Carcharhinus leucas (Bull Shark)

Family: Carcharhinidae (Requiem Sharks)
Order: Carcharhiniformes (Ground Sharks)
Class: Chondrichthyes (Cartilaginous Fish)

Fig. 1. Bull Shark, *Carcharhinus leucas*.

[http://animals.nationalgeographic.com/animals/fish/bull-shark/, downloaded 8 November 2011]

TRAITS. *Carcharhinus leucas*, which are a near threatened species, are known as bull sharks because of the presence of a short broad bluntly rounded snout (Curtis, 2011) (Fig. 2). They have small eyes, broad triangular shaped and heavily serrated upper teeth (MarineBio.org, 2011) and narrow triangular teeth with fine serrations (Fig. 2). The anterior teeth are erect and symmetrical while the posterior are more oblique (Curtis, 2011). These medium sized sharks (National Geographic, 2011) have thick robust bodies and lack an interdorsal ridge. The first dorsal fin is large and triangular with a pointed apex while the second dorsal fin is almost three times smaller than the first dorsal fin (Bonfil, 2004) as well as the pectoral fins of the shark are very large. The dorsal side of the shark tends to be a dark grey gradually becoming white on the ventral side. Young bull sharks have black tips on their fins which fade as they grow to become a hazy grey

colour (Curtis, 2011). There is some sexual dimorphism in bull sharks as females are usually larger than males probably due to them having a longer lifespan than males. Females typically grow to about 240 cm, weighing approximately 130 kg and live for around 16 years while males typically grow to about 225 cm, weighing approximately 95 kg and live for about 12 years. The average growth rate in the first four years of the sharks' lifespan is about 28 cm per year after which it drops to about 14cm per year (Curtis, 2011).

ECOLOGY. Bull sharks have the ability to tolerate a range of salinities ranging from hypersaline to freshwater for long periods of time. Hence these sharks can be found in almost any water system that is connected to allow the journey from one water system to the next. Because these sharks need warm water, they have a worldwide distribution in tropical and subtropical water and can sometimes be found in even be found wandering into warm temperate waters (IUCN, 2011). They can be found at depths of 1 metre to 150 metres in coastal areas (Curtis, 2011) but are most often found in coastal waters that are less than 20 metres with variable salinity and temperatures over 20°C. They also tend to utilize the same habitat for long periods of time before moving along the coast (with some venturing into open water) to other habitats. Some deep sea diving behaviour was observed but not properly investigated (Carlson *et al*, 2010).

SOCIAL ORGANIZATION. These sharks have been found to live in apparent communities in estuaries (Snelson *et al*, 1984), lakes (Tuma, 1976) and coastal areas (Carlson *et al*, 2010). However, these creatures are solitary (MarineBio.org, 2011) and only cross paths incidentally, or for feeding frenzies or mating. Very little research has been done on the structure of these shark populations and would be difficult as so little is known about them. The only know fact about the population structure is that the estuarine nurseries are made up entirely of sexually immature bull sharks with pregnant females coming to give birth to their young around May to July. Thereafter, the female leaves the estuary (Snelson *et* al, 1984) and her pups. Parental care is totally absent in this species of shark.

ACTIVITY. Shark activity largely depends on the temperature and currents of the water as feeding rates and migratory patterns are affected. Generally the sharks migrate away from the equator to subtropical waters when tropical waters increase in temperature (around June – August) and back to tropical waters when the subtropical waters begin to decrease in temperature (around September) (IUCN, 2011). The sharks show some horizontal movement and very limited vertical movement through the water column except on migratory pathways on which the shark was recorded to be diving at depths of up to about 100 metres in well mixed water (i.e. no thermocline). It was found that these sharks swim at shallower depths at night than during the day, however this observation may hold no merit biologically (Brunnschweiler *et al*, 2010). The shark appears to be docile as it swims through the water column slowly and sluggishly. However, its behaviour changes to that which one would expect of an apex predator when it is threatened or a feeding opportunity arises. It quickly bursts with speed toward its target and aggressively executes its attack (Animal Planet, 2011).

FORAGING BEHAVIOUR. Bull sharks are apex predators that hunt alone (MarineBio.org, 2011). They are opportunistic and indiscriminate scavengers that will feed on almost anything that is available. These sharks are known to feed on dead tissue. However, they also feed on

bony fish, elasmobranchs, arthropods, reptiles and even young sharks of the same and other species. They are also known to feed on items that are of no nutritional value to them such as vegetation, pebbles, bottles and other items (Tuma, 1976). Although these sharks swim in a slow and sluggish manner at the bottom of the water column, they can become quite fast and agile and can capture prey moving at speeds of up to 19 km/h (Curtis, 2011). There is no published data of swim speed in these sharks and as such the optimum speed was deduced from the catch in its stomach contents. There is no data to suggest that the feeding habits differed in any way among the adult male, adult female and the juveniles (Tuma, 1976). These sharks are known to have a hunting style that is both unpredictable and aggressive. While swimming slowly the shark suddenly in an unpredictable manner bursts with great speed towards its prey. As it approaches the prey with such speed it butts the prey head-on then attacks aggressively. It bites into the flesh of the prey and violently shakes its head from side to side in an effort to rip off pieces of flesh. This technique is referred to as the "bump and bite" technique (Fig. 4) (Animal Planet, 2011).

COMMUNICATION. Sharks are solitary creatures (MarineBio.org, 2011) and as such the communication among individuals is difficult to observe. Theoretically, the can detect sound at low frequencies as well as electrical signals. They may communication through aggressive acts toward one another displayed during feeding frenzies and rarely fight for territory but more so for food. They body display can also send non-verbal messages (Sharks-World.com, 2011) as in the case of mating where the male bites the female on her dorsum (MarineBio.org, 2011).

