

# MANTA INFORMATION

**GENERAL DESCRIPTION:** Manta rays are large graceful sea animals that live in tropical, sub-tropical and temperate waters worldwide. Their side or pectoral fins have evolved into wide triangular wings that they use to easily propel themselves through the water. With wing spans reaching over 20' across, manta rays are one of the largest animals in the ocean. Their broad blanket-like bodies earned them the name *manta* that means cloak or blanket in Spanish. In Hawaiian, they are called *hahalua*.

**RELATIVES:** Manta rays are related to sharks. Sharks and rays are cartilaginous fishes as opposed to bony fishes. Rays and sharks are called elasmobranchs. Loosely translated, *elasmos* means plate-like or beaten metal and *branchia* means gills in Latin. Manta rays belong to the family of rays referred to as devil rays, scientifically called *Mobulidae*. Devil rays share the common characteristic of cephalic or head fins. When unfurled, the fins help to funnel in food and water into the mouth. To make the fins more streamlined, devil rays can roll up these flexible appendages. When furled, these fins were thought to resemble a devil's horns, hence the name.

**SPECIES:** Based on the most recent study conducted by Dr. Andrea Marshall (2009), manta rays are divided into two different species: *Manta birostris* and *Manta alfredi*. The *Manta birostris* rays are more oceanic and migratory. They are regularly sighted at offshore islands, oceanic seamounts, and submarine ridge systems. *Manta birostris* are located in the Atlantic, Indian and Pacific oceans. This species can reach up to 22' across. *Manta alfredi* is a smaller species that has an average size of 11' across. This species is commonly sighted near shore around coral or rocky reefs, often times in residential groups. The species is widespread in tropical waters and found in the Atlantic, Indian, and Pacific oceans. *Manta birostris* is occasionally sighted along the Kona Coast usually off the points. *Manta alfredi* is the species of manta ray sighted on the Kona Manta Ray Night Dive.

**COLOR AND MARKINGS:** Typically, manta rays are black dorsally with white dorsal "shoulder bars". While the dorsal coloration is relatively similar in mantas worldwide, their ventral side can be very different. Typically, *Manta birostris* has few spots ventrally with wide gray bands along the back edge of the wings. *Manta alfredi* has big blotchy spot patterns ventrally located. These spot patterns are unique to each manta and can be used for accurate identification. The most extreme difference in manta coloration comes with the "black manta". These mantas are predominantly black on their ventral surface with small spots or patches of white. Both *Manta birostris* and *Manta alfredi* species have a black coloration. Both black and white mantas can be seen together in some locations, however the white color morphology is always more dominant. Black mantas are sighted occasionally on the Kona coast.

**EVOLUTION:** Most rays, like the well known sting ray, dwell on the ocean bottom and feed on mollusks and other animals that inhabit the sea floor. Manta rays started out as bottom feeders long ago, but over time evolved into surface feeders taking advantage of the abundant microscopic animals that inhabit the open water. The mouths of bottom dwelling rays are located on the underside of their bodies and have strong sucking and crushing ability to pulverize shellfish and other bottom dwelling prey. The mouth of the manta ray has migrated to the front edge of its body and has expanded in size considerably. The broad mouth is large and deep inside and used to swallow immense quantities of water and food. The manta ray, like all devil rays, has developed head fins called cephalic fins to enhance their feeding ability. These specialized fins help funnel food and water into their cavernous mouths.

Bottom dwelling rays “breathe” by using spiracles, openings on top of their head that allow water to enter the body and be pumped past their gills. Manta rays still possess spiracles, however they are small and non-functional. Instead, mantas remove oxygen from water that enters their mouth and passes over their gills. For self-defense, bottom dwelling rays use camouflage whether by color, spot patterns, and/or covering their bodies in sand or debris of the ocean floor. They have eyes located on their topside that look out and ahead. This exposes their most vulnerable point behind them. Consequently these bottom dwelling rays, such as the stingray, have sharp spines at the base of their tails for defense. Manta rays use their size and fast maneuverable swimming ability for defense that has rendered tail stingers unnecessary. All that remains to indicate their evolutionary past is a small pit at the base of their tail where the spine used to be and a small piece of cartilage under their skin.

