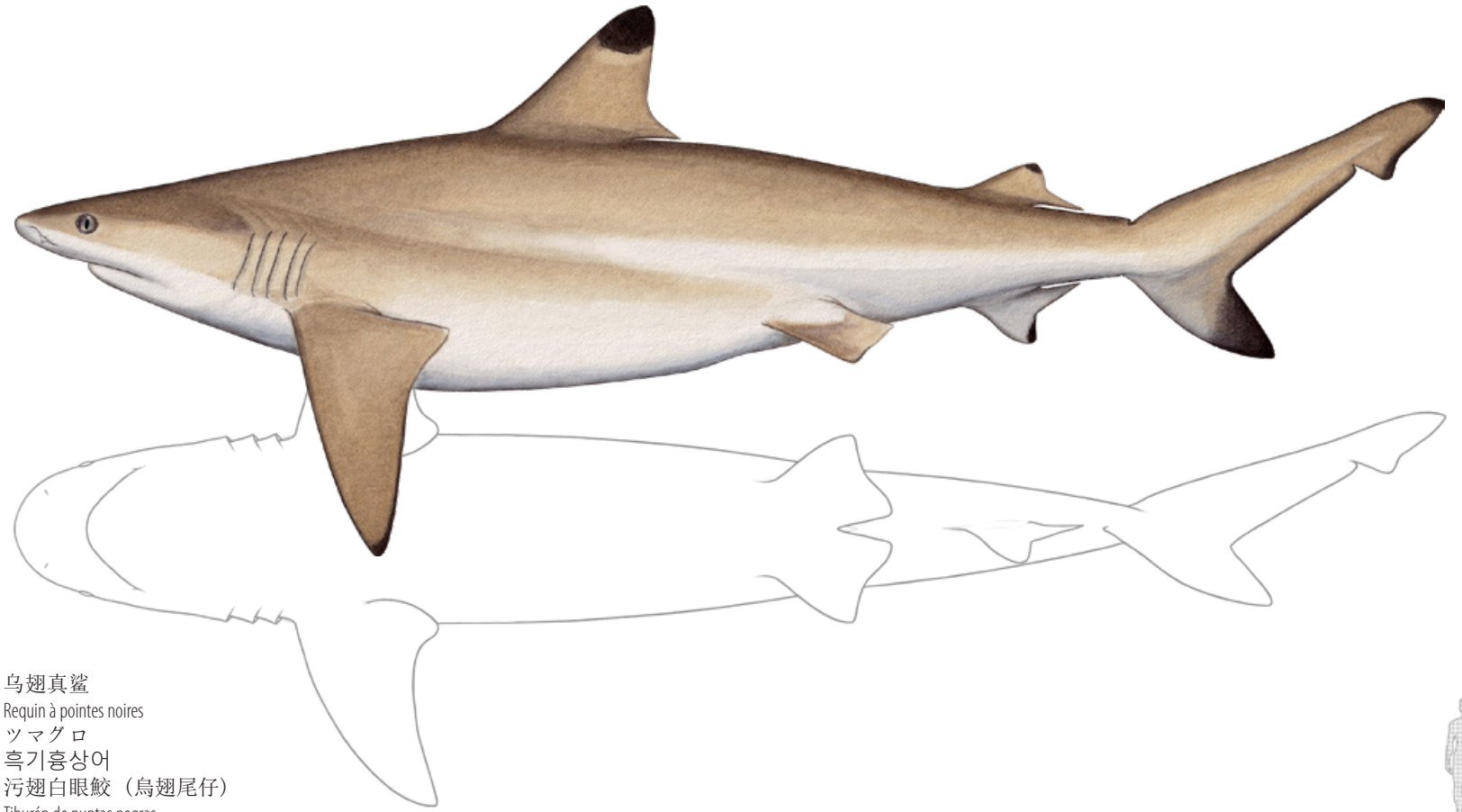


Body very stocky
Short blunt snout
Largest upper teeth broad, triangular and serrated
Large second dorsal fin (larger than1/3 of first dorsal fin height)

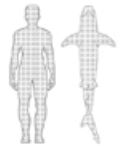




Cantonese: 灰六鰓鯊
French: Requin bouledogue
Japanese: ガラパゴスザメ
Korean:
Mandarin: 公牛白眼鮫（鬣目鳥）
Spanish: Tiburón sarda



Cantonese: 乌翅真鲨
French: Requin à pointes noires
Japanese: ツマグロ
Korean: 흑기흉상어
Mandarin: 污翅白眼鲛（烏翅尾仔）
Spanish: Tiburón de puntas negras



Body yellow-brown to brown-grey with pale flank stripe
First dorsal with distinct black tip highlighted by white
Caudal fin with black tip on lower lobe that joins black posterior edge



