

Identifying Shark Fins:

Implementing and Enforcing CITES



Species covered in this field guide

This field guide focuses on identifying unprocessed first dorsal fins and paired pectoral fins from the following nine commercially-exploited, large-bodied, globally distributed species that are traded internationally in large numbers for their fins.

Easily identified by their first dorsal fins or pectoral fins

Oceanic whitetip
(*Carcharhinus longimanus*)



Scalloped, great and smooth hammerheads
(*Sphyrna lewini*, *S. mokarran*, *S. zygaena*)



Porbeagle
(*Lamna nasus*)



Silky
(*Carcharhinus falciformis*)



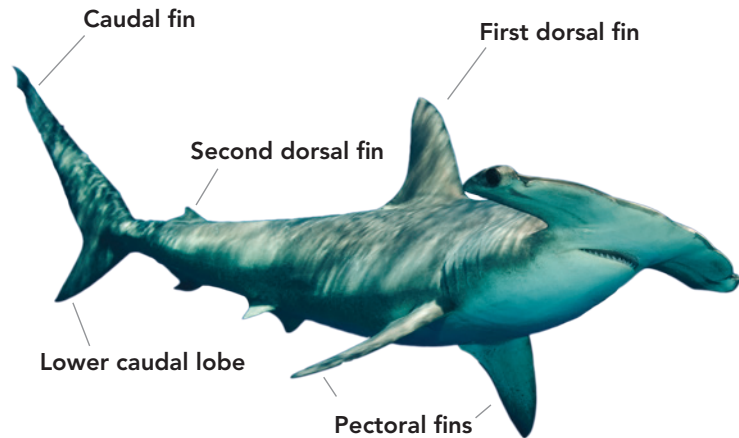
Easily identified by their pectoral fins

Bigeye, common and pelagic threshers
(*Alopias superciliosus*,
A. vulpinus, *A. pelagicus*)



Shark fins

The image shows the positions of the fin types that are highly prized in trade: the first dorsal, paired pectoral fins and the lower lobe of the caudal fin. The upper caudal lobe is typically discarded but may be retained for the cartilage. Second dorsal fins, paired pelvic fins and anal fins, though less valuable, also occur in trade.



The purpose of this field guide

The fin trade is a major driver of shark overexploitation globally. Shark fins are one of the most expensive seafood commodities on the market, estimated to be worth US\$400-\$550 million annually.¹ Despite documented population declines for several shark species worldwide, prior to 2013, there were no international trade controls for commercially important shark species traded in large numbers primarily for their fins and meat.

The species covered in this guide are common in international trade due to the high value of their fins, which collectively make up a significant proportion (as much as 20%) of the market.² Governments from around the world identified the need for trade in these species to be closely monitored and regulated to prevent extinction and listed these species on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Although there are more than 500 shark species worldwide, research has indicated that the fins of fewer than 50 shark species are considered commercially important³ and recent studies in Hong Kong, SAR; Indonesia; Taiwan, Province of China and the United Arab Emirates have also shown that the species composition of the fin trade is dominated by fewer than 20 of the large-bodied carcharhinid and lamnid sharks,^{4,5,6,7,8} many of which can be identified through the use of this guide.

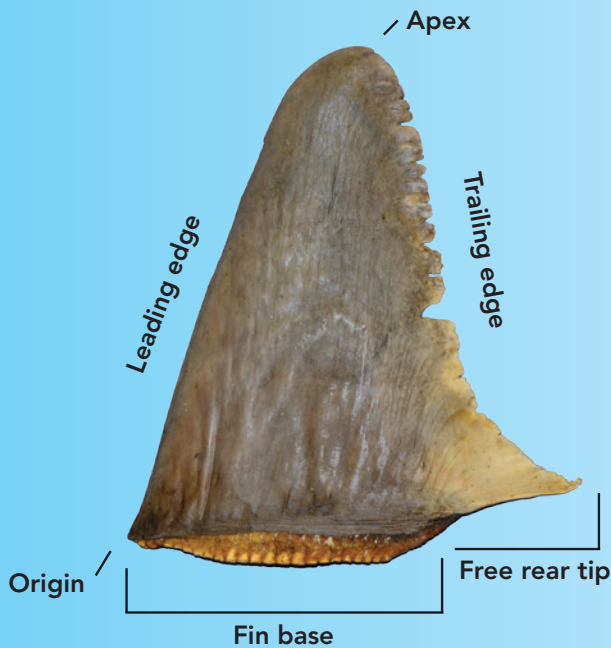
Identifying Shark Fins was created to help enforcement personnel to provisionally **identify the dried and wet fins of commercially traded CITES listed shark species based on morphological characteristics** of their most distinctive fins in their commonly traded form (frozen and/or dried and unprocessed) at the first point of trade. A preliminary visual identification will establish reasonable or probable cause in enforcement settings so that expert opinion can be sought or genetic testing can confirm field identification, aiding governments in successfully implementing and enforcing the CITES shark listings and promoting legal, sustainable trade.

Since 2012, over 500 officials from dozens of countries have been trained on how to use this guide to visually distinguish fins from CITES listed sharks amongst fins of non-CITES listed species during routine inspections. In fact, the Agriculture, Fisheries and Conservation Department (AFCD) in Hong Kong, SAR has confiscated just over 4 tons of fins based on preliminary visual identification since November 2014.

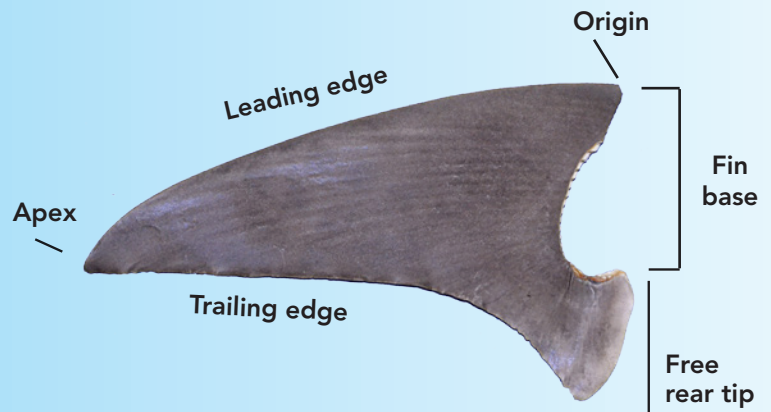
Landmarks used in this field guide

The fin types highlighted in this field guide are first dorsal fin and the paired pectoral fins. The landmarks used to describe key features of each fin type are the same, for consistency and ease of use.

