

= Whitetip reef shark =

The whitetip reef shark (*Triaenodon obesus*) is a species of requiem shark , in the family Carcharhinidae , and the only member of its genus . A small shark usually not exceeding 1 @. @ 6 m (5 @. @ 2 ft) in length , this species is easily recognizable by its slender body and short but broad head , as well as tubular skin flaps beside the nostrils , oval eyes with vertical pupils , and white @-@ tipped dorsal and caudal fins . One of the most common sharks found on Indo @-@ Pacific coral reefs , the whitetip reef shark occurs as far east as South Africa and as far west as Central America . It is typically found on or near the bottom in clear water , at a depth of 8 ? 40 m (26 ? 131 ft) .

During the day , whitetip reef sharks spend much of their time resting inside caves . Unlike other requiem sharks , which rely on ram ventilation and must constantly swim to breathe , this shark can pump water over its gills and lie still on the bottom . At night , whitetip reef sharks emerge to hunt bony fishes , crustaceans , and octopus in groups , their elongate bodies allowing them to force their way into crevices and holes to extract hidden prey . Individuals may stay within a particular area of the reef for months to years , time and again returning to the same shelter . This species is viviparous , in which the developing embryos are sustained by a placental connection to their mother . One of the few sharks in which mating has been observed in the wild , receptive female whitetip reef sharks are followed by prospective males , which attempt to grasp her pectoral fin and maneuver the two of them into positions suitable for copulation . Females give birth to one to six pups every other year , after a gestation period of 10 ? 13 months .

Whitetip reef sharks are rarely aggressive towards humans , though they may investigate swimmers closely . However , spear fishers are at risk of being bitten by one attempting to steal their catch . This species is caught for food , though ciguatera poisoning resulting from its consumption has been reported . The IUCN has assessed the whitetip reef shark as Near Threatened , noting its numbers are dwindling due to increasing levels of unregulated fishing activity across its range . The slow reproductive rate and limited habitat preferences of this species renders its populations vulnerable to overfishing .

= Taxonomy and phylogeny =

The whitetip reef shark was first described by the German naturalist Eduard Rüppell as *Carcharias obesus* , in the 1837 *Fische des Rothen Meeres* (*Fishes of the Red Sea*) . His choice of the specific epithet *obesus* was curious , given that this shark is actually quite slender . Later in 1837 , Johannes Müller and Friedrich Henle moved this species into its own genus *Triaenodon* , from the Greek *triaena* meaning " trident " , and *odon* meaning " tooth " . As Rüppell did not originally designate a holotype , in 1960 a 31 @-@ cm @-@ long specimen caught off Jeddah , Saudi Arabia , was made the species lectotype . Other common names for this shark include blunthead shark , light @-@ tip shark , reef whitetip shark , and whitetip shark .

Once placed in the family Triakidae , the whitetip reef shark is now recognized by most authors as belonging to the family Carcharhinidae on the basis of morphological characters , such as a full nictitating membrane , well @-@ developed precaudal pit , strong lower caudal fin lobe , and scroll @-@ like intestinal valves . Morphological and molecular phylogenetic analyses suggest the whitetip reef shark is grouped with the lemon sharks (*Negaprion*) and the sliteye shark (*Loxodon*) in occupying an intermediate position on the carcharhinid evolutionary tree , between most basal genera (*Galeocerdo* , *Rhizoprionodon* , and *Scoliodon*) and the most derived (*Carcharhinus* and *Sphyrna*) .

