

Seaside Chats

Manta Rays: The Mysterious Giants in our Backyard

Unanswered Questions

The following information provides responses to questions asked, but not answered, during live webinar. Most of these responses were copied directly from the Manta Trust website, scientific papers, and national marine sanctuary-associated websites. Links to the source websites are provided along with the responses. In addition, questions on similar topics have been grouped together.

Research:

Have you done research in the Tropical Eastern Pacific?

The Manta Trust is involved with Mobulid projects all around the world. You can find details on their website.

<https://www.mantatrust.org/our-affiliate-projects>

What is the deepest depth a manta has been, according to the tags?

A study referenced on The Manta Trust website lists a depth of 672 meters as the deepest known dive for reef manta rays. You can access the study at the link below.

<https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0228815>

What is the temperature difference between these deeper nightly foraging areas and the shallower daytime habitat?

A paper referenced on The Manta Trust website, "Diving behavior of the reef manta ray (*Mobula alfredi*) in New Caledonia: More frequent and deeper night-time diving to 672 meters," says that temperatures at depths greater than 300 meters were 20-26 degrees Celsius. You can access the paper at the link below.

<https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0228815>

How many tags do you deploy?

This depends on the research question. However, most studies require at least half a dozen individuals to produce meaningful results, and ideally many more. As tagging equipment is very expensive, studies can often only afford 5-15 tags at a time.

<https://www.mantatrust.org/tagging-and-tracking>

Has Josh published his findings on migration? If so, do you have the citation so that I can read?

There are several peer reviewed journal articles and papers listed on the Resources page of The Manta Trust website.

<https://www.mantatrust.org/resources>

How often are pregnant mantas encountered in the course of your research?

On manta rays, the male's mating grip causes scarring on the dorsal tips of the female's pectoral fins, leaving behind white and/or black circular and oblong marks. These dorsal mating scars are permanent and allow manta scientists to gauge what percentage of the female population consists of fully mature

females. The fresh mating wounds on the underside of the pectoral fins also allow scientists to plot recent matings, which can be used to track pregnancies and reproductive trends over the following years.

<https://www.mantatrust.org/mobulid-behavioural-ecology>

Have scientists sequenced their genome?

The Manta Trust Mobulid Genetics Project is based within the Conservation Science group at the University of Edinburgh. The focus of the Mobulid Genetics Project is to develop tools for the conservation and management of manta and devil rays worldwide. We are working to resolve mobulid taxonomy and uncover the factors driving the recent speciation within devil rays on a genome-wide scale. Furthermore, this project aims to characterise global population structure and infer demographic history in order to make robust conservation recommendations. Finally, we are working to provide a genetic means of species identification to both monitor fisheries and aid in the enforcement of CITES regulations.

<https://www.mantatrust.org/genetics>

Identification:

How broadly (globally) is the photo ID database shared?

IDtheManta was created to utilise the power of citizen science to aid in the research and conservation of the world's manta rays. Today we receive over 5,000 photo-ID submissions each year and, since its global roll-out in 2012, the IDtheManta Database has become the largest of its kind. Over 10,000 individual reef (*Mobula alfredi*) and oceanic (*Mobula birostris*) mantas have been identified, through more than 100,000 photographed sightings from over 70 countries.

<https://www.mantatrust.org/idthemanta>

Is identification of oceanic vs reef mantas the same worldwide?

In 2009, scientists established that there are at least two distinct species of manta ray; the giant oceanic manta (*Mobula birostris*), and the reef manta (*Mobula alfredi*). There are several morphological and behavioural differences that distinguish the species apart. The most obvious differences relate to their body size, their colouration, and their habitat use. However it's worth noting these are only rules of thumb - some mantas look very similar to the other species! There are also black-morph individuals found in both manta species. Genetic work is continuing to further define the true nature of this separation, both for mantas and devil rays.

<https://www.mantatrust.org/what-are-mobulids>

What is the difference between manta rays and sting rays?

Although they are related, stingrays and manta rays still have several differences. Manta rays do not have the infamous barb found on their tails, while stingrays utilize the barb as a defense mechanism. Manta rays have a wide mouth found at the front edge of their bodies with cephalic lobes (specialized, flap-like appendages) on either side that help funnel plankton and other small organisms into their mouths for filter feeding. This feeding method is ideal for manta rays as they spend their time in coastal and pelagic waters where they can swim through the water column collecting tiny marine organisms. Stingrays have a mouth on the underside of their bodies that is strong enough to crush clams and crustaceans that they find along the bottom of the ocean in coastal waters.

<https://marinesanctuary.org/blog/manta-rays-vs-stingrays/>

What's the delineator between manta and devil rays, size?

Devil rays are the manta's smaller and more elusive relatives. We know even less about devil rays than we do mantas; they are shy and elusive, making them harder to observe and study in the wild. Manta and devil rays (collectively known as mobulids) belong to a group of rays called the Myliobatiforms, which contain 12 families and about 370 species. Taxonomically within the Mobulidae family there is just one genus: Mobula, which contains ten species - two (possibly three) manta species and eight devil ray species.

<https://www.mantatrust.org/what-are-mobulids>

Life Cycle/Natural History:

At what age do they reach sexual maturity (both reef and oceanic manta rays)?

Estimates range from 6-15 years.

How long have mantas been around on Earth?