First dorsal fin



Pectoral fin



Three steps to using this field guide

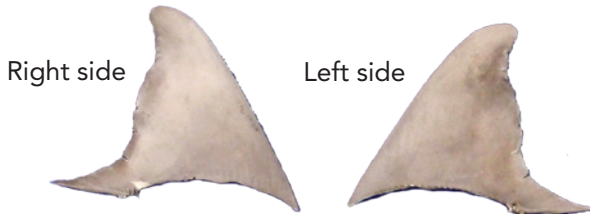
- Step 1.** Distinguish the highly-valued fin types: first dorsal fins and pectoral fins from lower caudal lobes. **If it is a dorsal fin, proceed to Step 2. If it is a pectoral fin, proceed to Step 3.**
- Step 2.** Distinguish oceanic whitetip, porbeagle, hammerhead and silky first dorsal fins from non-CITES listed species using the flowchart on Page 4.
- Step 3.** Distinguish oceanic whitetip, porbeagle, hammerhead, silky and thresher shark pectoral fins from non-CITES listed species using the flowchart on Page 8.

Step 1: Distinguish first dorsal fins and pectoral fins from lower caudal lobes

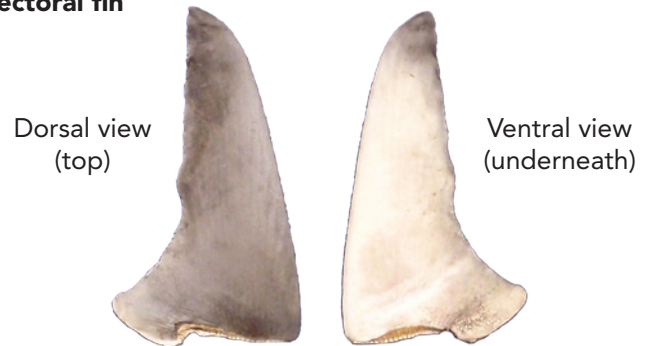
a. Check the fin color on each side.

Dorsal fins are the same color on both sides (see right and left side views below). In contrast, pectoral fins are darker on the top side (dorsal view) and lighter underneath (ventral view) also known as countershading.

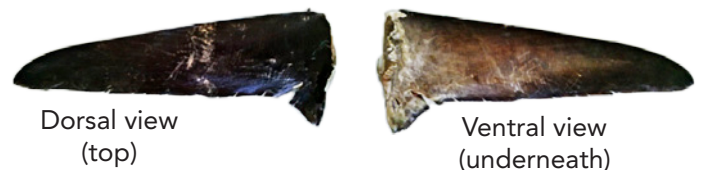
Dorsal fin



Pectoral fin

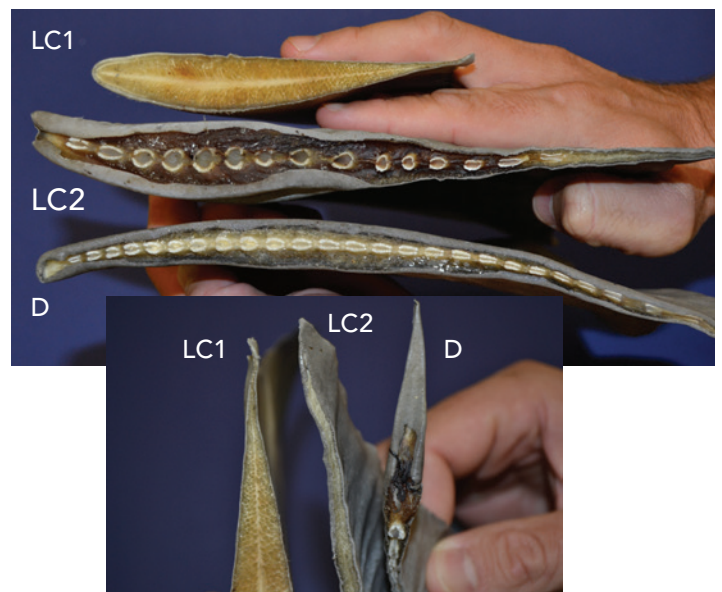


Thresher shark pectorals can be distinguished from pectoral fins of other shark species because they have a ventral surface that is only slightly lighter in color than the dorsal surface. However, there is still a detectable difference between the two sides of the fin. **Pectoral fins are the easiest way to identify thresher shark species from other species.**



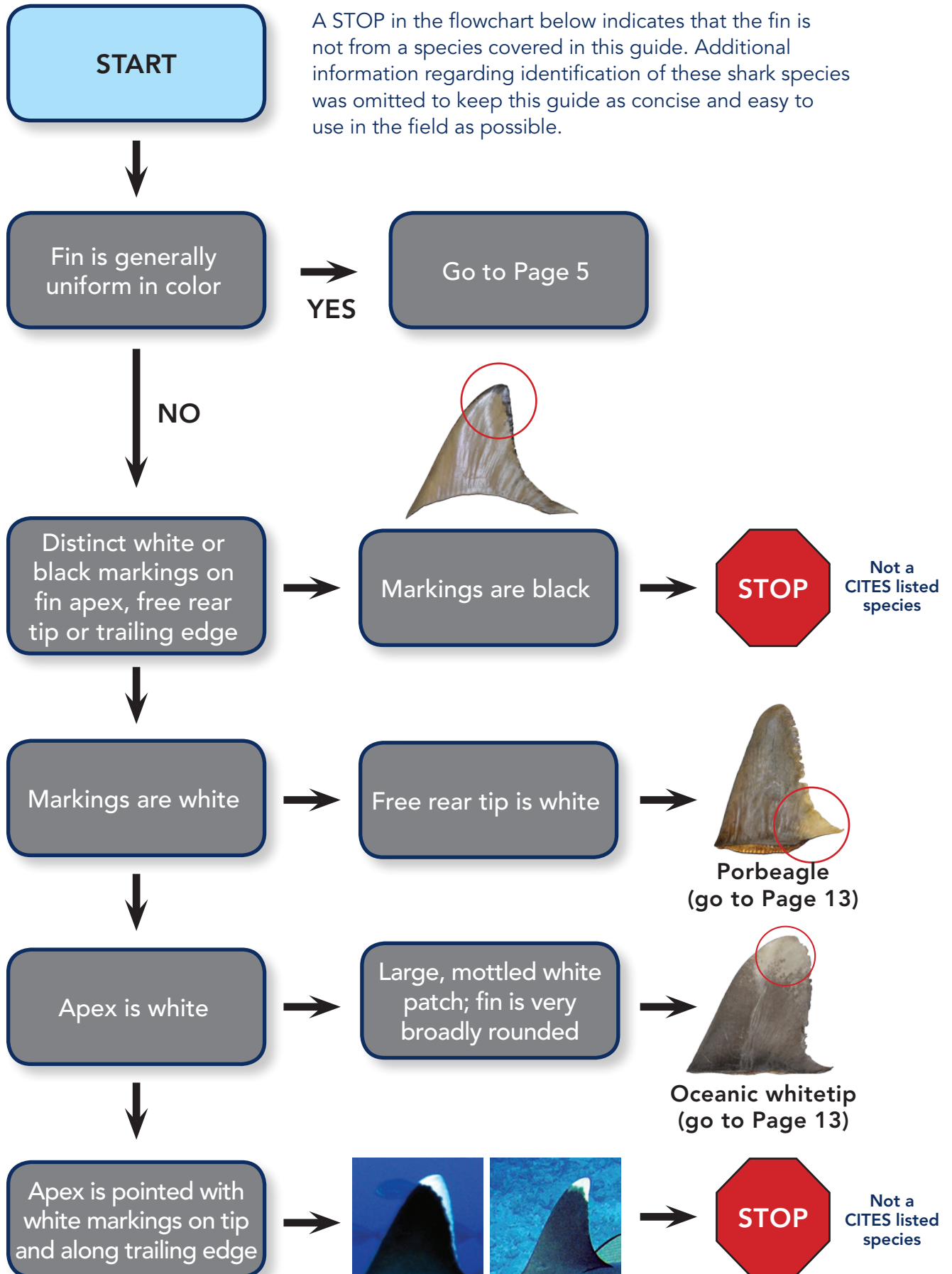
b. Check the base of the fin.