# *Carcharhinus melanopterus*

Blacktip reef shark

Carcharhinidae: Requiem sharks

# *Carcharhinus brevipinna*

Spinner shark

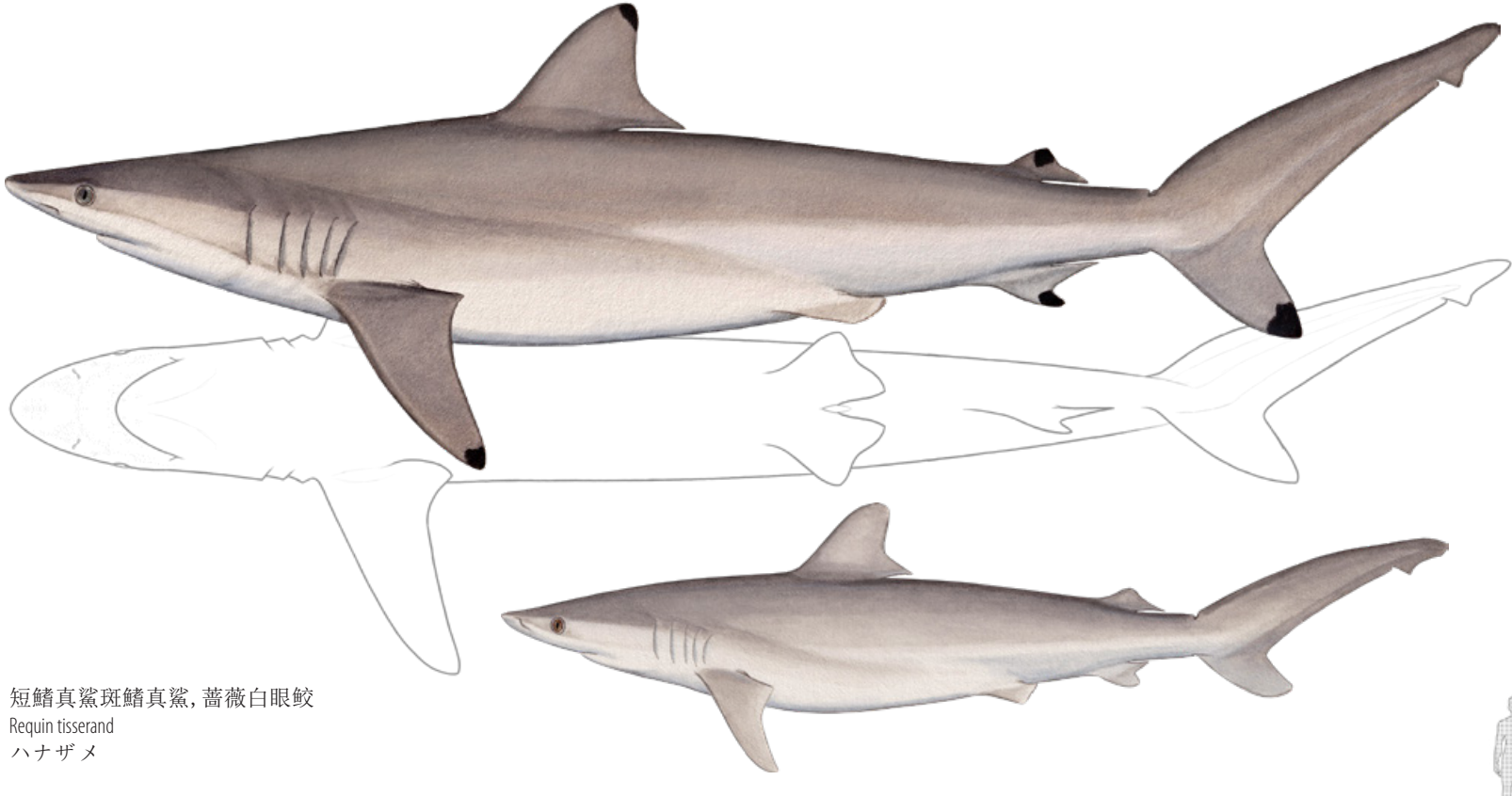
Carcharhinidae: Requiem sharks

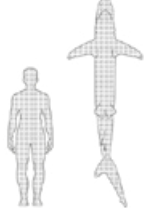


Identification keys 1 2 3 6 10 13 14 19 20 21 22 23 24 25 26 27 28 29 34 35 36

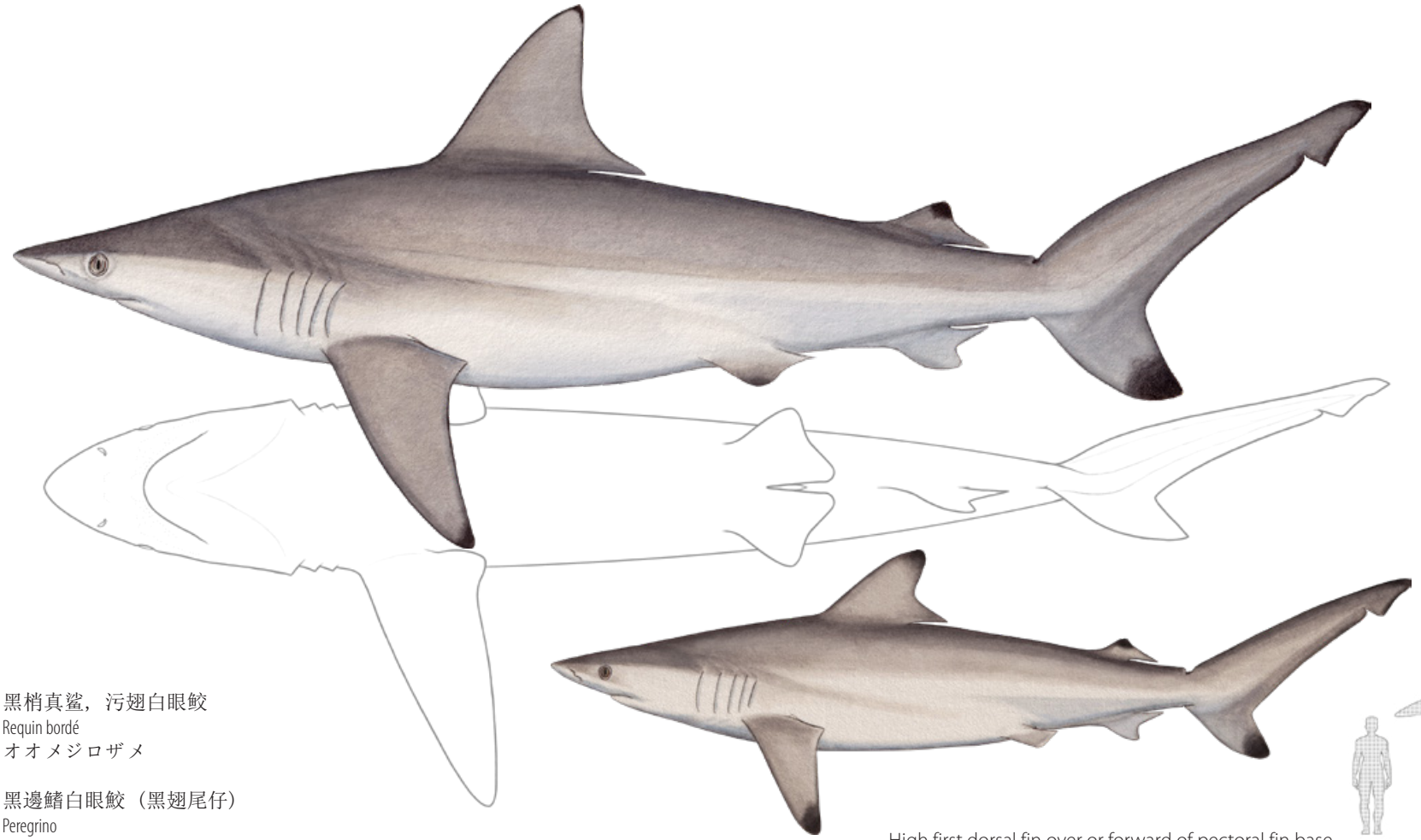
CCB

Slender body and long narrow pointed snout
First dorsal fin relatively low, origin over or just behind pectoral free rear tips
Black tips on all fins except pelvic fins (NOT in juveniles)





Cantonese: 短鰭真鯊斑鰭真鯊, 薔薇白眼鮫
French: Requin tisserand
Japanese: ハナザメ
Korean:
Mandarin: 直齒真鯊
Spanish: Tiburón aleta negra



Cantonese: 黑梢真鯊，污翅白眼鮫
French: Requin bordé
Japanese: オオメジロザメ
Korean:
Mandarin: 黑邊鰭白眼鮫（黑翅尾仔）
Spanish: Peregrino



High first dorsal fin over or forward of pectoral fin base
Black edges on first dorsal apex and dorsal caudal lobe
Black tips to pectorals, dorsals, pelvics and ventral caudal lobe (ALSO in juveniles)