Manta and devil rays first appear in the fossil record around 28 million years ago; evolving from bottom dwelling rays, they adapted to life in the water column.

<https://www.mantatrust.org/what-are-mobulids>

Do mantas nurture their pups? If yes, for how long?

Manta and mobula rays give birth to live young that are small versions of their parents. Ready to fend for themselves, they are completely independent from birth.

<https://www.mantatrust.org/mobulid-behavioural-ecology>

Is mating/pupping seasonal?

Under natural conditions, where food is limited and variable, female reef manta rays cannot usually sustain continual reproductive cycles of mating, pregnancies, and births without rest periods in between. The females therefore usually need seasonal gaps in their reproductive cycles to build up their energy reserves. On average, reef manta rays around the world give birth approximately once every 2 to 3 years and in some locations the reproductive rate is as low as one pup every 7 years.

<https://www.mantatrust.org/mobulid-behavioural-ecology>

You mention there has been no document of a live birth. Is it thought mantas give birth at night or maybe in the deep?

Courtship rituals and mating events are observed relatively infrequently, and the only documented accounts of a manta ray giving birth come from a single female housed in a public aquarium in Japan. No mobula ray have ever been recorded giving birth. Many gaps still remain in our knowledge of the life history strategies and reproductive behaviour of these animals, and what little we do know is based on limited scientific data, much of which comes from observations on just one species; the reef manta ray.

<https://www.mantatrust.org/mobulid-behavioural-ecology>

How do mantas detect the zooplankton?

We observed feeding by both species on high-density zooplankton prey that was associated with the thermocline, suggesting that this prey aggregator may be important to the foraging ecology of both species. However, we also captured a variety of social and non-feeding behaviors that occurred within

the thermocline, suggesting that telemetry-based temperature and depth data alone cannot facilitate an evaluation of the relative importance of thermocline-associated feeding.

<https://www.int-res.com/abstracts/meps/v632/p145-158>

As opportunistic feeders, manta rays are capable of undertaking relatively large-scale movements between productive areas (up to 750 km) [3,4,8,13–17]. Some studies have shown that reef manta rays are also able to explore substantial depths (up to 432 m), presumably to feed on deeper zooplankton and other food resources [8,10,18–20]. These foraging strategies remain unclear and more detailed information on this behaviour and the associated drivers are needed.

<https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0228815>

How do they get the zooplankton off the “hairs” on their gills (gill rakers)?

A study by Misty Paig-Tran at California State University, Fullerton used 3D print models to answer just this question. It seems the gill rakers cause food to ricochet toward the throat rather than catch onto the food. You can read about her work at the link below.

<https://www.insidescience.org/news/manta-rays-filter-water-way-never-previously-seen>

Do they have any predators besides humans?

According to some reports, mantas may be attacked by sharks, killer whales, and false killer whales.

A lot of photos have large fish on the fins-if they aren't cleaner fish, what are they?

The large fish that attach to manta rays and sharks are called remoras. These fish have a modified dorsal fin that acts like a suction cup and allows them to attach to other animals. They do not harm the animals they attach to, but get a free ride and scraps of food for their efforts.

<https://sanctuaries.noaa.gov/earthisblue/wk252-remora.html>

Do they have teeth at all?

Yes, but only in the lower jaw. These are not used for feeding but play a role in manta courtship and mating. When a male mobula or manta bites hold of the female’s pectoral fin during mating it causes minor cuts and abrasions to the upper and lower surface of the female’s wing-tip. The male’s teeth on the lower jaw often leave linear scrapes on the underside of the female’s fins, which are visible as red scratches.

<https://www.mantatrust.org/mobulid-behavioural-ecology>

Do Mantas dwell on the bottom much like stingrays or is all of their life spent swimming in the water column?

Born into a life of perpetual motion, manta rays can never stop moving, as they must keep water flowing over their gills to respire. Their daily and seasonal movements are tuned to the ebb and flow of the ocean currents that breathe life into their world, bearing the planktonic food upon which they depend.

<https://www.mantatrust.org/what-are-mobulids>

What size is their brain?

They have the largest brain of all fish. Their obvious intellect and complex social interactions set manta rays apart from other fish.

<https://www.mantatrust.org/what-are-mobulids>

Behavior:

Is the FGB ban on touching manta rays risk-averse or is there evidence of impacts to mantas from gentle touching?

Mantas are very sensitive to disturbance, and if left without proper measures, tourism has the potential to do more harm than good. There have been occasions where uncontrolled human interactions have negatively impacted local manta populations, driving them away from important areas where they clean, feed or breed.

We've created our Manta Tourism Code of Conduct following years of research conducted with snorkelers and divers in the Maldives. But don't just take our word for it! For those interested in diving into the science that's shaped our Code of Conduct, we've made the original studies and reports available to download.

<https://swimwithmantas.org/>

(This is a website hosted by The Manta Trust specifically to address swimming with manta rays)

Conservation:

Is there any advice you have on how everyday people can help to save these creatures from becoming bycatch?

The great news is that as consumers we have the power to make a real difference for manta and devil rays, and other marine species, through the food that we choose to eat! The page below has some tips on how to make more environmentally responsible choices when you are food shopping or eating out.

<https://www.mantatrust.org/eat-sustainably>

Additional resources:

The Manta Trust webinars - <https://www.mantatrust.org/webinars>

Manta Infographics - <https://www.mantatrust.org/resources>