

## = Smalltooth sand tiger =

The smalltooth sand tiger or bumpytail ragged @-@ tooth ( *Odontaspis ferox* ) is a species of mackerel shark in the family Odontaspidae , with a patchy but worldwide distribution in tropical and warm temperate waters . They usually inhabit deepwater rocky habitats , though they are occasionally encountered in shallow water , and have been known to return to the same location year after year . This rare species is often mistaken for the much more common grey nurse shark ( *Carcharias taurus* ) , from which it can be distinguished by its first dorsal fin , which is larger than the second and placed further forward . It grows to at least 4 @.@ 1 m ( 13 @.@ 5 ft ) in length .

Very little is known of the biology and behavior of the smalltooth sand tiger . It is an active predator of benthic bony fishes , invertebrates , and cartilaginous fishes . This species is thought to be ovoviviparous with oophagous embryos like other mackerel sharks . In contrast to its formidable size and appearance , this shark is harmless , having never been known to behave aggressively towards humans . There is concern that its numbers are declining due to human activities in the Mediterranean and elsewhere , though existing data is inadequate for a full assessment of its conservation status .

## = Taxonomy and phylogeny =

The smalltooth sand tiger was originally described as *Squalus ferox* by Italian @-@ French naturalist Antoine Risso in 1810 , based on a specimen from Nice , France . In 1950 , Gilbert Percy Whitley described *O. herbsti* from Australian specimens , separating them from *O. ferox* on the basis of dentition and the absence of spots . Leonard Compagno synonymized the two species in 1984 , as subsequently discovered Pacific specimens had blurred Whitley 's distinguishing characters . The specific epithet *ferox* is Latin for " fierce " . Other common names for this shark include blue nurse shark , fierce shark , Herbst 's nurse shark , and sand tiger shark .

A phylogenetic study based on mitochondrial DNA , performed by Naylor et al. in 1997 , suggests that the smalltooth sand tiger and its relative , the bigeye sand tiger ( *O. noronhai* ) , are more closely related to the thresher sharks than to the grey nurse shark , to which it bears a strong resemblance . If true , this would indicate that the similarities between this species and the grey nurse shark arose as the result of convergent evolution . Fossil teeth belonging to the smalltooth sand tiger have been found from Lower Pliocene ( 5 @.@ 3 ? 3 @.@ 6 Ma ) deposits in Italy and Venezuela .

## = Description =

The smalltooth sand tiger has a bulky body with a long , bulbous , slightly flattened snout . The eyes are medium @-@ sized , with large round pupils ( as opposed to slit @-@ like in the grey nurse shark ) , and lack nictitating membranes .

The mouth is large and filled with projecting teeth . Each tooth has a narrow , tall central cusp flanked by 2 @-@ 3 pairs of lateral cusplets . There are 48 ? 56 tooth rows in the upper jaw and 36 ? 46 tooth rows in the lower jaw ; the front large teeth in the upper jaw are separated from the lateral teeth by 2 ? 5 intermediate teeth .

The fins are broad @-@ based and angular in shape . The first dorsal fin is larger than the second and placed closer to the pectoral fins than the pelvic fins . The caudal fin is strongly asymmetrical with the upper lobe much longer than the lower . The coloration is gray to gray @-@ brown above and lighter below . Juveniles are uniform in color with darker fin margins , while adults often exhibit dark spots or blotches that vary widely in pattern , size , and density . Coloration also appears to vary by region , with some individuals from the Mediterranean displaying a patchy , " piebald " pattern . The smalltooth sand tiger attains a maximum length of 4 @.@ 1 m ( 13 @.@ 5 ft ) and a maximum weight of 289 kg ( 637 lbs ) . There are unconfirmed reports of much larger individuals from Malpelo Island off Colombia .

## = = Distribution and habitat = =

Smalltooth sand tigers have been caught at widely scattered locations throughout the world , indicating a possibly circumtropical distribution . In the eastern Atlantic Ocean , it is known from the Bay of Biscay south to Morocco , including the Mediterranean Sea , the Azores , and the Canary Islands . In the western Atlantic , it has been reported from off North Carolina and Florida ( USA ) , the Yucatan Peninsula ( Mexico ) , and Fernando de Noronha ( Brazil ) . It occurs throughout the Indian Ocean , from South Africa , Madagascar , and Tanzania in the west to the Maldives and the Southwest Indian Ridge in the east . In the northern Pacific it is known from off Japan , Hawaii , California , and Colombia , and in the southern Pacific it is known from New Caledonia , eastern Australia , and New Zealand .