SEXUAL BEHAVIOUR. Mating occurs between a sexually mature male and a sexually mature female, and usually occurs in the months of June to August in the warmest waters within the sharks' range. The process involves courtship which usually leaves the female with mating scars (Curtis, 2011). Courtship involves the pairing of the sharks in a clinch, males then nibble or bite at the females dorsum and hold the female's pectoral fin in its mouth (Fig. 5) (MarineBio.org, 2011). The female's eggs are then fertilized after which she goes through a gestation period of about 10 to 12 months. Females carrying near-term embryos start to move to shallower waters closer to the shore around April. Around May to July, the female then moves into an estuary where she then gives birth (Snelson *et* al, 1984) to live, free swimming young (Curtis, 2011). After partus, the female then leaves the estuary (Snelson *et al*, 1984).

JUVENILE BEHAVIOUR. Juveniles are born in litter with a size of about 1 to 13 young per litter, at a size of around 60 to 80 cm in length (MarineBio.org, 2011). They are born into an estuary or lagoon nursery around May to July and stay there until the onset of sexual maturity at around which time they are fully adapted to coping with varying salinities. As they approach sexual maturity, 80 to 109 cm in total length, they temporarily leave the estuary. Juveniles have the same feeding behaviours as in the adults, however food sizes tend to be smaller (Tuma, 1976).

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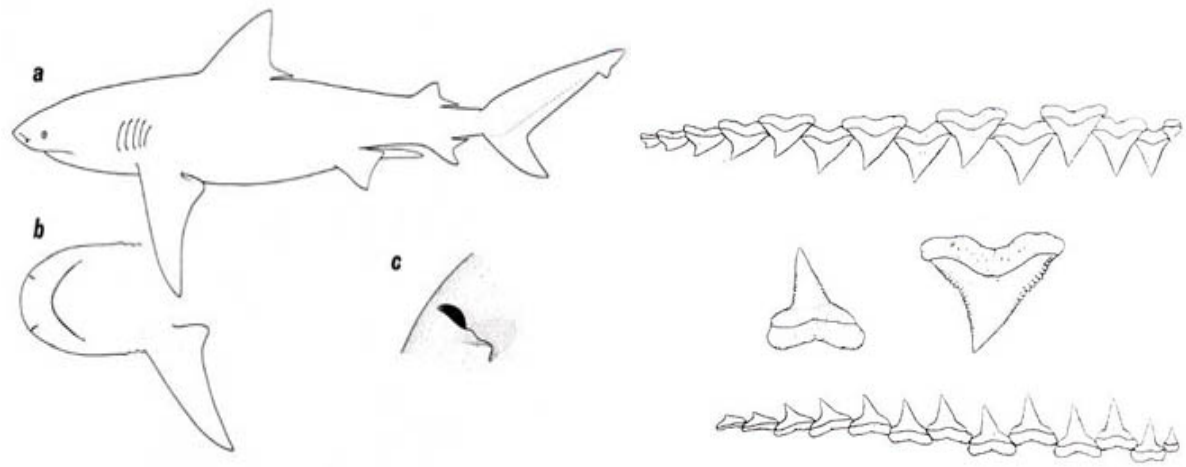

Fig. 2. External features and dentition of *Carcharhinus leuas*.

[http://www.flmnh.ufl.edu/fish/Gallery/Descript/bullshark/bullshark.htm, downloaded 8 November 2011]

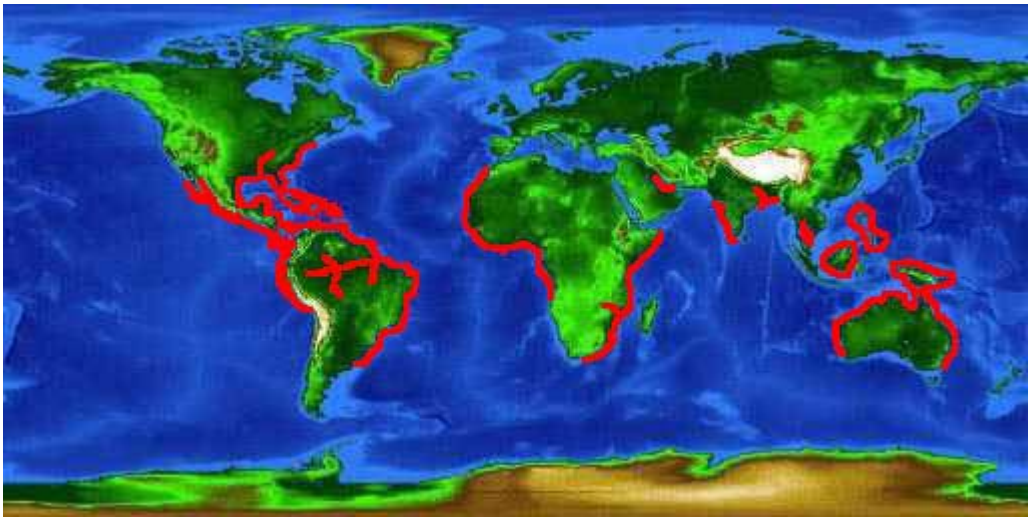

Fig. 3. Worldwide distribution of *Carcharhinus leucas*.

[http://www.flmnh.ufl.edu/fish/Gallery/Descript/bullshark/bullshark.htm, downloaded 8 November 2011]

Fig. 4. Bull shark feeding using the bump and bite technique.

[http://fijisharkdiving.blogspot.com/2010/07/opah.html, downloaded 8 November 2011]

Fig. 5. Bull sharks displaying courtship behaviour.

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