# *Carcharhinus limbatus*

## Common blacktip shark

Carcharhinidae: Requiem sharks

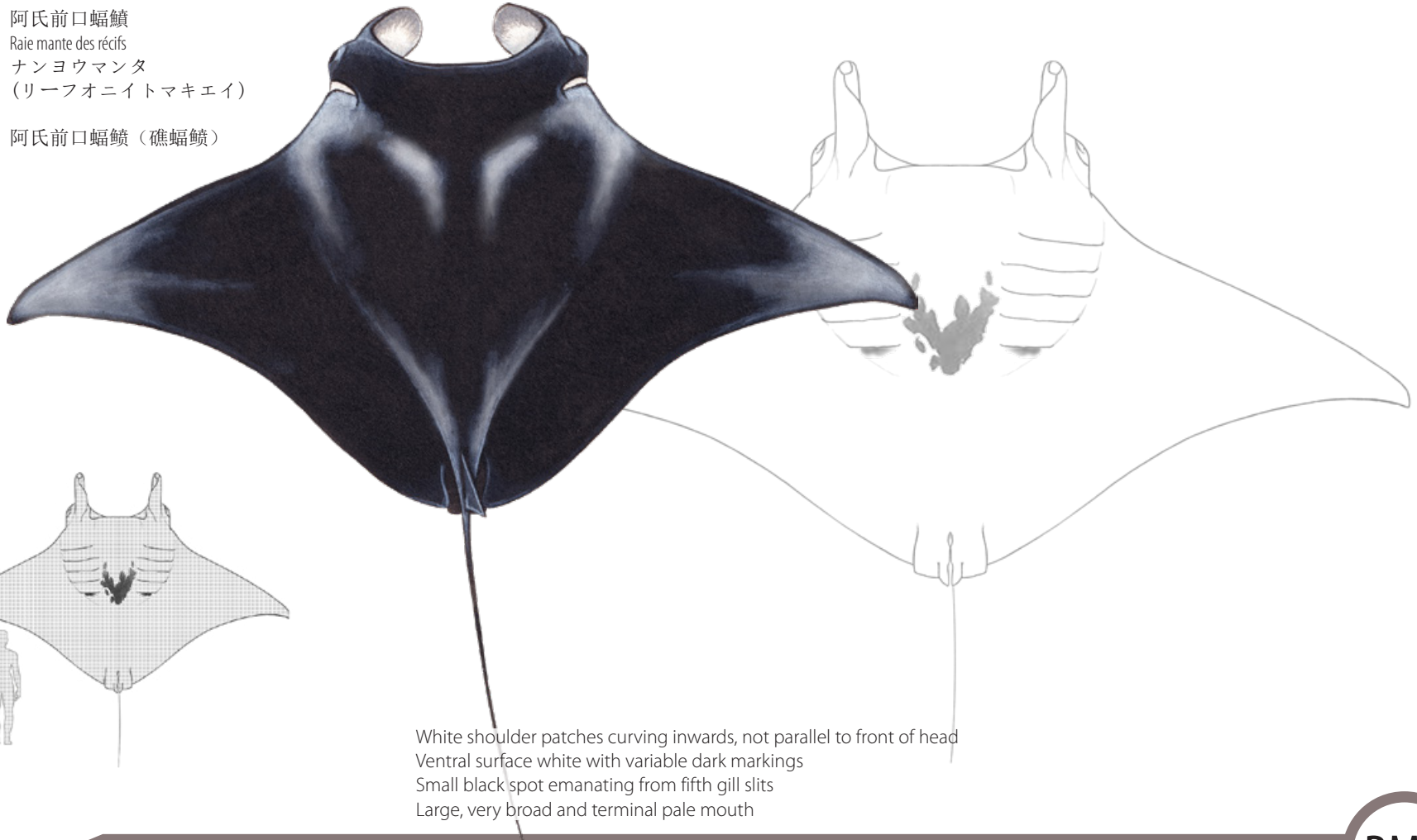
# *Mobula birostris* Giant manta



White shoulder patch anterior margins parallel to front of head
Calcified lump with embedded spine behind dorsal fin
Large black spot emanating from fifth gill slits

Cantonese: 双吻前口蝠鱝
French: Mante géante
Japanese: オニイトマキエイ
Korean:
Mandarin: 雙吻前口蝠鱝
（鬼蝠魟、飛魶仔）
Spanish: Manta gigante

Cantonese: 阿氏前口蝠鱝
French: Raie mante des récifs
Japanese: ナンヨウマンタ
（リーフオニイトマキエイ）
Korean:
Mandarin: 阿氏前口蝠鱝（礁蝠鱝）
Spanish:



White shoulder patches curving inwards, not parallel to front of head
Ventral surface white with variable dark markings
Small black spot emanating from fifth gill slits
Large, very broad and terminal pale mouth



