

Manta birostris (Giant Manta Ray)

Family: Myliobatidae (Eagle and Manta Rays)

Order: Rajiformes (Rays and Sawfish)

Class: Chondrichthyes (Cartilaginous Fish)



Fig. 1. Giant manta ray, *Manta birostris*.

[<http://nickseaworld.wordpress.com/> downloaded 12 November 2012]

TRAITS. The largest species of manta with a wing span of 7 m, an adult *manta birostris* can be recognized by its flat body and its large triangular pectoral fins as well as projecting cephalic fins. Projecting anteriorly on either side of its head can be found forward extensions of the pectoral fins. The cephalic fins are two times as long as the base is wide with each cephalic lobe (tip to mouth) making up 14% of the disc width. When swimming the cephalic fins are rolled like spiral and are flattened when eating. The ventral portion of their bodies is usually white with the dorsal half being black, dark bluish, or greyish with pale edges. The eyes are located laterally and behind the cephalic fins allowing acute vision downward and forward however vision behind it is impaired. They possess spineless tails which in males contain a clasper (male sex organ); females contain a cloaca. Their mouth is located to the front of their body as well and contains 18 rows of non functional teeth on the bottom jaw. The gills are located on the dorsal side its body. They contain no bone, only cartilage (Marshall 2009).

ECOLOGY. Found in tropical, subtropical and temperate waters worldwide between 35°N and 35°S latitudes. Mantas can be found in the western Atlantic Ocean (South Carolina to Brazil), the Indo Pacific and the east coast of Africa; they are more or less circumglobal. Typically manta rays are filter and bottom feeders whose main foods are plankton and fish larvae. They consume on average 20 to 30 kg of plankton per day. Their prey and habitat overlap with other filter feeders such as blues whale, whale sharks and other filter feeders. They are solitary but however have high commensalism interactions with opportunistic scavengers such as remoras who feed on parasites on the manta and in doing so clean the mantas.

SOCIAL ORGANIZATION. Manta rays are mostly solitary creatures especially among themselves; they are more likely to come in contact with other sharks and fishes. However they interact with each other during mating where they chase each other and mimic each other's behaviour. They are also seen together when they are migrating to warmer waters, proceeding to cleaning stations or if they are feeding. They are migratory and as such aren't territorial. As they are individualistic there is no hierarchy among them. They are seasonal visitors to coastal sites with their presence being more common and predictable at specific times of the year at some sites (aggregation sites); Smilan islands Thailand, Isla de la Plata Ecuador and Isla Holbox Mexico. Mantas frequently gather at specific reef sites referred to as cleaning stations where they employ fish (remoras) to clean wounds and remove parasites. Apart from the occasional gathering, mantas can be observed leaping out of the water and into the air in succession, a process termed breaching (Fig. 2). The immediate purpose of breaching still remains uncertain.

ACTIVITY. Not much is known about the activity of mantas. They are circumglobal and spend most time off shore. However they come inshore to known sites better known as cleaning stations. They also come inshore to feed or mate.

FORAGING BEHAVIOUR. Not much is known about the feeding behaviour of *M. birostris*. However what we do know is that they are filter and bottom feeders. They feed on plankton and small crustaceans. They use their cephalic fins to channel plankton rich water to their mouth. The water is then directed over their gills where gill rakers trap the plankton. It was suggested based on the finding of fragments resembling that of shrimp shells in the stomach contents of a *M. birostris* that they consume shrimp as well. It has been noted that they feed alone or in groups. When feeding alone where plankton is abundant mantas orient themselves vertically and begin to roll backwards a technique describe as barrel rolling which is a form of ram jetting. They also feed at the bottom and use their cephalic fins to aid in retrieving plankton that sank to the floor. In groups they chain feed i.e. line up behind each other head to tail and feed together, other times they cyclone feed and this is when they swim together closely packed to create a cyclone. Sometime mantas can be observed using their cephalic fins to direct small fish up against a beach and channel them into their mouths. Mantas feed both during the day and the night however based on the fact that plankton is more abundant at the night when they rise to the surface it has been suggested that feeding is more prevalent during the night.

COMMUNICATION. Mantas are usually solitary and as such hardly communicate with each other. However they would still need to find food, mates and sense predators. As such they are armed with various information processing systems such as olfaction, visual and mechanosensory systems as they navigate their aquatic world. Mantas have a good sense of taste

which allows them to detect bicochemicals released by other organisms. The hearing sense of mantas is unknown however it has been suggested that the splashing sound made by mantas when breaching is a means of communicating with each other. An experiment conducted on a captive manta proved that mantas use visual and olfactory senses in feeding. A feed bucket (visual) and the scent of shrimp (olfaction) were used to feed the manta at a particular time every day. It was proven that the manta was able to remember the time of day it was fed when these aids weren't used.

SEXUAL BEHAVIOUR. Female mantas are sexually mature around 8-10 years. They are considered to be oviparous because they birth to one live young that hatches from an egg inside the mother. Little is known on the sexual behaviour of mantas, however observations made off Japan suggest that courtship can last for a good few days involving a number of males following a female in what is described as a “mating train”. Eventually one male succeeds and copulation begins. This usually occurs in summer. The only documented copulation of *M. birostris* observed off Japan stated that copulation has 5 distinct behaviours: chasing behaviour, biting behaviour, copulating behaviour, post copulating behaviour and separation behaviour. Copulation is abdomen to abdomen and occurs after the males chase the female for around 20 minutes at a speed of 10km/hr a depth of 1 metre under the water's surface in shallow waters. The female's left pectoral fin is grasped in the mouth of the male (Fig. 3) and the male's clasper inserted into the cloaca for 90 seconds. Gestation lasts for 12 months with the female giving birth to one live young. Before birth the pup feeds from uterine milk inside the mother. Usually one offspring is born and births take place every 2-5 years. (Marshall 2009). Mating usually results in scarring of the left pectoral fin in females (Marshall and Bennett 2008).

JUVENILE BEHAVIOUR. Pups weigh in at approximately 20 pounds at birth and are left to fend on their own after birth. Most will die but those that survive go on to feed on plankton for a year and then move on to deeper oceans. Pups are playfull and can be seen breaching regularly and are more social and playfull than adults.

ANTIPREDATOR BEHAVIOUR. Due to their size mantas have few predators; man and warm water sharks (tiger sharks) and killer whales. They only defence mechanism mantas have is their size and their large pectoral fins. It has been noted that when they come in rapid or sudden contact with humans the roll over and swim away or dive and only right themselves when they are a good distance away.

REFERENCES

- Marshall, A., & Bennett, M. (2008). Cleaning Behaviour of a Photographically Identified Population of Manta Rays in Southern Mozambique. Paper presented at the 2008 Joint Meeting of Ichthyologists and Herpetologists, Montreal, Canada.
- Marshall, A. D. (2009). Biology and population ecology of *Manta birostris* in southern Mozambique. PhD Thesis, University of Queensland.

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Fig. 2. *Manta birostris* breaching.

[<http://samshelby.blogspot.com/> downloaded 19 November 2012]



Fig. 3. Mating behaviour of *M. birostris*.

[<http://www.mantatrust.org/about-mantas/sexual-selection/> downloaded 19 November 2012]