= Distribution and habitat =

The Whitetip Reef Shark is distributed widely across the entire Indo @-@ Pacific region . It was once thought to have formerly existed in the Atlantic Ocean , based on fossil teeth found in North Carolina dating to the Miocene epoch . However , more recent research indicates that the teeth

belonged to a mackerel shark , and that this species has never colonized the Atlantic . In the Indian Ocean , it occurs from northern KwaZulu @-@ Natal , South Africa to the Red Sea and the Indian subcontinent , including Madagascar , Mauritius , the Comoros , the Aldabra Group , the Seychelles , Sri Lanka , and the Chagos Archipelago . In the western and central Pacific , it occurs from off southern China , Taiwan , and the Ryukyu Islands , to the Philippines , Southeast Asia , and Indonesia , to northern Australia , and is also found around numerous islands in Melanesia , Micronesia , and Polynesia , as far as Hawaii to the north and the Pitcairn Islands to the southeast . In the eastern Pacific , it occurs from Costa Rica to Panama , and off the Galápagos Islands .

Associated almost exclusively with coral reef habitats , whitetip reef sharks are most often encountered around coral heads and ledges with high vertical relief , and additionally over sandy flats , in lagoons , and near drop @-@ offs to deeper water . They prefer very clear water and rarely swim far from the bottom . This species is most common at a depth of 8 ? 40 m (26 ? 131 ft) . On occasion , they may enter water less than 1 m deep , and there is an exceptional record of a whitetip reef shark being captured from a depth of 330 m (1 @,@ 080 ft) in the Ryukyu Islands .

= = Description = =

A relatively small species , few whitetip reef sharks are longer than 1 @.@ 6 m (5 @.@ 2 ft) . The maximum length this species attains is often given as 2 @.@ 1 m (6 @.@ 9 ft) , though this was originally based on visual observations and may be dubious . The maximum reported weight is 18 @.@ 3 kg (40 lb) . The whitetip reef shark has a slim body and a short , broad head . The snout is flattened and blunt , with large flaps of skin in front of the nares that are furled into tubes . The eyes are small and oval with vertical pupils and prominent ridges above , and are often followed by a small notch . The mouth has a distinct downward slant (imparting a disgruntled expression to the shark) , with short furrows at the corners . There are 42 ? 50 tooth rows in the upper jaw and 42 ? 48 tooth rows in the lower jaw . Each tooth has a single narrow , smooth @-@ edged cusp at the center , flanked by a pair of much smaller cusplets .

The first dorsal fin is positioned well back on the body , closer to the pelvic than the pectoral fins . The second dorsal and anal fins are large , about half to three @-@ quarters as high as the first dorsal fin . The broad , triangular pectoral fins originate at or slightly before the level of the fifth gill slit . There is no ridge between the first and second dorsal fins . The lower lobe of the caudal fin is half the length of the upper , which has a strong notch near the tip . The dermal denticles are small and overlapping , usually with 7 horizontal ridges , giving the skin a smooth feel . The coloration is grayish to brownish above and white below , with a pattern of scattered small , dark spots unique to each individual . The tips of the first dorsal fin and upper caudal fin lobe , and sometimes also the second dorsal fin and lower caudal fin lobe , are bright white .

= = Biology and ecology = =

The whitetip reef shark is one of the three most common sharks inhabiting the reefs of the Indo @-@ Pacific , the other two being the blacktip reef shark (*Carcharhinus melanopterus*) and the grey reef shark (*Carcharhinus amblyrhynchos*) . The habitat preferences of this species overlap those of the other two , though it does not tend to frequent very shallow water like the blacktip reef shark , nor the outer reef like the grey reef shark . The whitetip reef shark swims with strong undulations of its body , and unlike other requiem sharks can lie motionless on the bottom and actively pump water over its gills for respiration . This species is most active at night or during slack tide , and spends much of the day resting inside caves singly or in small groups , arranged in parallel or stacked atop one another . Off Hawaii , these sharks may be found sheltering inside underwater lava tubes , while off Costa Rica they are often seen lying in the open on sandy flats .