Identification keys 1 37 38 39

# *Mobula alfredi* Reef manta

# *Mobula tarapacana*

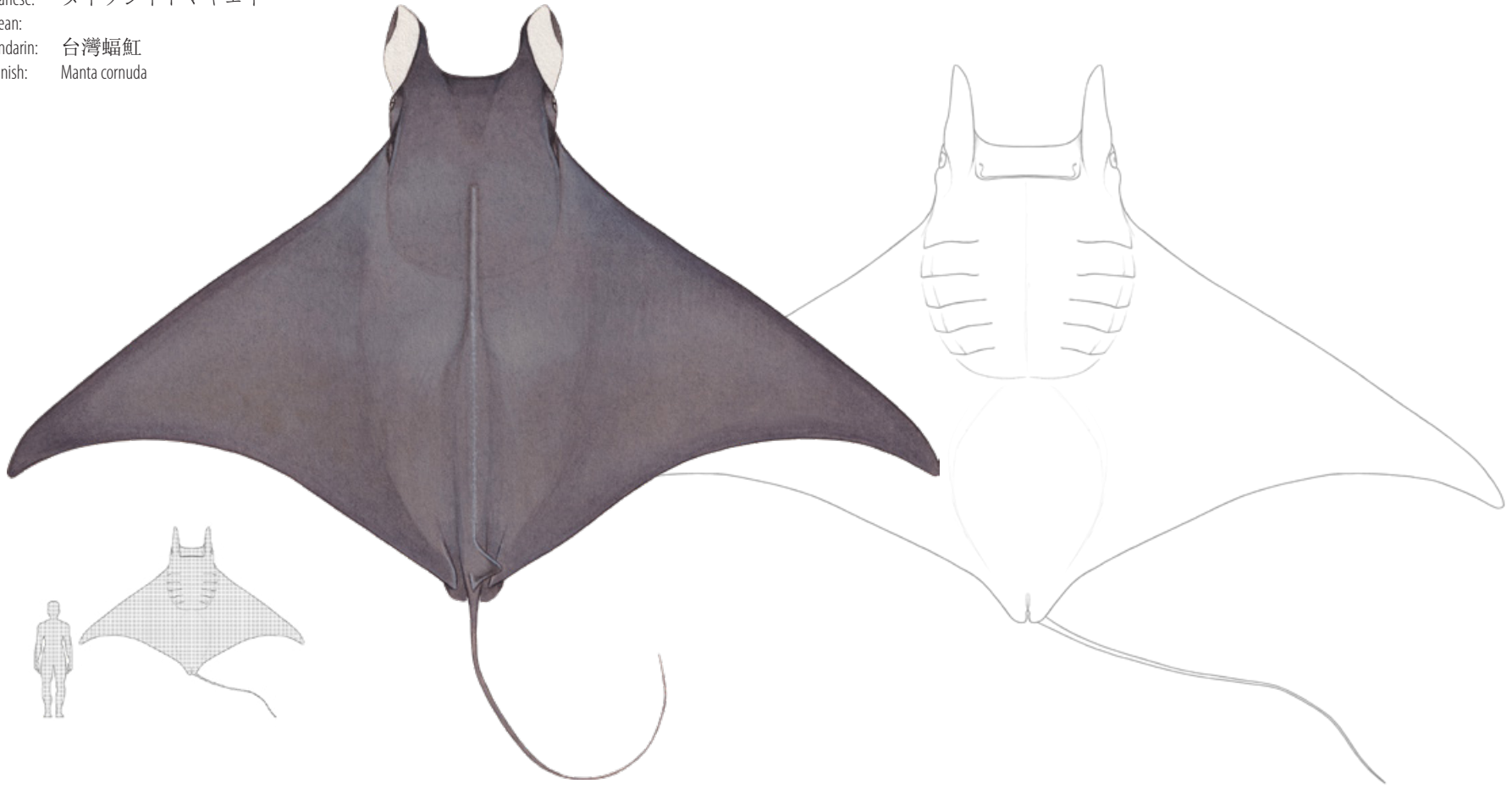
## Chilean devilray



Identification keys **1** **37** **38** **39**

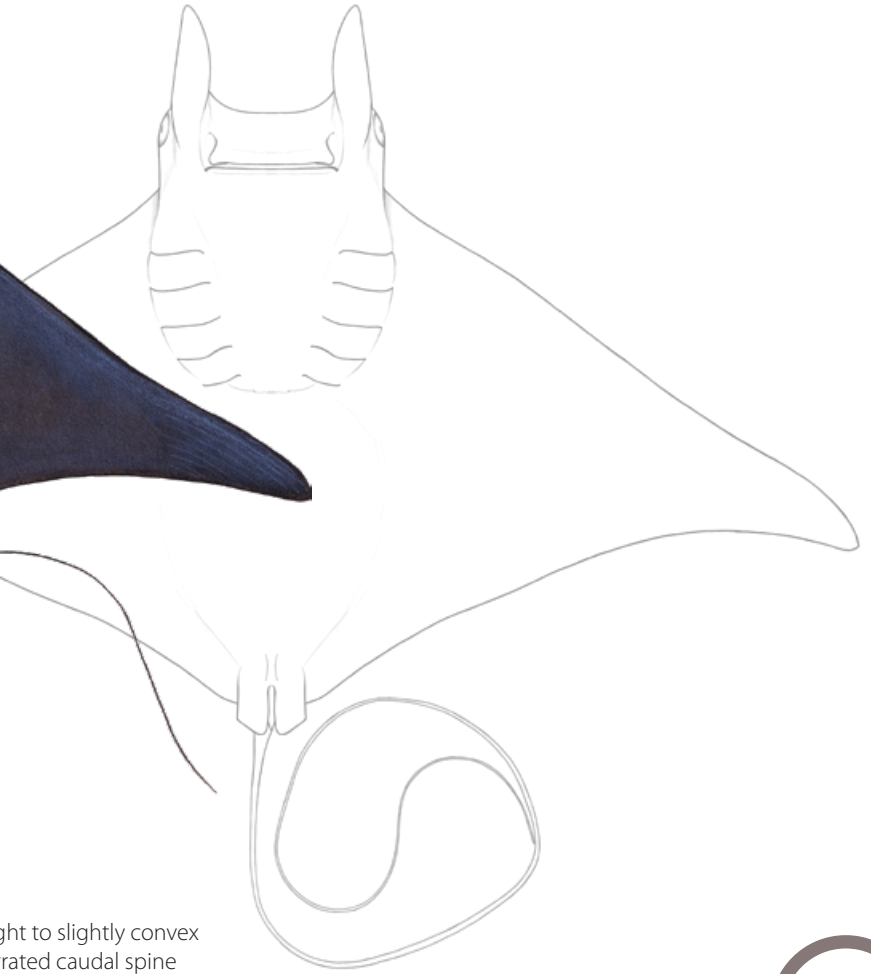
Pectoral fins strongly falcate
Strong bony ridge along dorsal midline
Disc greyish, elongate and strongly falcate
Dorsal fin uniform grey; no caudal spine

Cantonese: 台湾蝠魟
French: Mante chilienne
Japanese: タイワンイトマキエイ
Korean:
Mandarin: 台灣蝠魟
Spanish: Manta cornuda



Cantonese: 光尾蝠鱝、印度蝠鱝
French: Diable de mer méditerranéen
Japanese:
Korean:
Mandarin: 无刺蝠鱝（姬蝠魟、飛魶仔、魔鬼魚）
Spanish: Manta mobula





Blue-black falcate disc, front edge straight to slightly convex
Dorsal fin with prominent white tip; serrated caudal spine