Like dorsal fins, the lower lobe of the caudal fin is the same color on both sides. However, the fin base looks quite different compared to the fin base of a dorsal fin. Dorsal fins (D) have a continuous row of closely spaced cartilaginous blocks running along almost the entire fin base. When looking at a cross section of the base of a lower caudal lobe (LC1), there is typically only a yellow, "spongy" material called ceratotrichia, which is the material used in shark fin soup. In some lower caudal lobes (LC2) there may be a small number of the cartilaginous blocks, but they are usually widely spaced and/or occur only along part of the fin base. Usually the lower caudal lobe has been cut along its entire base when removed from the shark; in contrast, dorsal fins frequently have a free rear tip that is fully intact.



c. If the fin is a dorsal fin, go to Step 2 (Page 4). If the fin is a pectoral fin, go to Step 3 (Page 8).

Step 2 DORSAL FINs: Identify oceanic whitetip, porbeagle, hammerhead and silky shark dorsal fins.

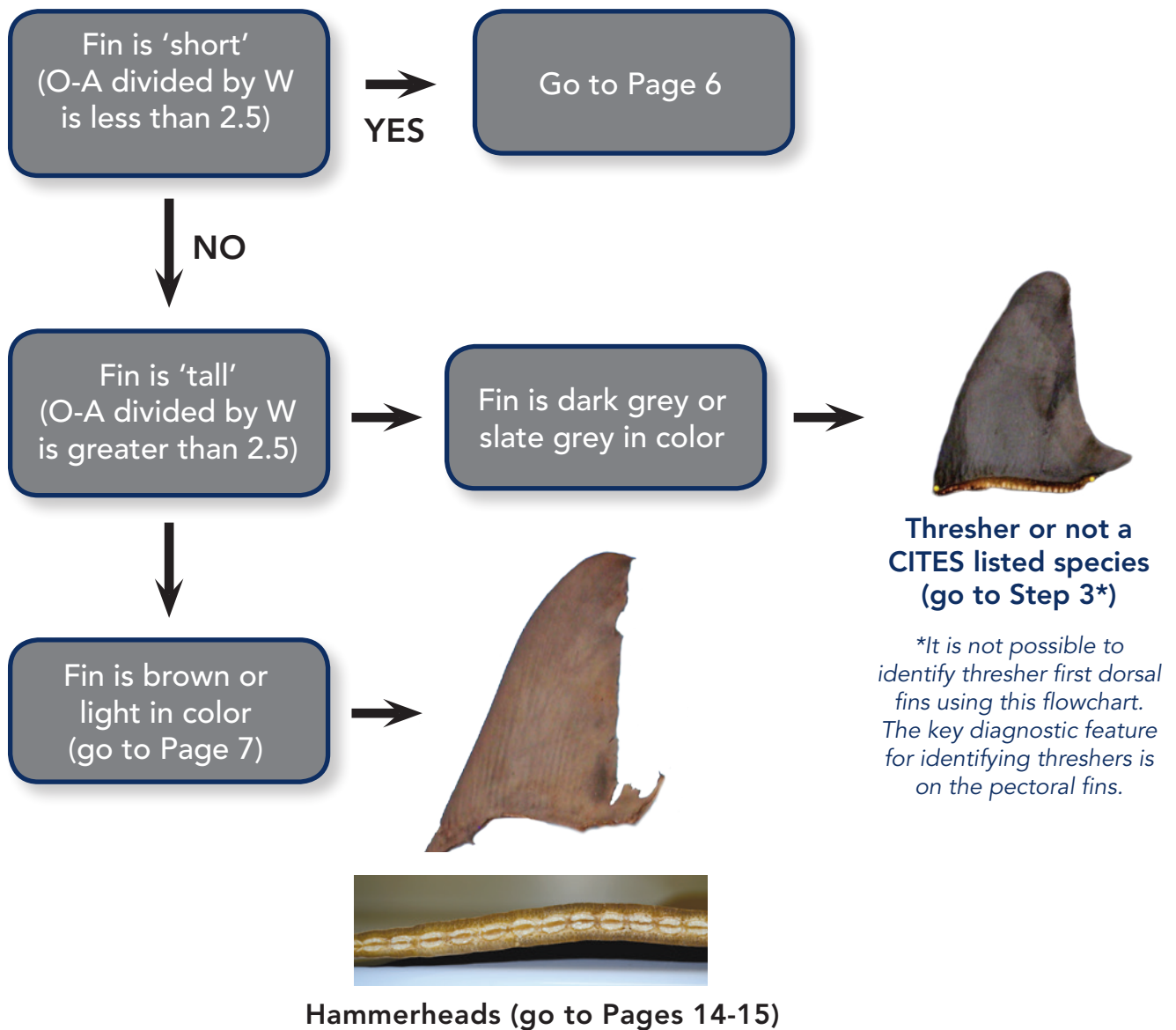
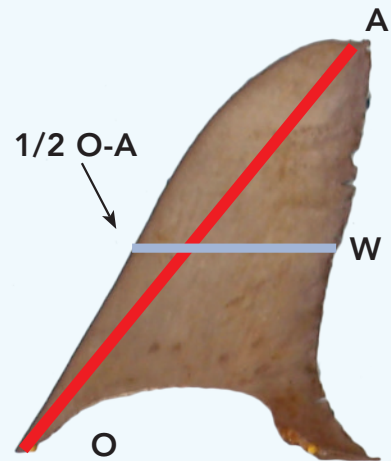