Whitetip reef sharks generally remain within a highly localized area ; only rarely do they undertake long movements , wandering for a while before settling down somewhere new . One study at Johnston Atoll found that none of the sharks examined had moved more than 3 km (1 @.@ 9 mi) away from their original capture location over periods of up to a year . Another study at Rangiroa

Atoll in French Polynesia found that , after more than three years , around 40 % of the originally tagged sharks were still present on the same reef where they were first captured . An individual shark may rest inside the same cave for months to years . The daytime home range of a whitetip reef shark is limited to approximately 0 @. @ 05 km² (0 @. @ 019 sq mi) ; at night this range increases to 1 km² (0 @. @ 39 sq mi) . These sharks are not territorial and share their home ranges with others of their species ; they do not perform threat displays .

Important predators of the whitetip reef shark include tiger sharks (*Galeocerdo cuvier*) , Galapagos sharks (*Carcharhinus galapagensis*) , and possibly also silvertip sharks (*Carcharhinus albimarginatus*) , though they usually occur at depths greater than those favored by whitetip reef sharks . An 80 cm (31 in) long whitetip reef shark has also been found in the stomach of a giant grouper (*Epinephelus lanceolatus*) , though these groupers are unlikely to be significant predators of this species due to their rarity . Known parasites of the whitetip reef shark include the copepod *Paralebion elongatus* and the praniza (parasitic) larvae of the isopod *Gnathia grandilaris* . While resting during the day , these sharks have been observed being cleaned by the wrasse *Bodianus diplotaenia* and the goby *Elacatinus puncticulatus* . Unusually , there is also a report of seven whitetip reef sharks adopting a cleaning posture (mouth agape and gills flared) in the midst of a swarm of non @-@ cleaning hyperiid amphipods ; the mechanical stimulation from the moving amphipods are thought to have evoked this behavior through their similarity to actual cleaner organisms .

= = = Feeding = = =

With its slender , lithe body , the whitetip reef shark specializes in wriggling into narrow crevices and holes in the reef and extracting prey inaccessible to other reef sharks . Alternatively , it is rather clumsy when attempting to take food suspended in open water . This species feeds mainly on bony fishes , including eels , squirrelfishes , snappers , damselfishes , parrotfishes , surgeonfishes , triggerfishes , and goatfishes , as well as octopus , spiny lobsters , and crabs . The whitetip reef shark is highly responsive to the olfactory , acoustic , and electrical cues given off by potential prey , while its visual system is attuned more to movement and / or contrast than to object details . It is especially sensitive to natural and artificial low @-@ frequency sounds in the 25 ? 100 Hz range , which evoke struggling fish .

Whitetip reef sharks hunt primarily at night , when many fishes are asleep and easily taken . After dusk , groups of sharks methodically scour the reef , often breaking off pieces of coral in their vigorous pursuit of prey . Multiple sharks may target the same prey item , covering every exit route from a particular coral head . Each shark hunts for itself and in competition with the others in its group . Unlike blacktip reef sharks and grey reef sharks , whitetip reef sharks do not become more excited when feeding in groups and are unlikely to be stirred into a feeding frenzy . Despite their nocturnal habits , whitetip reef sharks will hunt opportunistically in daytime . Off Borneo , this species gathers around reef drop @-@ offs to feed on food brought up by the rising current . Off Hawaii , they follow Hawaiian monk seals (*Monachus schauinslandi*) and attempt to steal their catches . A whitetip reef shark can survive for six weeks without food .

= = = Life history = = =

Like other members of its family , the whitetip reef shark is viviparous ; once the developing embryos exhaust their supply of yolk , the yolk sac is converted into a placental connection through which the mother delivers nourishment for the remainder of gestation . Mature females have a single functional ovary , on the left side , and two functional uteruses . The reproductive cycle is biennial .