Identification keys 1 37 38 39

RMM

*Mobula mobular* Giant devilray

Mobulidae: Devil rays

# *Mobula thurstoni*

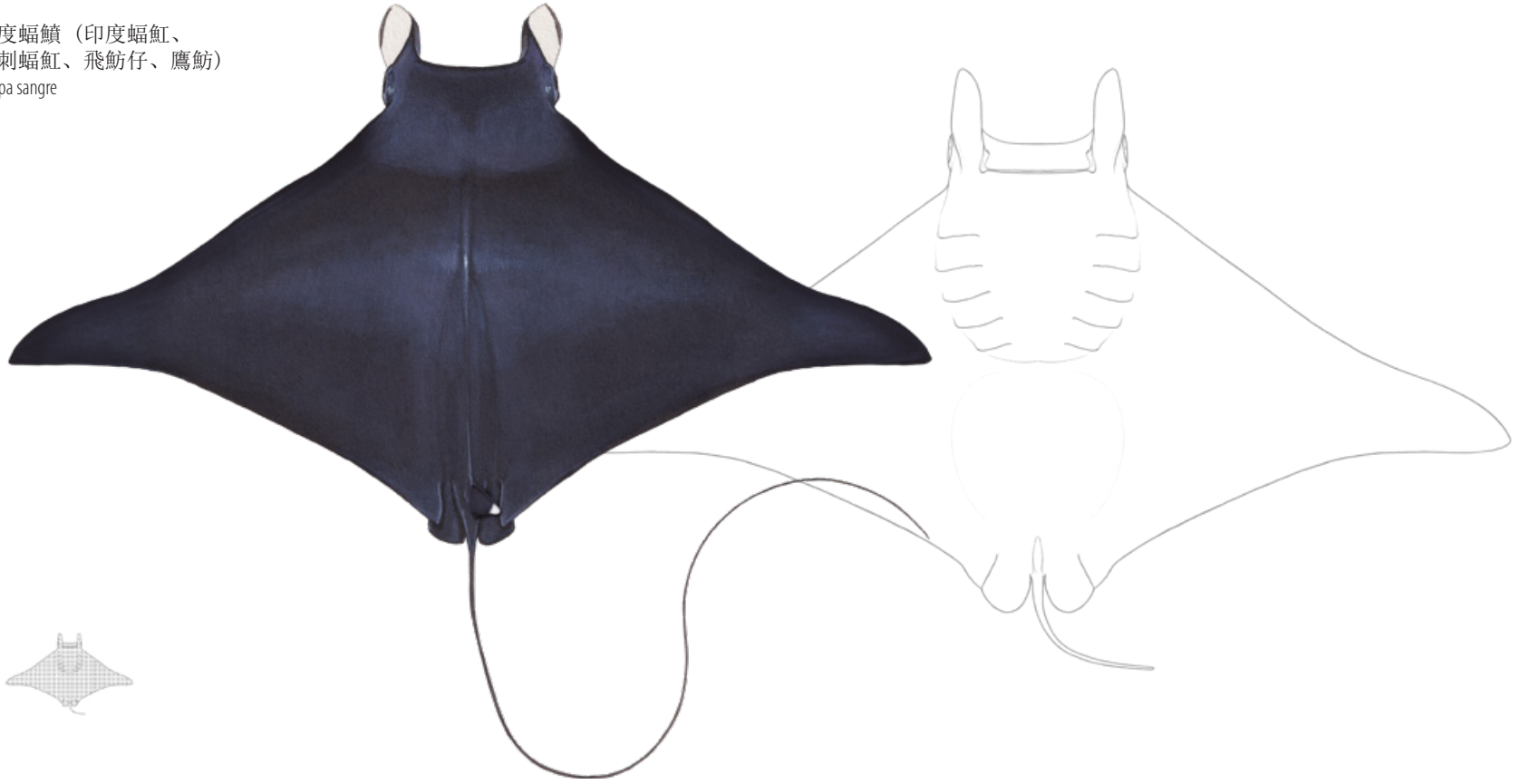
## Bentfin devilray



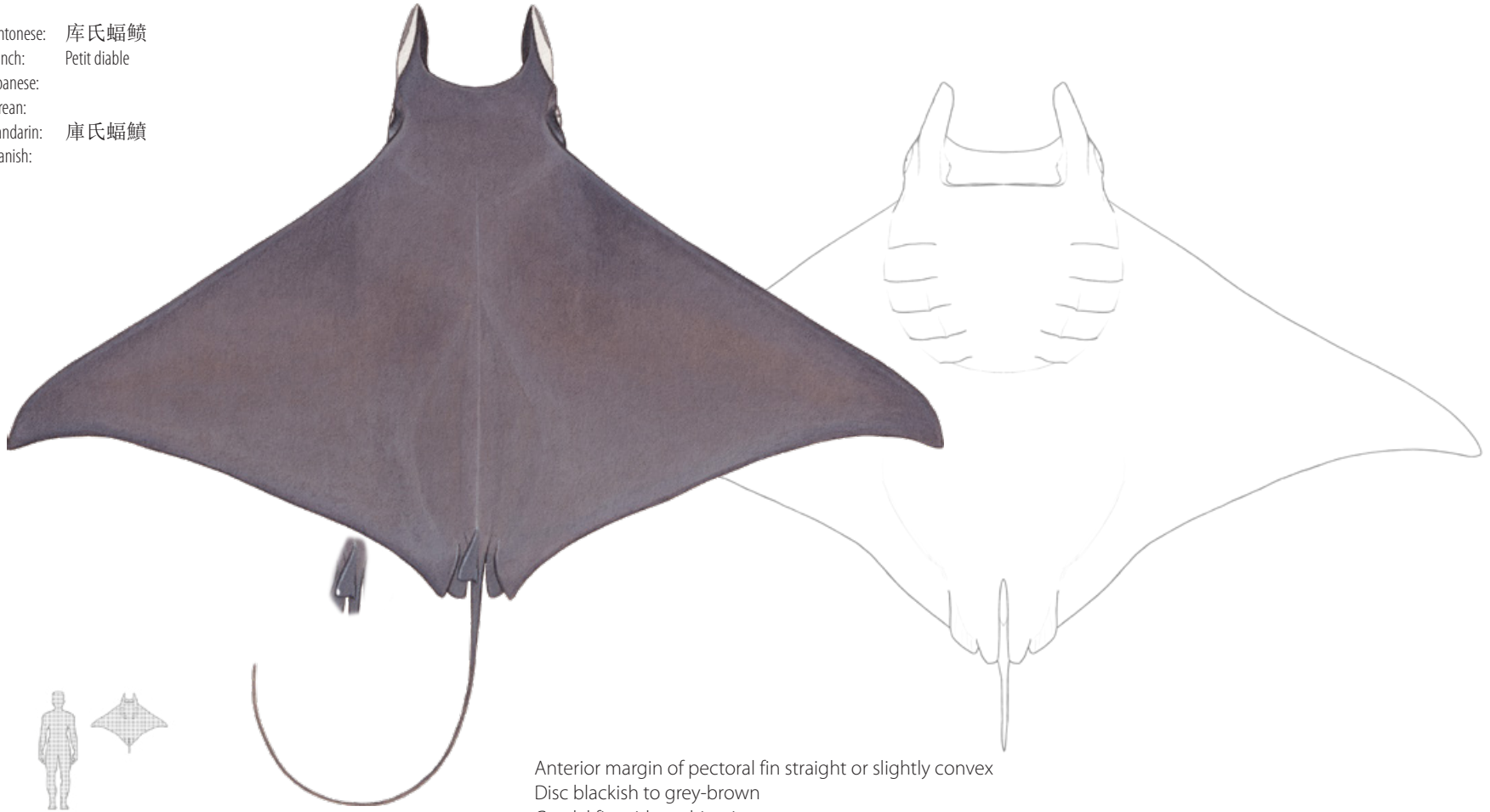
Identification keys **1** **37** **38** **40** **42**

Anterior margin of pectoral fins with double curved edge
Dorsal fin with a prominent white tip, no caudal spine
Base of tail depressed

Cantonese: 光尾蝠鱝、印度蝠鱝
French: Mante vampire
Japanese: ヒメイトマキエイ
Korean:
Mandarin: 印度蝠鱝（印度蝠魟、無刺蝠魟、飛魶仔、鷹魶）
Spanish: Chupa sangre



Cantonese: 库氏蝠鱝
French: Petit diable
Japanese:
Korean:
Mandarin: 庫氏蝠鱝
Spanish:



Anterior margin of pectoral fin straight or slightly convex
Disc blackish to grey-brown
Caudal fin with a white tip
Base of tail quadrangular