**GENDER:** Males are distinguished from females by the presence of two claspers (male sex organs) located adjacent to the inside edge of each pelvic fin. In baby males like the Baby Huey, Taz, and Iki, the claspers appear as buds at the base of the pelvic fins. In mature males like Shadow and Kong, the claspers extend well past the pelvic fins. Males also possess clasper glands that are located at the base of each clasper. Males and females also have a cloaca that is a cavity where intestinal, urinal, and reproductive (female) canals come together. The cloaca can be seen as a slit that starts at the upper junction where the pelvic fins meet and runs vertically toward the belly for a few inches.

**COURTSHIP AND MATING:** When a female is ready to mate, males chase after her and form a train. We have seen four to eight manta rays following one female here on the Kona Coast, although trains up to 20 males have been reported. When mating, the male will swim on top of the female, grab the tip of her wing in his mouth, and insert a clasper into her cloaca. The couple stays attached for a few seconds until the mating ends and the female swims away.

**REPRODUCTION:** Manta rays are ovoviviparous which in Latin breaks down to *ovum* (egg), *vivius* (alive), and *papere* (to produce). In other words, manta rays produce live young hatched from an egg. Baby manta rays hatch in the female's oviduct from a thin membranous egg case and remain inside of the mother until they are fully developed. Babies are born with their pectoral fins folded over themselves. When they stretch out their "wings," they are known to be approximately 3' across. The smallest manta ray we have documented is Iki. We first saw him swimming near Kailua Pier on July 30, 1996. At that time, he looked like a toy manta ray because he was only 3' across. He was named Iki because it means "small" in the Hawaiian language.

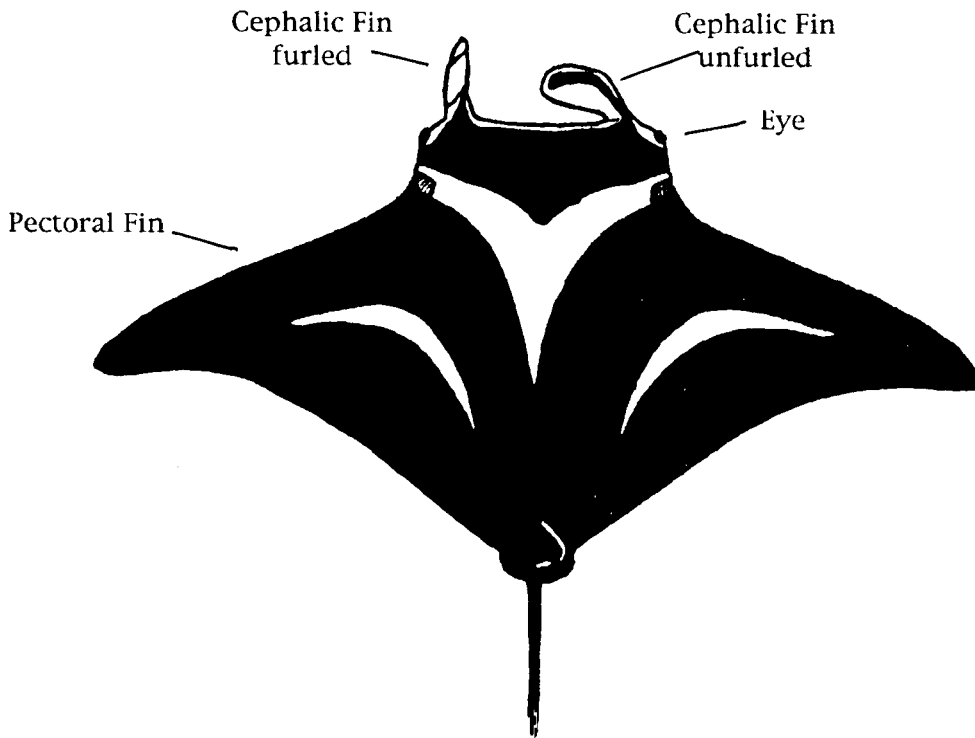
**CLEANING:** Manta rays have a symbiotic relationship with cleaner fish. The rays come to the reef hoping that cleaner fish will come to them. Often times, the rays will frequent the same area and these are referred to as cleaning stations. We know of cleaning stations at Keauhou Bay and Ho'ona Bay (Garden Eels dive site) on the Kona Coast and Olowalu reef off of Maui. We commonly see the Hawaiian cleaner wrasse (*Labroides phthirophagus* - the 3" florescent purple and yellow fish) hover over the manta's body picking away at parasites and tissue.