Typically regarded as a deepwater species , the smalltooth sand tiger has been caught down to a depth of 880 m ( 2 @, @ 900 ft ) . They are usually found near the bottom in rocky , boulder @-@ strewn regions on continental shelves and the upper continental slope , as well as around submarine ridges and mountains . There are also reports of this species near the drop @-@ offs of rocky or coral reefs and in the upper layers of the open ocean . In the Mediterranean , smalltooth sand tigers occur at depths less than 250 m ( 820 ft ) , including at depths accessible to divers . They have been seen swimming over sandy flats at Cocos Island and Fernando de Noronha . The temperature range favored by this species is 6 ? 20 ° C ( 43 ? 63 ° F ) ; in hot climates they are found below the thermocline in cooler water .

## = = Biology and ecology = =

The smalltooth sand tiger is a strong @-@ swimming shark that may be encountered singly or in aggregations of up to five individuals . Catch records suggest that this species may cover long distances in oceanic waters along underwater ridges or " hopping " between seamounts . It has a very large , oily liver , which allows it to maintain neutral buoyancy in the water column with minimal effort . At a location called " Shark Point " off Beirut , Lebanon , small groups of smalltooth sand tigers appear every summer on rocky reefs at a depth of 30 ? 45 m ( 100 ? 150 ft ) . The same individuals have been documented returning to this site year after year . Their purpose there is unknown , being speculated to relate to mating . When confronted , these sharks have been observed to stall , gape their mouths , turn around , and shake their tails towards the perceived threat .

Adult smalltooth sand tigers have no known predators , though they are bitten by cookiecutter sharks ( *Isistius brasiliensis* ) . A known parasite is the tapeworm *Lithobothrium gracile* , which infests the shark 's spiral valve intestine . The carcass of a 3 @.@ 7 m ( 12 @.@ 1 ft ) long female found off Fuerteventura in the Canary Islands contained a number of snubnosed eels ( *Simenchelys parasitica* ) inside her heart , body cavity , and back muscles . It is unknown whether the eels contributed to the shark 's death .

## = = = Feeding = = =

Compared to the grey nurse shark , the dentition of the smalltooth sand tiger is less robust and lacks specialized cutting and crushing teeth , suggesting that it tends to tackle smaller prey . The diet of the smalltooth sand tiger consists of bottom @-@ dwelling bony fishes such as rockfish ( *Sebastes* spp . ) , invertebrates such as squid , shrimp , and possibly marine isopods , and cartilaginous fishes including rays and chimaeras . The largest known prey item taken by this species was a 1 @.@ 3 m ( 4 @.@ 3 ft ) long kitefin shark ( *Dalatias licha* ) , found inside the stomach of a 2 @.@ 9 m ( 9 @.@ 5 ft ) long male from New Caledonia .

## = = = Life history = = =

No pregnant smalltooth sand tigers have ever been found ; this species is presumed to be

ovoviviparous as in other mackerel sharks . Villavicencio et al. Garayzar ( 1996 ) described a 3 @. @ 6 m ( 11 @. @ 8 ft ) female from the Gulf of California that contained " hundreds of ova " in her right ovary , which would support the embryos being oophagous . Whether the embryos also cannibalize each other as in the grey nurse shark is unknown . The size at birth is estimated to be 1 @. @ 0 ? 1 @. @ 1 m ( 3 @. @ 3 ? 3 @. @ 6 ft ) . With a few recorded exceptions , juveniles are found in deep water and only adults are present above a depth of 200 m ( 660 ft ) ; this may serve to reduce predation on young individuals by large , shallow @-@ water predators such as the great white shark ( *Carcharodon carcharias* ) . Males mature at a length of 2 @. @ 0 ? 2 @. @ 5 m ( 6 @. @ 6 ? 8 @. @ 2 ft ) and females at a length of 3 @. @ 0 ? 3 @. @ 5 m ( 9 @. @ 4 ? 11 @. @ 5 ft ) . Faint scars seen on some individuals may be related to courtship .

= = Human interactions = =

Encounters with divers have shown that , despite their size , smalltooth sand tigers are docile and do not react aggressively even when closely approached . This species is taken as bycatch in gillnets , bottom trawls , and on longlines ; most captures occur in the Mediterranean and off Japan . It is usually discarded when caught , except in Japan where the meat is consumed ( though considered very inferior to the grey nurse shark ) and the liver oil is utilized . The fins , jaws , and cartilage are also of value .

Discoveries , beginning in the 1970s , of smalltooth sand tigers in shallow water have raised urgent conservation concerns , as this species is apparently more vulnerable to human activity than previously believed . There is at present insufficient data for the International Union for Conservation of Nature ( IUCN ) to assess the worldwide conservation status of this species . It has been assessed as Vulnerable in Australian waters , due to a decline of over 50 % in catches off New South Wales since the 1970s . Populations of this species in the Mediterranean are also believed to have declined , due to a combination of habitat degradation , overfishing , pollution , and human disturbance . The smalltooth sand tiger has been protected by the Australian government since 1984 ; this came about concurrently with protection for the grey nurse shark , which had been decimated in Australian waters , so as to prevent any claims of confusing one species for the other . However , these regulations have proven difficult to enforce .