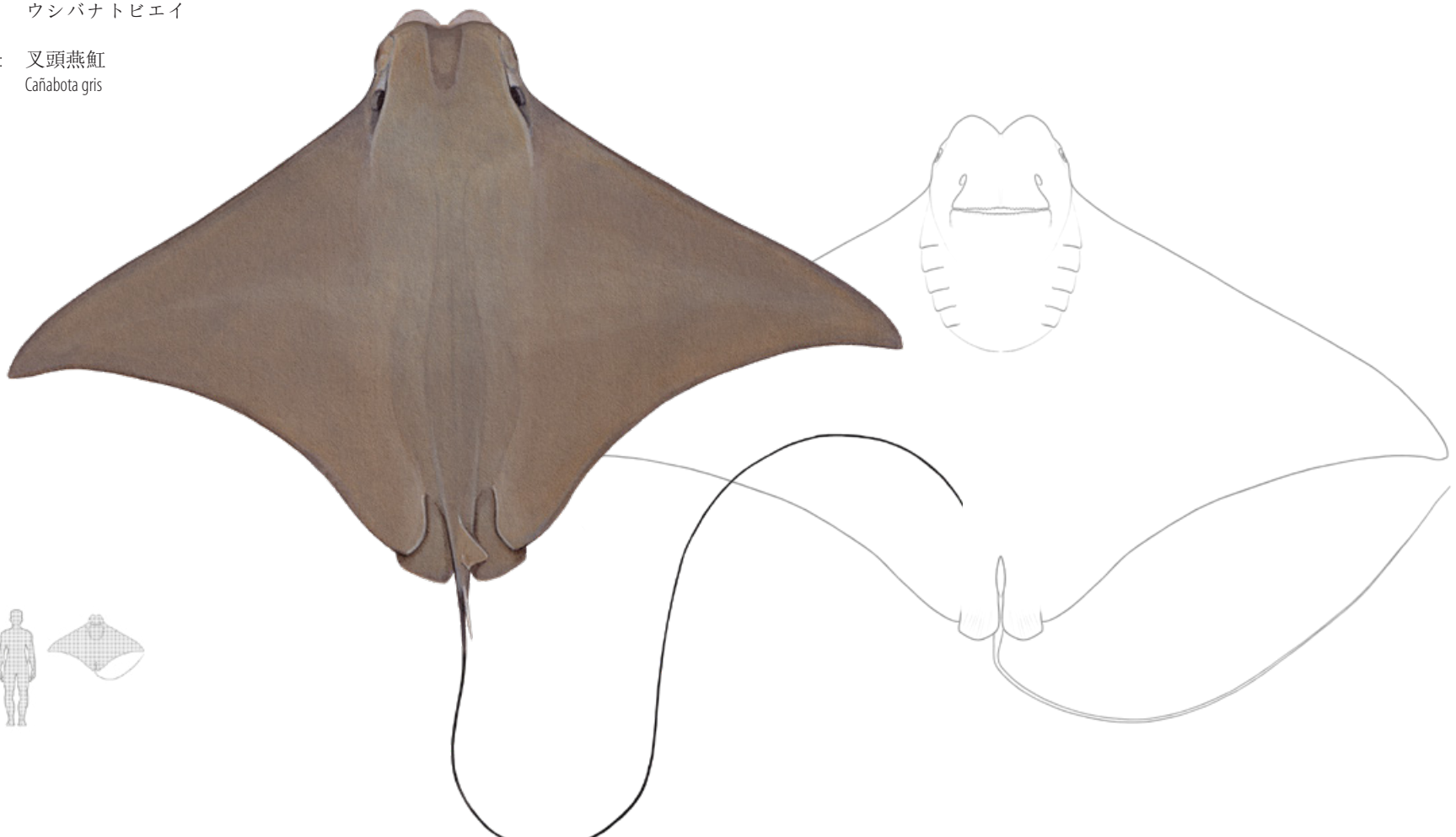
# *Rhinoptera javanica*

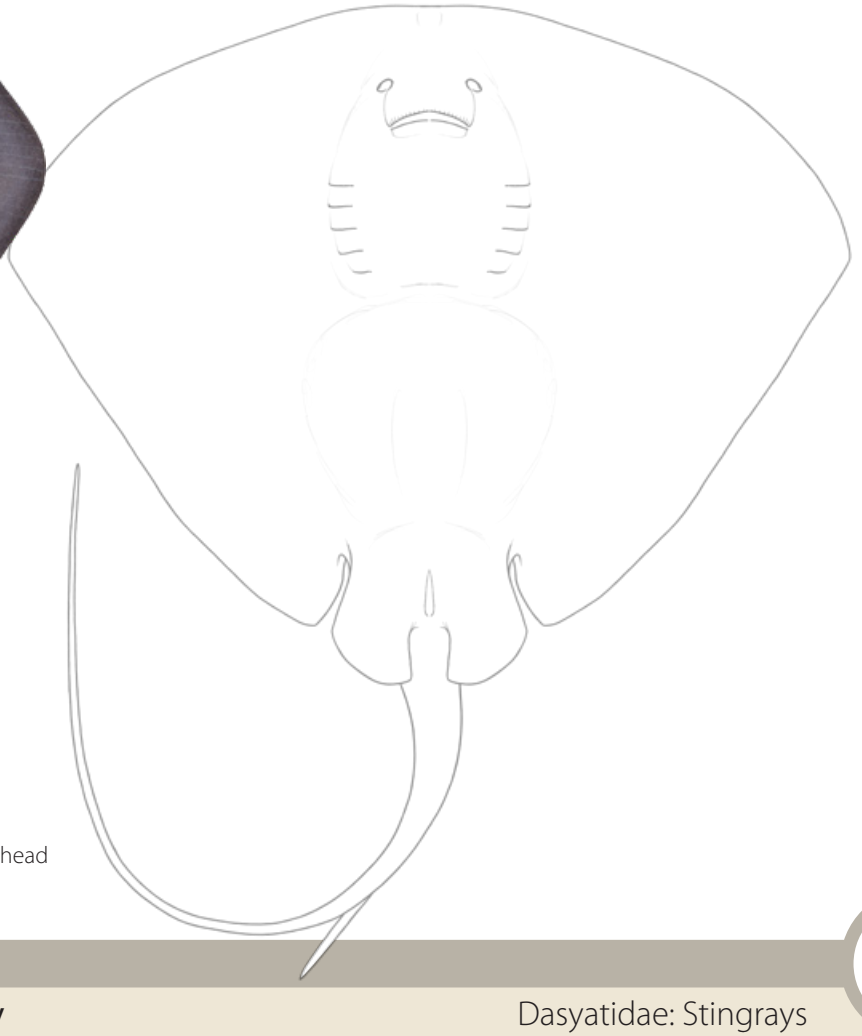
## Javan cownose ray



Snout with a pair of broad lobes separated by a deep notch
Spiracle larger than eye slightly behind pectoral fins' front edge
Dorsal fin origin well behind pectoral fin insertions

Cantonese: 爪哇牛鼻鱝
French: Mourine javanaise
Japanese: ウシバナトビエイ
Korean:
Mandarin: 叉頭燕魟
Spanish: Cañabota gris





Cantonese: 紫魟、吉勒氏魟
French: Pastenague violette
Japanese: カラスエイ
Korean:
Mandarin: 紫魟
Spanish: Raya látigo obispo



Flattened cone shaped disc, broad head
No dorsal fin
Row of small thorns on back



Identification keys 1 37 43

PLS

# *Pteroplatytrygon violacea*

## Pelagic stingray

Dasyatidae: Stingrays

# WCPFC shark and ray handling guidelines for purse-seiner and longliner crew

The purpose of the shark and ray handling guidelines in this manual is to inform observers and crew of the WCPFC-recommended handling methods for the release of sharks and rays to minimise injury to sharks, rays and the crew.

The objective of the WCPFC-recommended shark and ray handling guidelines is to create routine processes to release sharks and rays safely and enhance their survival by mitigating the risk of injury and stress. The release of SSIs is compulsory. The guidelines should also be used for other key shark species to be released with minimal injury when they are not to be retained and fully utilised.

Vessel operators and crew are advised by WCPFC to adopt these guidelines as best handling practices for the release of sharks and rays. Maintaining crew safety is the top priority. Where large and dangerous animals are to be released, the guidelines recommend the use of tools such as stretchers to carry the sharks, or netting to lift them from the deck. Preferably they should be released directly from the net or line while still in the water. The crew should be prepared with the necessary equipment and instructed on how to use it to make the processes safe.

The role of the Pacific Islands Regional Fisheries Observers (PIRFOs) is to record the fate and condition of the released sharks and rays and note the method of release. PIRFOs also report what mitigation procedures are used to avoid SSI landings. It is not the role of an observer to release the sharks and rays.

These guidelines represent a compilation of WCPFC-recommended handling standards and illustrations. The source documents are listed in reverse chronological order on the next page of this section and should also be referred to for further detail.

# Reference sources

## Handling guidelines


Anon., Australia. 2019. Information paper for a draft conservation and management measure on mobulid rays caught in association with fisheries in the WCPFC Convention area. WCPFC-TCC15-2019-DP05_rev

Justel-Rubio A., Swimmer Y. and Hutchinson M. 2019. Graphics for best handling practices for the safe release of sharks. WCPFC-SC15-2019/EB-WP-14.

Grande M. , Murua J., Ruiz J., Ferarios J.M., Murua H. , Krug I. , Arregui I., Zudaire I., Goñi N. and Santiago J. 2019. Bycatch mitigation actions on tropical tuna purse seiners: best practices program and bycatch releasing tools. In: IATTC - 9th Meeting of the Working Group on Bycatch. San Diego, California.

WCPFC 15. 2018. Best handling practices for the safe release of sharks (other than whale sharks and mantas/mobulids). suppl_CMM 2010-07. WCPFC15 Summary Report.

Common Oceans (ABNJ) Tuna Project. 2018. Safe release guidelines for sharks and rays 2018. WCPFC-SC14-2018/EB-IP-03.

Clarke S., Staisch K. and Manarangi-Trott L. 2017. Clarification of WCPFC shark designations and observer data collection requirements in response to WCPFC13 decisions regarding manta and mobulid (devil) rays. WCPFC-SC13-2017/ST-WP-07.

WCPFC. 2017. Best handling practices for the safe release of mantas and mobulids. suppl_CMM 2010-07. WCPFC14 ISG-5 Report. ,WCPFC SC13 Summary Report, Attachment P.

WCPFC. 2015. Guidelines for the safe release of encircled whale sharks. suppl_ CMM 2012-04, WCPFC 12 Summary Report,

Gilman E. (Ed.). 2014. Methods for longline fishers to safely handle and release unwanted sharks and rays. Luen Thai Fishing Venture, Resources Legacy Fund, Secretariat of the Pacific Community, The Safina Center.

Poisson F., Vernet A.L., Seret B. and Dagorn L. 2012. Good practices to reduce the mortality of sharks and rays caught incidentally by the tropical tuna purse seiners. WCPFC-SC8-2012/ EB-IP-12


## WCPFC conservation and management measures pertaining to sharks and rays


CMM 2014-05. (2014). Conservation and Management Measure For Sharks. WCPFC.

CMM 2013-08. (2013). Conservation and Management Measure For Silky Sharks. WCPFC.

CMM 2012-04 (2012). Conservation and Management Measure for Protection of Whale Sharks from Purse Seine Fishing Operations. WCPFC.

CMM 2011-04 (2011). Conservation and Management Measure for Oceanic Whitetip Shark. WCPFC.

CMM 2010-07, (2010). Conservation and Management Measure for Sharks II. WCPFC.