Step 2 DORSAL FINS: *continued*

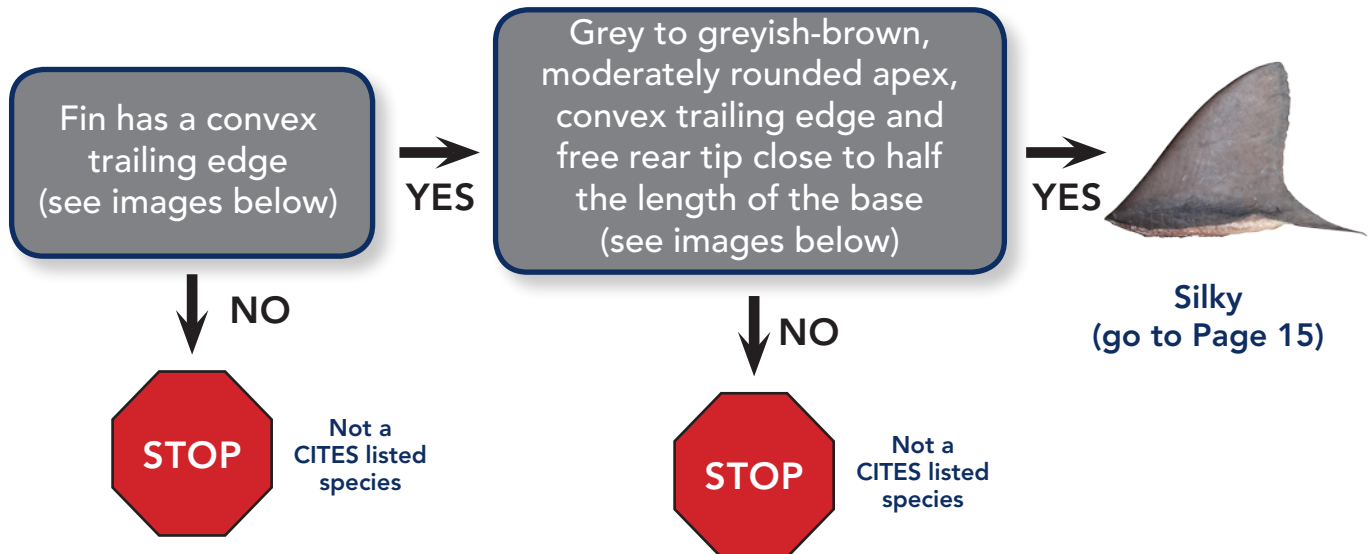
Take fin measurements

- 1) Measure fin origin to apex (O-A) with a flexible tape measure.
- 2) Measure the fin width (W) at the halfway point of O-A (i.e., if O-A is 10 cm, measure W at 5 cm along O-A).
- 3) Divide O-A by W (O-A/W).

Origin, apex and fin width (measured from leading edge to trailing edge) are landmarks found to be the most useful for species identification purposes, as measurements based on fin height, fin base and free rear tip were often too variable and dependent on cut and condition of the fin.



Step 2 DORSAL FINs: *continued*



Comparing silky first dorsal fins with first dorsal fins of similar size, shape and color

Because the commonly traded first dorsal fins from non-CITES listed species also have a convex trailing edge, it is helpful to compare those species to dorsal fins from the silky shark.

Silky



Silky shark (*Carcharhinus falciformis*) first dorsal fins:

- uniform grey or greyish-brown in color
- sloping leading edge
- moderately rounded (as opposed to pointed) apex
- convex (outwardly rounded) trailing edge
- free rear tip is close to half the length of the base

Blue



Blue shark (*Prionace glauca*) first dorsal fins:

- noticeably darker in color
- low angular leading edge
- a much more strongly convex (outwardly rounded) trailing edge
- much shorter free rear tip

Dusky



Dusky shark (*Carcharhinus obscurus*) first dorsal fins:

- narrowly rounded at the apex
- not as strongly convex (outwardly rounded) trailing edge
- shorter free rear tip

Night



Night shark (*Carcharhinus signatus*) first dorsal fins:

- more convex (outwardly rounded) trailing edge
- shorter free rear tip

Comparing hammerhead first dorsal fins with other "tall" fins (wedgfish and blacktip sharks)

Dorsal fins that are tall and slender and dull brown or light grey are probably one of three species of hammerhead sharks: great (*Sphyrna mokarran*), scalloped (*S. lewini*) or smooth (*S. zygaena*). Fin descriptions for these three species can be found on Pages 14 and 15.



Tall dorsal fins can also come from several species of **wedgfish** or **blacktip sharks**. In wedgfish dorsal fins, cartilaginous blocks do not extend across the entire fin base (Image A). In hammerheads, these cartilaginous blocks are present along almost the entire fin base (Image A). Wedgfish dorsal fins also exhibit a glossy sheen (Image B), and some species also have white spots, unlike the dull brown, uniform coloration of hammerhead dorsal fins.



Some blacktip shark (*Carcharhinus limbatus*) first dorsal fins exhibit O-A/W that is close to or slightly greater than 2.5. However, they often (but not always) have a black spot on the dorsal fin apex, and the fin has a glossy appearance compared to the dull look of hammerhead first dorsal fins (Image C).



Dorsal fins and pectoral fins are often traded together as a set. Pectoral fins from blacktip sharks have a glossy appearance and are longer and more slender than the dull, short, broad pectoral fins of hammerheads (Image D).