**FEEDING:** Manta rays are one of the largest animals in the ocean, and yet they feed on some of the smallest animals. Manta rays feed on microscopic organisms such as copepods, mysids (minuscule shrimp-like animals) along with larvae of fish, lobster, and octopus that float and swim in the open water.

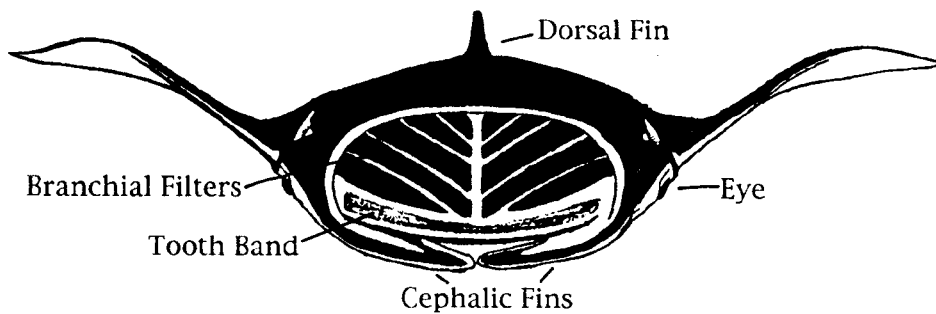
Manta rays, like basking sharks, push through the water with mouths wide open to capture the tiny animals suspended in the liquid. This type of feeding is called ram-jet filter feeding. This differs from the suction filter feeders such as whale sharks that suck in a mouthful of water and then push it out their gills. When manta rays swim through the water to feed, they frequently somersault repeatedly in the water column to capture concentrated masses of food. We see this regularly on the Kona Manta Ray Night Dive. With flexible bodies, the animals loop, pivot, and circle in a graceful acrobatic performance to maximize the feeding opportunity.

The wide mouth of the manta ray is located across the front edge of its head to facilitate filter feeding. The cephalic fins are located on each side of the mouth and aid in funneling water into the opening. When a manta ray opens his wide mouth, we can easily look inside the expansive interior. As the water passes through the body and out the gills, food and oxygen are trapped in five sets of meshwork plates, called branchial filters. Although they are filter feeders, manta rays still possess very small teeth that form a sandpaper-like band along the lower jaw only.