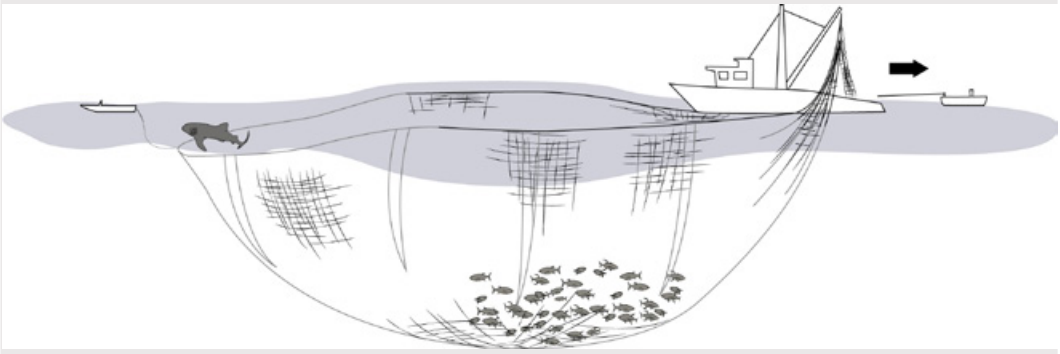
PSD PSN DOs and DON'Ts for purse-seiner crew

LLD LLN DOs and DON'Ts for longliner crew

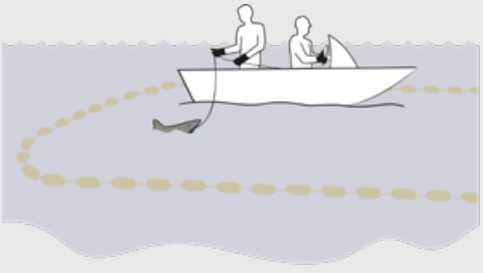
# PURSE SEINERS

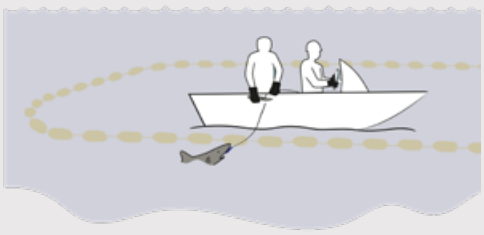
PSD1

Release sharks and rays while they are still free-swimming whenever possible (e.g. back down procedure, submerging corks, cutting net)



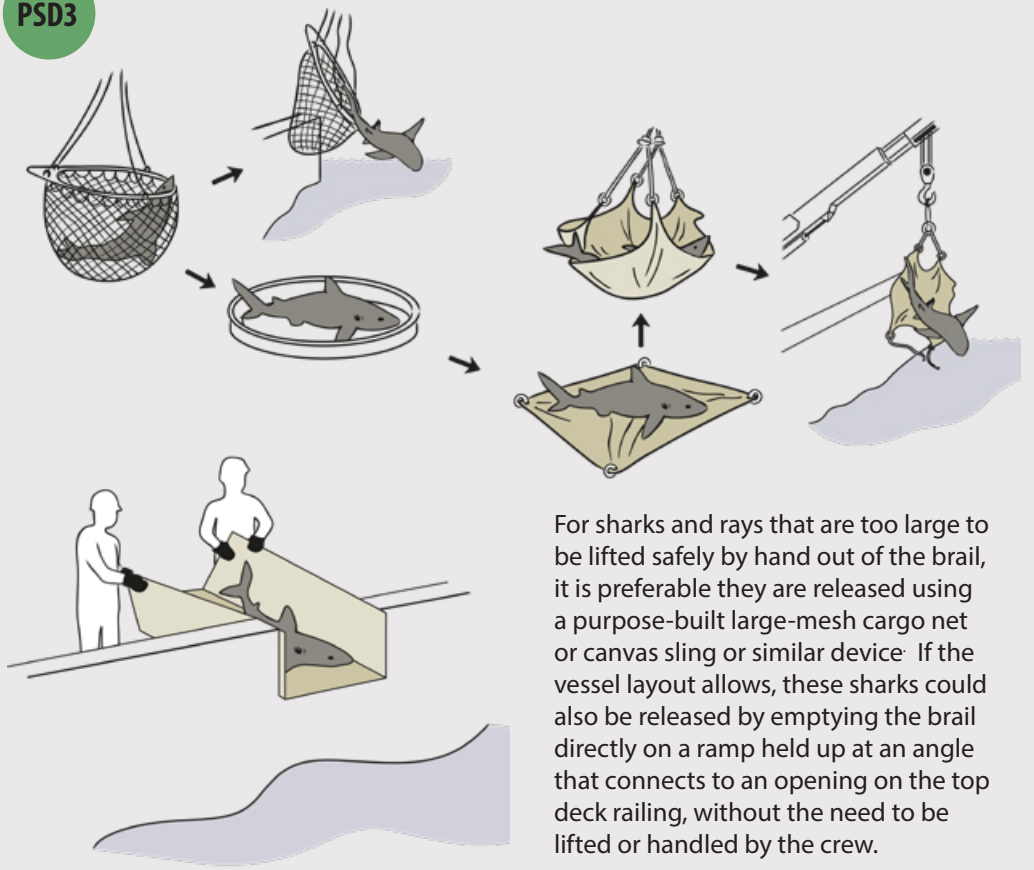
PSD2





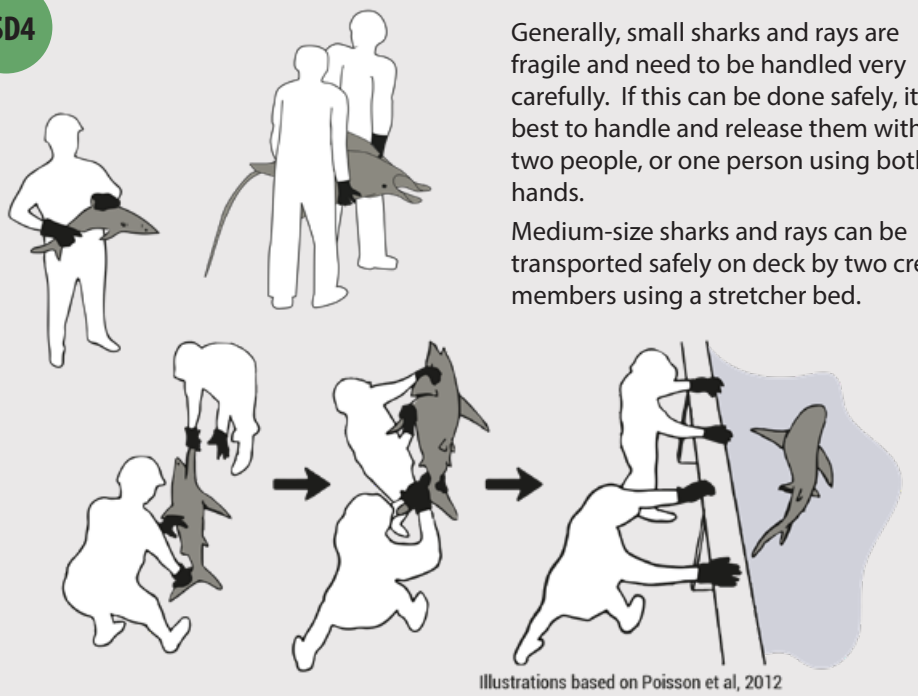
For sharks that cannot be released from the purse-seine net, consider removing them using a hook and line.

## PSD3



For sharks and rays that are too large to be lifted safely by hand out of the brail, it is preferable they are released using a purpose-built large-mesh cargo net or canvas sling or similar device. If the vessel layout allows, these sharks could also be released by emptying the brail directly on a ramp held up at an angle that connects to an opening on the top deck railing, without the need to be lifted or handled by the crew.

## PSD4

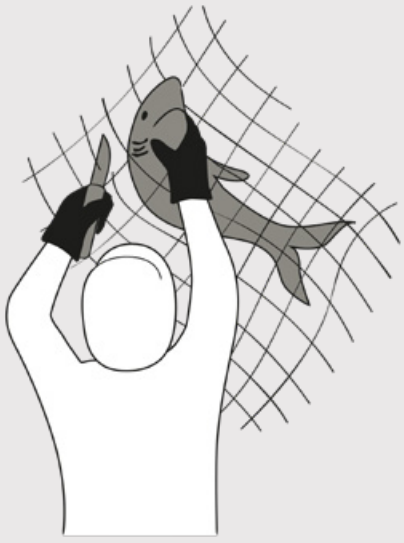


Generally, small sharks and rays are fragile and need to be handled very carefully. If this can be done safely, it is best to handle and release them with two people, or one person using both hands.

Medium-size sharks and rays can be transported safely on deck by two crew members using a stretcher bed.