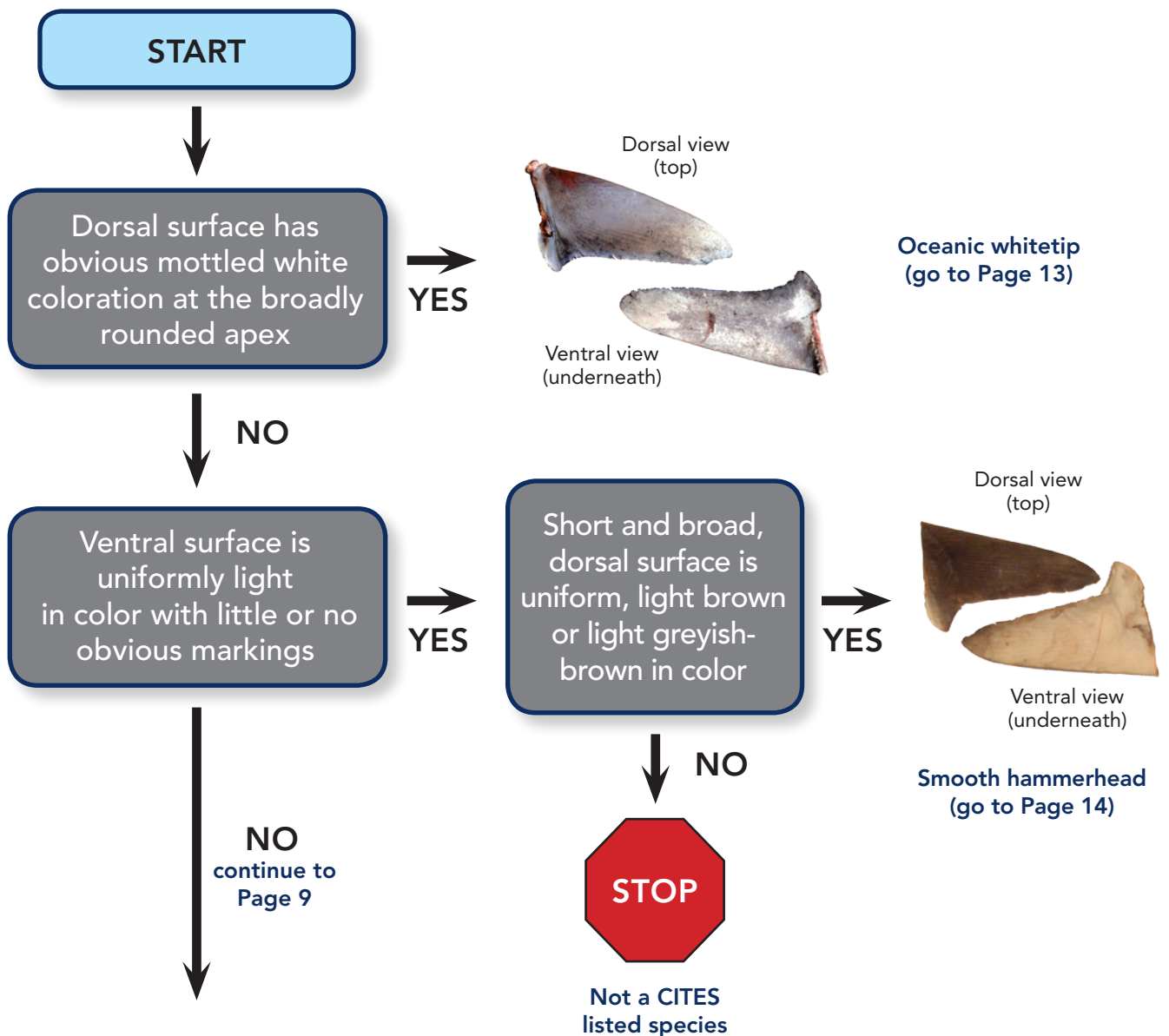


Step 3 PECTORAL FINS: Distinguish oceanic whitetip, porbeagle, hammerhead, silky and thresher shark pectoral fins from non-CITES listed species

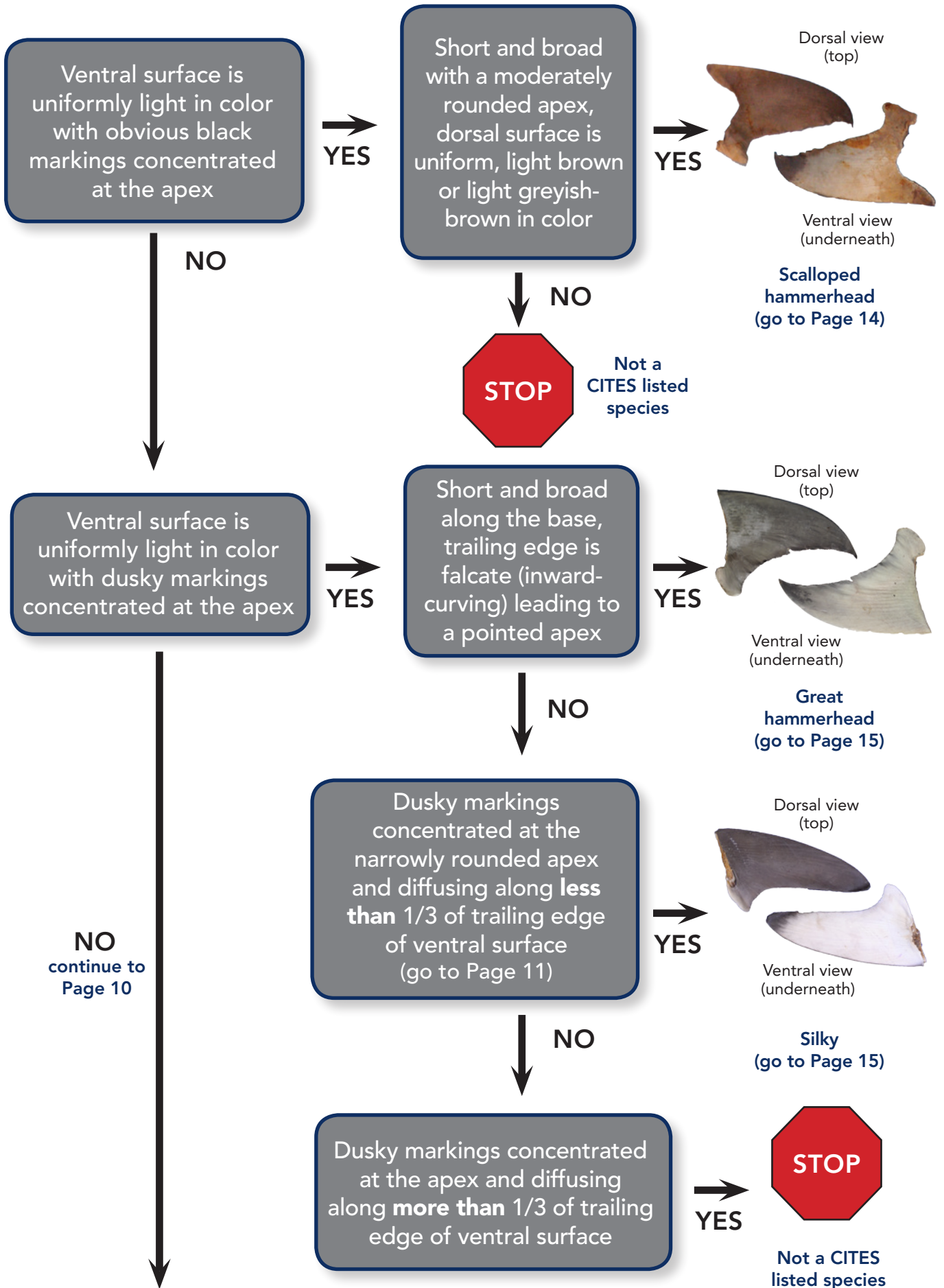
Black vs Dusky definitions:

The term 'black' refers to markings that are dark (inky black) in color with a stark demarcation between the white or light coloration on the ventral surface.