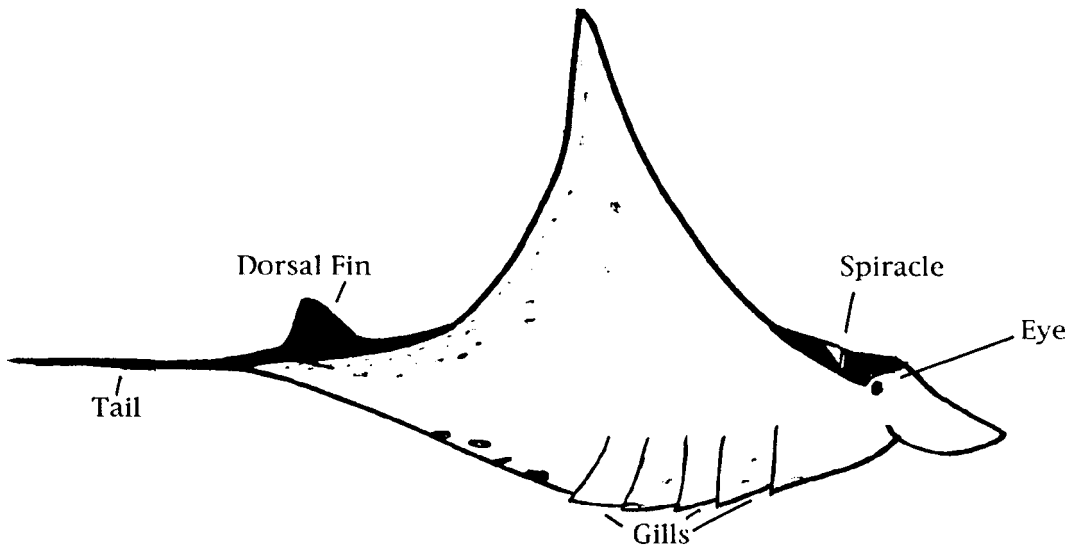
**DORSAL VIEW**



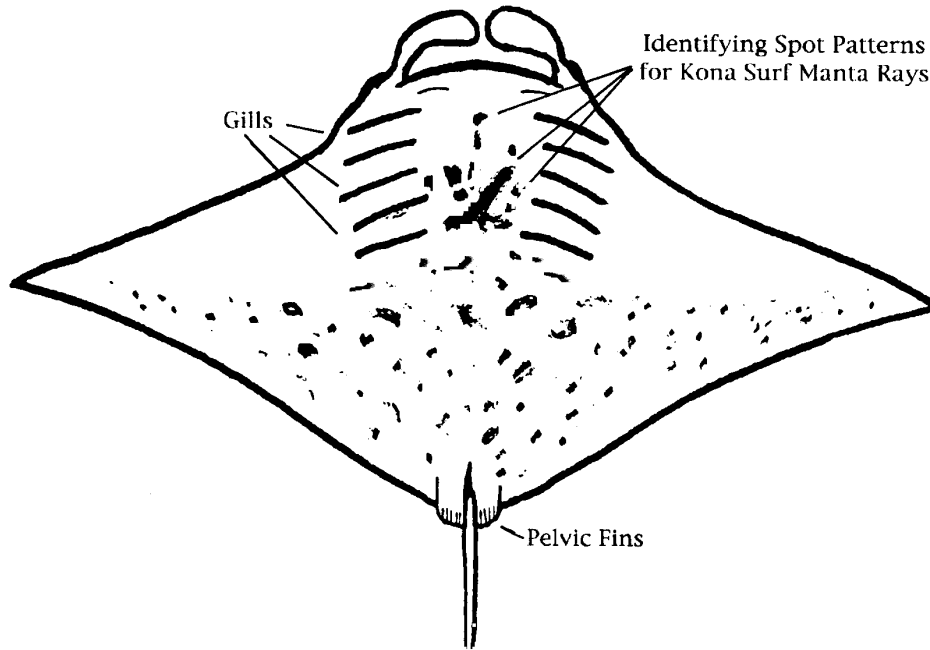
**ANTERIOR VIEW**



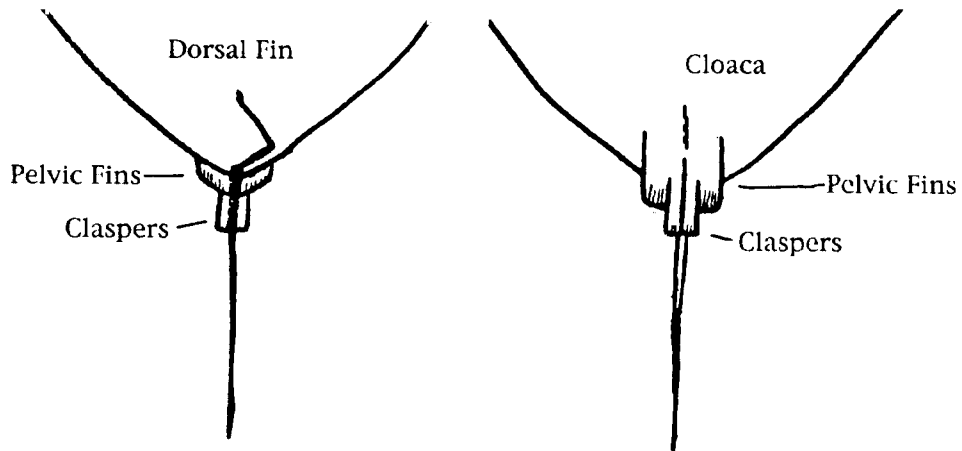
**LATERAL VIEW**



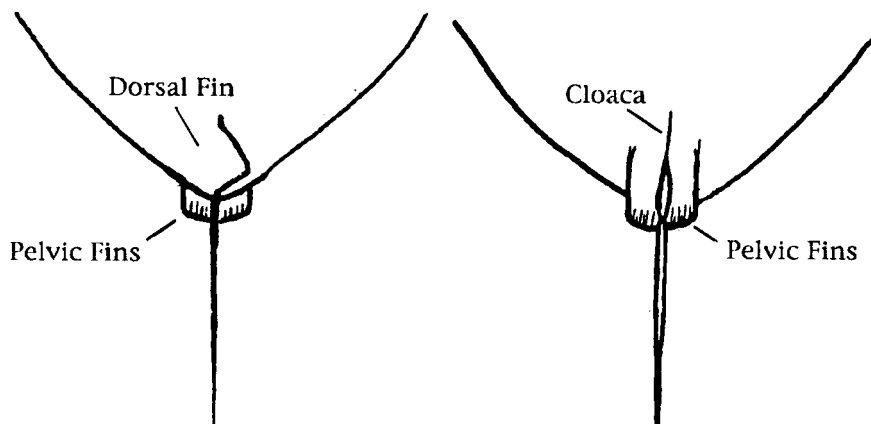
**VENTRAL VIEW**



**MALE MANTA ANATOMY**



**FEMALE MANTA ANATOMY**



These guidelines were originally drafted by the dive operators in Kona, Hawaii and PADI's Project AWARE. They're redistributed here by Manta Pacific Research Foundation. For more information go to [www.mantapacific.org](http://www.mantapacific.org).

## **GUIDELINES FOR YOUR MANTA RAY ENCOUNTER**

1. **OBSERVE ONLY:** No touching. Resist the urge to "pet" the mantas. This will rub off their protective mucus coating. Do not chase, grab, or try to take a ride on the mantas. This doesn't benefit the animal in anyway.
2. **DIVER POSITION:** Divers please stay on or near the sand, rubble or boulder bottom. An open water column is necessary for the mantas to maneuver. Avoid contact with coral, sea urchins, or other marine life. Form a semi-circle with your group.
3. **SNORKELER POSITION:** Snorkelers please stay on the surface. Do not dive down into the water column where the mantas are feeding.
4. **LIGHTS:** Divers please shine lights up into the water column to attract plankton. Snorkelers please shine lights down.
5. **BUBBLES:** Divers please avoid exhaling bubbles directly into the manta's face.
6. **TAKING PHOTOS or VIDEO:** Photographers and videographers please be considerate of others. Adhere to these guidelines and let the mantas come to you.

Manta Pacific Research Foundation (MPRF) is a 501 (c)(3) non-profit organization with a mission to study manta rays in their natural habitat, conduct scientific research, provide education programs for the public about manta rays and the marine environment, and to establish and promote manta ray conservation.

MPRF's research includes identifying local populations, collecting long term population data, and conducting scientific studies. For more information about manta rays and to access the full identification catalog, please visit [www.mantapacific.org](http://www.mantapacific.org).