Mating is initiated when up to five males follow closely behind a female and bite at her fins and body , possibly cued by pheromones indicating the female 's readiness . Each male attempts to seize the female by engulfing one of her pectoral fins ; at times two males might grasp a female on both sides simultaneously . Once engaged , the sharks sink to the bottom , whereupon the male (or males) rotates one of his claspers forward , inflates the associated siphon sac (a subcutaneous

abdominal organ that takes in seawater that is used to flush sperm into the female) , and attempts to make contact with the female 's vent . In many cases , the female resists by pressing her belly against the bottom and arching her tail ; this may reflect mate choice on her part . The male has a limited time in which to achieve copulation , as while he is holding the female 's pectoral fin in his mouth he is being deprived of oxygen . On the other hand , if the female is willing , the pair settles side @-@ by @-@ side with their heads pressed against the bottom and their bodies at an upward angle .

After a gestation period of 10 ? 13 months , females give birth to litters of 1 ? 6 (usually 2 ? 3) pups . The number of offspring is not correlated with female size ; each female produces an estimated average of 12 pups over her entire lifetime . Parturition occurs from May to August (autumn and winter) in French Polynesia , in July (summer) off Enewetak Atoll , and in October (summer) off Australia . Females give birth while swimming , making violent twists and turns of their bodies ; each pup takes under an hour to fully emerge . The newborns measure 52 ? 60 cm (20 ? 24 in) long and have relatively longer caudal fins than adults . This shark develops slowly compared to other requiem sharks ; newborns grow at a rate of 16 cm (6 @.@ 3 in) per year while adults grow as a rate of 2 ? 4 cm (0 @.@ 79 ? 1 @.@ 57 in) per year . Sexual maturity is reached at a length of around 1 @.@ 1 m (3 @.@ 6 ft) and an age of 8 ? 9 years , though mature males as small as 95 cm (37 in) long have been recorded from the Maldives , suggesting regional variation in maturation size . On the Great Barrier Reef , males live to 14 years and females to 19 years ; the maximum lifespan of this shark may be upwards of 25 years . In 2008 , a whitetip reef shark produced a single pup through possibly asexual means at the Nyiregyhaza Centre in Hungary ; previous instances of asexual reproduction in sharks have been reported in the bonnethead (*Sphyrna tiburo*) and the blacktip shark (*Carcharhinus limbatus*) .

= = Human interactions = =

Unlike its Oceanic cousin , the white tip reef shark is more harmless and is seldom aggressive unless provoked . They are also fearless and curious , as the whitetip reef sharks may approach swimmers closely to investigate . However , these sharks readily attempt , and quite boldly , to steal catches from spear fishers , which has resulted in several people being bitten in the process . In some places , local whitetip reef sharks have learned to associate the sound of a speargun discharge or a boat dropping anchor with food and respond within seconds . As of 2008 , the International Shark Attack File lists two provoked and three unprovoked attacks to this species . Whitetip reef sharks are well @-@ suited to ecotourism diving , and with conditioning they can be hand @-@ fed by divers . In Hawaiian mythology , the fidelity (i.e. " loyalty ") of whitetip reef sharks to certain areas of the reef for years at a time may have inspired belief in ?aum?kua , the spirits of family ancestors that take animal form and protect their descendants .

The whitetip reef shark is taken by fisheries operating off Pakistan , India , Sri Lanka , Madagascar , and likely elsewhere , using longlines , gillnets , and trawls . The meat and liver are eaten , though sharks from certain areas present a substantial risk of ciguatera poisoning (especially the liver , which contains a much higher concentration of the toxin than the meat) . The International Union for Conservation of Nature (IUCN) has assessed this species as Near Threatened , as its numbers have dropped in recent decades due to increasing , and thus far unregulated , fishing pressure in the tropics . Its restricted habitat , low dispersal , and slow reproduction are factors that limit this shark 's capacity for recovering from overfishing . On the Great Barrier Reef , populations of whitetip reef sharks in fishing zones have been reduced by 80 % relative to no @-@ entry zones . Furthermore , populations in no @-@ take zones , where boats are allowed but fishing prohibited , exhibit levels of depletion comparable to fishing zones due to poaching . Demographic models indicate that these depleted populations will continue to decline by 6 @.@ 6 ? 8 @.@ 3 % per year without additional conservation measures .