The term 'dusky' refers to markings that are slightly greyish or dark but diffuse in color. There is no stark demarcation between the white or light coloration on the ventral surface.



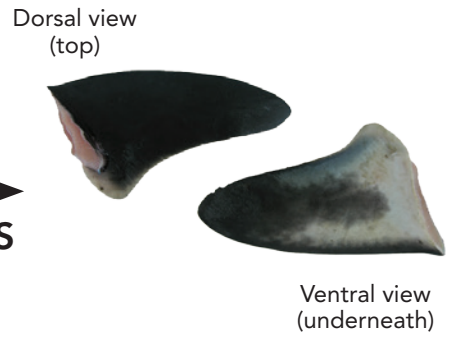
Step 3 PECTORAL FINS: *continued*



Step 3 PECTORAL FINS: *continued*

Ventral surface is light with dusky markings along the leading edge and concentrated at the apex and diffusing throughout the midsection of the fin.

→
YES

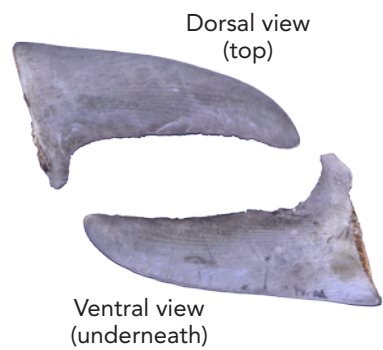


Porbeagle
(go to Page 13)

↓
NO

Ventral surface generally only slightly lighter than the dorsal surface (go to Page 12)

→
YES



Thresher
(go to Page 16-17)

↓
NO



If there are markings on the pectoral fin other than as described above, this is not a CITES listed species.

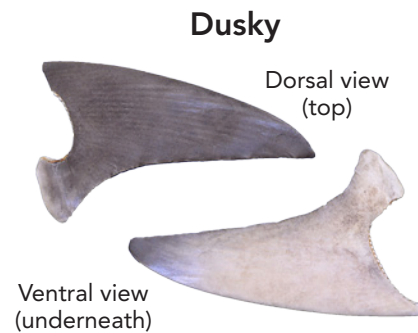
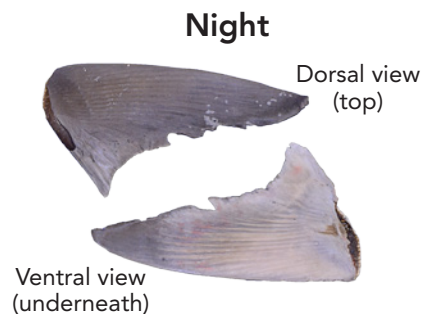
Comparing silky pectoral fins with pectoral fins of similar size, shape and/or color

Because commonly traded pectoral fins from non-CITES listed species also have dusky coloration concentrated at the apex of the ventral surface, it is helpful to compare those species to pectoral fins from the silky shark.



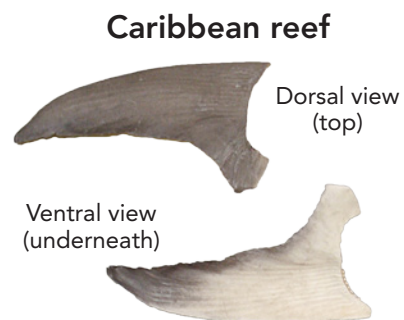
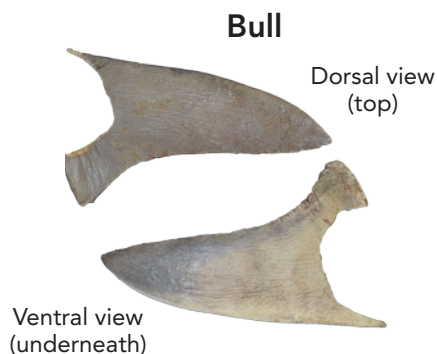
Silky (*Carcharhinus falciformis*) pectoral fins:

- dusky coloration heavily concentrated at apex, extending along less than 1/3 of the margin of the trailing edge
- narrowly rounded at apex



Night (*Carcharhinus signatus*) and Dusky (*Carcharhinus obscurus*) pectoral fins:

- dusky coloration at apex on ventral surface is less concentrated (or obvious), typically diffusing over more of the ventral surface
- apex is more pointed



Bull (*Carcharhinus leucas*) and Caribbean reef (*Carcharhinus perezii*) pectoral fins:

- dusky coloration extends further into the middle of the ventral surface and further along the trailing edge (more than 1/3)
- apex is more pointed

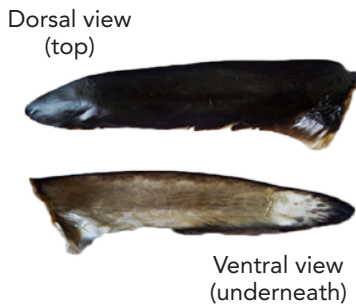
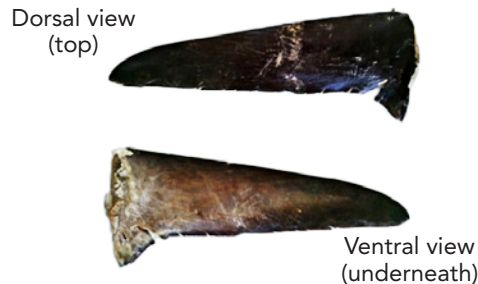
Note: Grey reef (*Carcharhinus amblyrhynchos*) pectoral fins examined from photos taken in aquaria and published online look extremely similar to Caribbean reef pectoral fins.

Comparing thresher pectoral fins with pectoral fins of similar size and shape

Because the commonly traded pectoral fins from non-CITES listed species may be of similar size, shape and coloration on the dorsal surface, it is helpful to compare those species to pectoral fins from a thresher shark for reference.

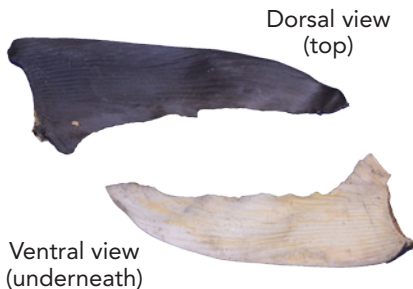
Thresher pectoral fins are easily differentiated from those of other species found in trade that may be similar in size and shape, due to coloration differences on the ventral surface of the pectoral fins.