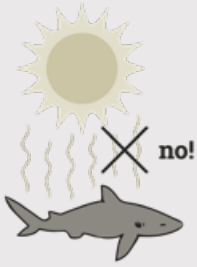
Illustrations based on Poisson et al, 2012

**PSD5**



When entangled in netting, if safe to do so, carefully cut the net away from the animal and release it to the sea as quickly as possible with no netting attached.

**PSN1**



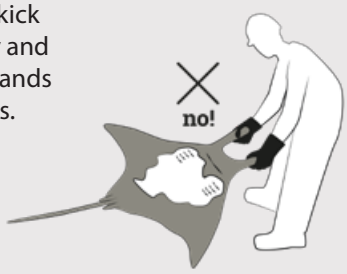

Do not wait until hauling is finished to release sharks and rays. Return them to the sea as soon as possible.

**PSN2**


Do not cut or punch holes through the shark's or ray's body.

**PSN3**

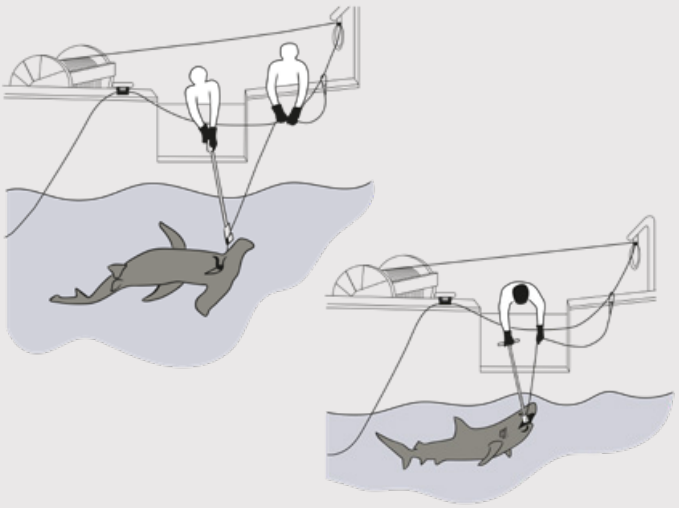

Do not gaff or kick a shark or a ray and do not insert hands into the gill slits.



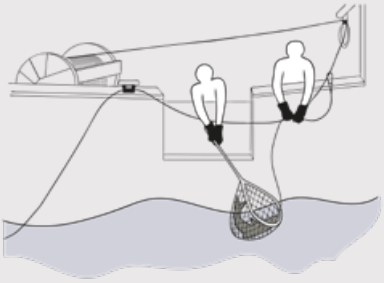

Do not pull a ray by the head lobes.

# LONGLINERS

**LLD1** The preference is to release all sharks and rays while they are still in the water, if possible. Use a dehooker to remove the hook or a long-handled line cutter to cut the gear as close to the hook as possible (ideally leaving less than 0.5 meters of line attached to the animal).

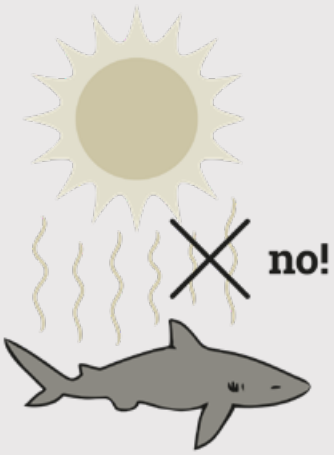


**LLD2**



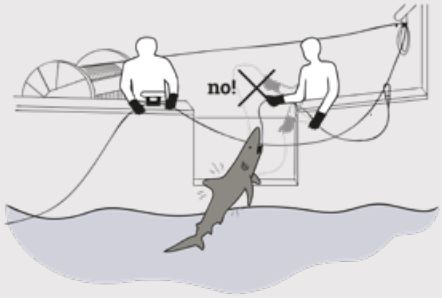
If de-hooking in the water proves to be difficult, and the shark or ray is small enough to be accommodated in a dip net, bring it on board and remove as much gear as possible by using a dehooker. If hooks are embedded, either cut the hook with bolt cutters or cut the line at the hook and gently return the animal to the sea.

**LLD3** Release all sharks and rays brought on deck as quickly as possible.



Do not strike a shark or a ray against any surface to remove the animal from the line.

LLN1




Do not attempt to dislodge a hook that is deeply ingested and not visible.

LLN2

Do not try to remove a hook by pulling sharply on the branchline.

LLN3


Do not cut the tail or any other body part.

LLN4


Do not gaff or kick a shark or a ray and do not insert hands into the gill slits.

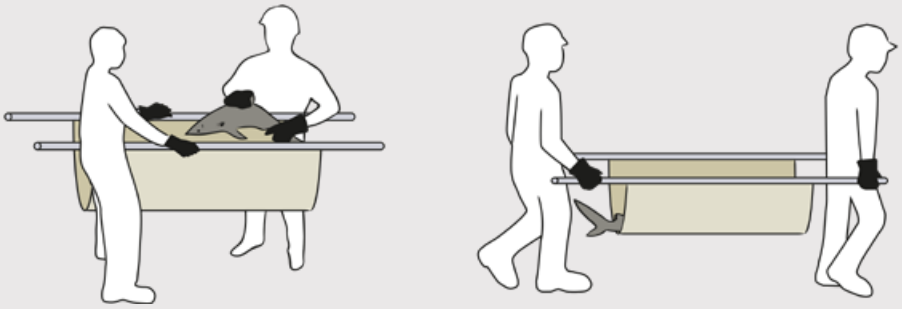
LLN5

## ADDITIONAL RECOMMENDATIONS

Knowing that any fishing operation may catch sharks or rays, several tools can be prepared in advance (e.g. canvas, net slings or stretchers for carrying or lifting; large mesh net or grid to cover hatches/hoppers on purse seiners; long-handled cutters and dehookers on longliners).

Example of stretcher use

AR1



Install grid to cover hatches/hoppers

AR2

# FAMILY INDEX

SHARKS



RAYS



# FAO CODE INDEX

# SPECIES INDEX

# GLOSSARY

| | |
|---|---|
| anterior | nearer the front of the body, or nearer to the head or forepart; opposite of posterior |
| apex | the uppermost point |
| bycatch | fish or other marine species caught unintentionally |
| concave | having an outline curved like the interior of a circle or sphere; opposite of convex |
| conspicuous | clearly visible; opposite of inconspicuous |
| convex | having an outline curved like the exterior of a circle or sphere; opposite of concave |
| denticle | a small, tooth-like structure on the skin of sharks and rays; placoid scale of cartilaginous fish. |
| dichotomous | divided into two mutually exclusive or contradictory groups or entities |
| disc | (of rays) dorsal or ventral body surface, excluding head and tail |
| dorsal | the upper side or back of the body; opposite of ventral |
| falcate | curved like a sickle; hooked |
| flank | the side of the body between the ribs and the hip |
| heterocercal | (of the caudal fin) having unequal upper and lower lobes, with the vertebral column passing into the upper lobe |
| homocercal | (of the caudal fin) having more or less equal upper and lower lobes, with the vertebral column passing into the upper lobe |
| inconspicuous | not prominent or readily noticeable; opposite of conspicuous |
| interdorsal ridge | a ridge of skin between the first and second dorsal fins |
| lateral | situated on one side or other of the body, especially in the region furthest from the median plane |
| lunate | (of the caudal fin) having more or less equal upper and lower lobes, with the vertebral column passing into the upper lobe (synonyms: homocercal, crescent shaped) |
| mottled | marked with spots or smears of colour |
| posterior | further back in position; of or nearer the rear or hind end; opposite of anterior |
| protrusible | capable of being thrust forward, as the tongue |
| serrated | having or denoting a jagged edge; sawlike |
| snout | part of a shark or ray in front of the mouth and eyes, including the nostrils |
| spiracle | external respiratory opening |
| subterminal | positioned near but not at the end of something |
| terminal | at the end of something |
| ventral | the underside of the body; opposite of dorsal |

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