GREAT WHITE SHARKS

Carcharodon carcharias [pronounced: car-care-o-don car-carryas]

ORDER: Lamniformes
FAMILY: Lamnidae
GENUS: Carcharodon
SPECIES; carcharias

Space for picture

The great white shark is the world's largest known predatory fish, and the only one which preys regularly on marine mammals as well as on large fish. Sharks have existed as a group for over 350 million years and share a close evolutionary history with rays and skates which, unlike true fish, have a cartilaginous skeleton rather than internal bones. Despite its ancient heritage, white sharks are far from primitive, and are in fact highly efficient and specialized hunters. Once thought to be solitary, they apparently can be social with a distinctive pecking order, especially around food sources. They may be long-lived and have a low reproductive rate; there are many unanswered questions about great white sharks. Currently there are no population estimates.

RANGE AND HABITAT

Great white sharks are found in mainly cold to warm temperate waters worldwide, and larger individuals are known to go to the tropics. They are mainly coastal (they will enter the surf and shallow bays), but are also found around offshore continental islands. Large great whites travel across open ocean and sometimes are found around oceanic islands. They range from the surface down to the seabed at depths of at least 4200 ft.; one source states depths up to 6,150 ft. Most populations are small and highly localized, with the greatest concentrations in California, South Africa and Australia, and a population in the Mediterranean.

In the eastern North Pacific great white sharks are found from the Gulf of Alaska to the Gulf of California. They are often seen near land where seals and sea lions congregate. Along the California coast, they seem to segregate by size: juveniles and smaller adults are common south of Point Conception, particularly around the Channel Islands, whereas intermediate and large sharks are seasonally numerous in central and northern California waters.

Many of the larger white sharks around the Farallon Islands seem to be there from about August to February, although there are some around the Farallones all the time. Many migrate from the Farallones to open water for an unknown reason; in fact recent tagging has revealed huge migrations across the ocean. There is good evidence that individual sharks repeatedly return to the same location seasonally year after year. Biologists on the Farallon Islands have been able to identify individual great white sharks based on body markings; the seasonal occurrence of these sharks coincides with peaks in the seal populations around these islands. Females seem to show up around the Farallons every other year, and males appear every year.

Around Point Reyes white sharks are most often observed in August, September and October, coinciding with the seasonal peaks of pinnipeds. Most observations have been in the Point Reyes Headlands area, around McClures Rock, and around Tomales Point.

DESCRIPTION

Great white sharks have a stout, spindle-shaped body, with a short, conical snout and large black eyes. They have a large, high, triangular first dorsal fin and a large crescent-shaped caudal fin. The teeth are large, triangular, and serrated, ideally suited for sawing chunks out of large prey. There are actually many teeth, in rows; when a tooth is lost in feeding or for any other reason, a replacement will roll forward in the jaw in a matter of days to replace the lost tooth.

Rather than being all white, as the name suggests, great white sharks are actually dusky to dark gray or blue-gray above and white below (separated by a distinct line). This coloration makes the shark difficult to spot because when viewed from below it's just a minimal silhouette against the sunlight, and when seen from above the darker shade blends in with the sea. Their skin's surface is covered with what appear to be millions of tiny teeth (when viewed under a microscope); these "dermal denticles" are thought to reduce friction and drag as the shark swims.

Pups are 4-5 ft long at birth, and about 40-50 pounds. Females can be up to 21 ft (possibly longer), males up to 15 ft or more. They can weigh over 4,000 pounds. They are warm blooded and maintain a body temperature higher than the water they swim in.

It is thought they live to about 30 years, although there is speculation that their lifespan could be much longer.

FEEDING

Great white sharks are primarily a visual predator. They do have a sense of smell and a sense of hearing, but sight is the main sense they use when hunting. They have voracious appetites, feeding mostly on bony fish, rays, carrion, and other sharks at the beginning of their lives, then switching to marine mammals as they grow. Occasionally they will eat birds, turtles, invertebrates, or even garbage.

Sharks are very powerful swimmers. While hunting marine mammals, they usually swim at the bottom of the ocean, looking up; when they spot something, they come up to investigate and engage in a swift, surprise attack from below the prey but usually near the surface of the ocean. Their teeth hit the prey first; their eyes roll back in the sockets to be protected from the flailing teeth and claws of the prey. Sometimes sharks even leap out of the water in pursuit. Often they rush up to their prey, inflict a potentially fatal bite, then back away while the animal dies. The shark then returns to either eat the prey or take it to a different place to be eaten later.

The white sharks in our area prey on seals and sea lions, and they scavenge on dead whales, which provide them with the richest energy source possible. In fact whale carcasses often attract a group of sharks to feed on it. White sharks may eat different things in other areas.

White sharks do not typically prey upon humans, but they are an extreme threat if humans are in their area. Even if a shark attacks a human, it often does not eat the person. In fact shark attacks on humans are often believed to be cases of mistaken identity. Great whites have also been observed many times in the presence of people swimming and surfing, where the shark will investigate, then swim away. In spite of the potentially high risk, given the number of people using beaches each year, the attack rate by great white sharks is extremely low.
The only known predator of great white sharks, besides man, is orca.

MATING AND BREEDING

There are many unanswered questions about white shark mating and breeding behaviors. The gestation period is unknown; it could be about 12 months or even as long as 18 months. The female may have 7 – 9 babies at once, but a birth has never been observed. There seems to be a high mortality rate during the first year of life. The males mature about 9 – 10 years of age, and the females seem to mature between 11 and 15 years of age. All of this information could point to a slow rate of reproduction.

Not many pregnant females have been captured, therefore not much is known about where they go or when. It is thought that they may segregate away from the main population, perhaps to reduce the risk of predation, most likely by other great white sharks. It is thought the islands off Baja and southern California may be pupping and nursery areas for white sharks off our coastline.

STATUS

White sharks are not protected worldwide. In fact in some areas not yet protecting them, they have become a popular trophy fish, especially for their fins, jaws and teeth, and their numbers have been significantly reduced. They are, however, protected in many areas, including South Africa, Australia, Gulf of Mexico, and the United States. There was a ban imposed on fishing for them in California in 1993.
Great white sharks are one of the top-level predators of the ocean, thus they play a crucial role in the marine ecosystem.

REFERENCES

Anderson, Scot. Presentations during Winter Wildlife Docent Training, December 2004 and 2006.

Carrier, Jeffrey C. 2006. Discovering Sharks. Voyageur Press, St. Paul, Minnesota.

Carwardine, Mark and Ken Watterson. 2002. The Shark Watcher's Handbook. Princeton University Press, Princeton, New Jersey

Chapple, Taylor. Presentation during Winter Wildlife Docent Training, December 2007.

Ebert, David A. 2003. Sharks, Rays, and Chimaeras of California. University of California Press, Berkeley and Los Angeles, California.

Perrine, Doug. 2002. Sharks. Voyageur Press, St. Paul, Minnesota.

Smith, Adam C. 2008. Point Reyes National Seashore Ocean Interpretation.