Bigeye thresher (*A. superciliosus*) pectoral fins



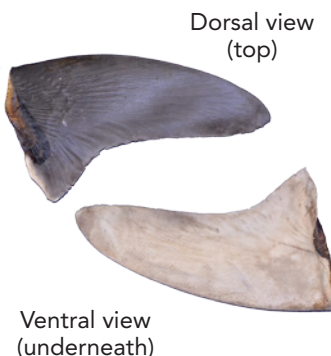
Longfin mako (*Isurus paucus*) pectoral fins:

- dorsal surface is dark greyish-brown or slate grey in color with an obvious white margin running along the edge of the free rear tip
- ventral surface is mostly white or light in color with dusky or dark markings at the apex and along the margins of the leading and trailing edges
- moderately rounded apex



Blue (*Prionace glauca*) pectoral fins:

- dorsal surface is dark grey or greyish-brown in color and there is no white margin running along the edge of the free rear tip
- ventral surface is uniform white or light in color with no obvious dark or dusky markings
- radial cartilage is easily seen extending from the base towards the apex
- narrowly rounded apex



Shortfin mako (*Isurus oxyrinchus*) pectoral fins:

- dorsal surface is dark greyish-brown or slate grey in color with an obvious white margin running along the edge of the free rear tip
- ventral surface is uniform white or light in color with no obvious dark or dusky markings
- moderately rounded apex

Porbeagle *Lamna nasus*

IUCN Red List
Designation

VULNERABLE



1st dorsal fin: dark blue/black to dark greyish brown, rounded apex with white patch on lower trailing edge onto free rear tip

Pectoral fins: broad, narrowly rounded at the apex. The ventral surface is white or light in color with a dusky coloration throughout the midsection of the fin and along the margins of the leading and trailing edge. The dorsal surface is dark greyish-brown or slate grey in color with an obvious white margin running along the edge of the free rear tip.



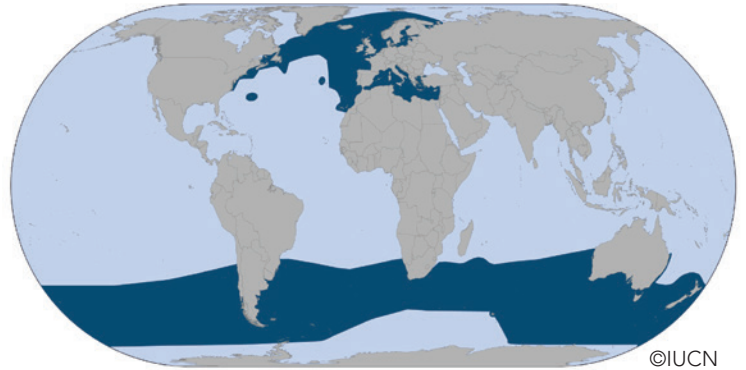
Dorsal view
(top)



Ventral view
(underneath)



Courtesy of NOAA Fisheries Service



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IUCN Red List Designations: NE Atlantic and the Mediterranean subpopulations are Critically Endangered, and the NW Atlantic subpopulation is designated as Endangered

Oceanic Whitetip *Carcharhinus longimanus*

IUCN Red List
Designation

VULNERABLE



1st dorsal fin: large and broadly rounded (paddle-like); mottled white color at apex

Pectoral fins: long, broadly rounded at apex; dorsal surface has mottled white color at apex; ventral surface is typically white but can have mottled brown coloration

- mottled white color also present on caudal fin (upper and lower lobe)
- very small juveniles may have mottled black coloration on dorsal, pectoral and caudal fins



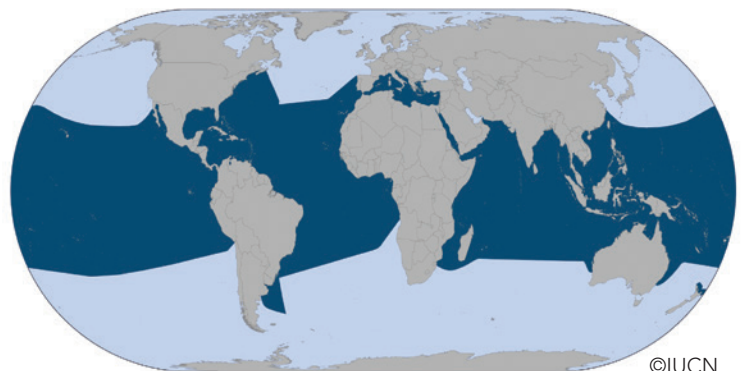
Dorsal view
(top)



Ventral view
(underneath)



Courtesy of NOAA Fisheries Service



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IUCN Red List Designations: NW Atlantic and Central Atlantic subpopulations are designated as Critically Endangered

Scalloped Hammerhead *Sphyrna lewini*

IUCN Red List
Designation

ENDANGERED



1st dorsal fin: tall, flattening out toward apex; straight to moderately curved trailing edge (similar to smooth hammerhead, less slender than great hammerhead 1st dorsal fin)



Courtesy of NOAA Fisheries Service

Pectoral fins: short and broad with black tips visible at the apex on ventral surface



Dorsal view
(top)



Ventral view
(underneath)



©IUCN

Smooth Hammerhead *Sphyrna zygaena*

IUCN Red List
Designation

VULNERABLE



1st dorsal fin: tall, sloping more at apex; moderately curved trailing edge (similar to scalloped hammerhead, less slender than great hammerhead 1st dorsal fin)

Note: Scalloped and smooth hammerhead 1st dorsal fins are so similar they are often extremely hard to differentiate. However, it is not uncommon for valuable fins from an individual to be traded as a set (first dorsal, paired pectoral fins and lower caudal lobe). If this is the case, the two species can be distinguished using the pectoral fins.

Pectoral fins: short and broad with faint to no markings on ventral surface



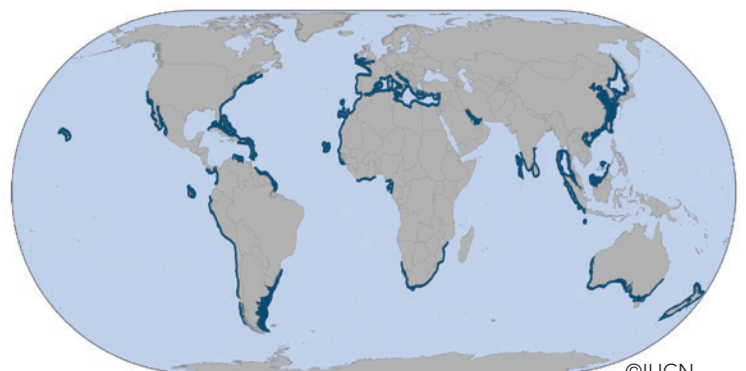
Dorsal view
(top)



Ventral view
(underneath)



Courtesy of NOAA Fisheries Service



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Great Hammerhead *Sphyrna mokarran*

IUCN Red List
Designation

ENDANGERED



1st dorsal fin: tall, slender from leading edge to trailing edge; elongated and pointed at apex

Note: Small to moderate-sized great hammerhead first dorsal fins may be difficult to distinguish from those of the winghead shark (*Eusphyrna blochii*). However, wingheads are only found in India, Thailand, Indonesia and Northern Australia and are extremely rare in trade. On a global basis, 1st dorsal fins with this shape are much more likely to be from great hammerheads than wingheads.

Pectoral fins: pointed apex, moderately curved along trailing edge with dusky color at apex on ventral side and often along trailing edge



Dorsal view
(top)



Ventral view
(underneath)



Courtesy of NOAA Fisheries Service



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Silky *Carcharhinus falciformis*

IUCN Red List
Designation

NEAR
THREATENED



1st dorsal fin: uniform grey to greyish-brown with sloping leading edge, moderately rounded (as opposed to pointed) apex and strongly convex (outwardly rounded) trailing edge. Free rear tip is close to half the length of the base.



Courtesy of NOAA Fisheries Service



Dorsal view
(top)



Ventral view
(underneath)

Pectoral fins: long, nearly straight trailing edge, narrowly rounded apex. Dorsal surface is grey or greyish-brown, and ventral surface is white with a visible dusky coloration concentrated at the apex and extends along less than 1/3 of the margin of the trailing edge.

Bigeye Thresher *Alopias superciliosus*

IUCN Red List
Designation

VULNERABLE



1st dorsal fin: broad and erect with steep angled leading edge, slightly convex trailing edge and short free rear tip. Very thick across the base with thick basal cartilage that is compressed and elongated laterally. Not as tall as the first dorsal fin of the common thresher.



Courtesy of NOAA Fisheries Service



Dorsal view
(top)



Ventral view
(underneath)

Pectoral fins: long and slender from leading edge to trailing edge, curving slightly at the rounded apex. Dorsal surface is a dark grey to dark greyish-brown. Ventral surface is almost as dark as the dorsal surface with a visible light coloration at the base that extends into the middle of the fin. Margins of the leading and trailing edges are dark.

Common Thresher *Alopias vulpinus*

IUCN Red List
Designation

VULNERABLE



1st dorsal fin: tall, erect with steep angled leading edge, slightly convex trailing edge, narrowly rounded apex and short free rear tip. Very thick along the base and thick basal cartilage that is compressed and elongated laterally.



Courtesy of NOAA Fisheries Service



Dorsal view
(top)



Ventral view
(underneath)

Pectoral fins: long and slender from leading edge to trailing edge, curving slightly at the rounded apex. Dorsal surface is dark grey to dark greyish-brown. Ventral surface is almost as dark as the dorsal surface with a mottled white coloration at the base. There is often a very small white spot at the tip of the apex (visible on both dorsal and ventral surfaces).



1st dorsal fin: broad and erect with steep angled leading edge, slightly convex trailing edge and short free rear tip. Very thick across the base with thick basal cartilage that is compressed and elongated laterally. Not as tall as the first dorsal fin of the common thresher.



Courtesy of NOAA Fisheries Service



Dorsal view
(top)



Ventral view
(underneath)

Pectoral fins: long and slender from leading edge to trailing edge, curving slightly at the rounded apex. Dorsal surface is dark grey to dark greyish-brown. Ventral surface is almost as dark as the dorsal surface with visible light coloration at the base and extending into the middle of the fin. Margins of the leading and trailing edges are dark.

End Notes

- ¹ Dulvy N.K., et al., 2014. Extinction risk and conservation of the world's sharks and rays. *eLife* 3.
- ² Fields et al., 2017 (in press). Species composition of the international chondrichthyan fin trade assessed by a retail market survey in Hong Kong. *Conservation Biology*.
- ³ Vannuccini S., 1999. Shark utilization, marketing and trade. FAO, Rome. 470pp.
- ⁴ Clarke S. C., et al., 2006. Identification of shark species composition and proportion in the Hong Kong shark fin market based on molecular genetics and trade records. *Conservation Biology* 20:201-211.
- ⁵ Chuang P. S., et al., 2016. The Species and Origin of Shark Fins in Taiwan's Fishing Ports, Markets, and Customs Detention: A DNA Barcoding Analysis. *PLoS ONE* 11:e0147290.
- ⁶ Fields et al., 2017 (in press). Species composition of the international chondrichthyan fin trade assessed by a retail market survey in Hong Kong. *Conservation Biology*.
- ⁷ Jabado R. W., et al., 2015. The trade in sharks and their products in the United Arab Emirates. *Biological Conservation* 181:190-198.
- ⁸ Liu S. Y. V., et al., 2013. DNA Barcoding of Shark Meats Identify Species Composition and CITES-Listed Species from the Markets in Taiwan. *PLoS ONE* 8:e79373.

About the guide

This field guide is based on data collected during the examination of more than 2,000 dorsal and pectoral fins from over 60 shark, ray and chimaera species, including all of the dominant species or species groups in the international fin trade reported in Clarke et al. (2006). Conspicuous fin markings were also assessed for pattern and consistency within species using photographs published in the literature and online. Fins used in this study originated from the United States, South Africa, Belize, Costa Rica, Chile, Colombia, Fiji, New Zealand, Sri Lanka and Hong Kong, SAR, and included a wide size range for each species. Fishermen, fin traders and scientists provided the fins examined during this study. No sharks were sacrificed for this project.

This field guide is intended to help enforcement personnel distinguish unprocessed first dorsal fins and pectoral fins of CITES listed shark species from those of other large-bodied coastal and pelagic species found in trade **based on morphological characteristics of their most distinctive fins**. With provisional identification of a fin originating from a CITES listed species, there is probable cause to detain shipments of fins without the appropriate CITES permits. Because small-bodied species are also traded for their fins internationally, we suggest exercising caution when using this field guide to identify extremely small fins. This is particularly true for fins originating from neonate and juvenile CITES listed hammerheads, given there are small-bodied hammerheads within the genus *Sphyrna* that are not CITES listed.

Cover photos were provided by Stan Shea and Shawn Heinrichs. Photos of whole shark specimens are courtesy of the NOAA Pelagic Observer Program (POP). Photos on the inside cover were provided by Jim Abernethy, Chris and Monique Fallows, Shawn Heinrichs, Alex Hofford/Greenpeace, and Doug Perrine/Sea Pics. Bigeye thresher, pelagic thresher and longfin mako fin photos were provided by Diego Cardenosa. Dorsal fin photos on Page 4 were provided by Angelo Villagomez (white tip reef) and Guy Stevens (silver tip). All other fin photos were provided by Debra Abercrombie. This fin identification work is ongoing and would greatly benefit from collaborations from around the world. If you would like to contribute information to be used in materials that are currently being developed, please contact Debra Abercrombie (debra.abercrombie@gmail.com).

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Notes

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