Giant Manta Ray

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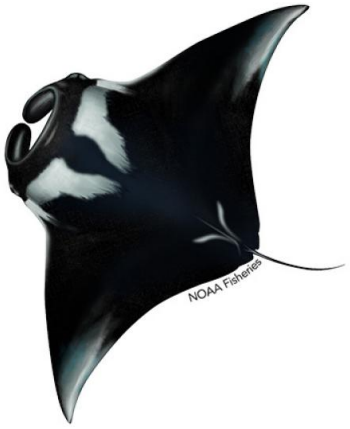
Manta birostris



Protected Status

ESA THREATENED
Throughout Its Range

CITES APPENDIX II
Throughout Its Range

Quick Facts

WEIGHT	Up to 5,300 pounds
LIFESPAN	Likely up to 40 years
LENGTH	Up to 23 feet
THREATS	Bycatch, Entanglement, Harvest for international trade, Marine debris/pollution, Over fishing, Recreational fishing interactions, Vessel strike
REGION	New England/Mid-Atlantic, Pacific Islands, Southeast

Giant manta ray in Flower Garden Banks National Marine Sanctuary - Photo: George Schmahl

About the Species

The giant manta ray is the world's largest ray with a wingspan of up to 29 feet. They are filter feeders and eat large quantities of zooplankton. Giant manta rays are slow-growing, migratory animals with small, highly fragmented populations that are sparsely distributed across the world.

The main threat to the giant manta ray is commercial fishing, with the species both targeted and caught as bycatch in a number of global fisheries throughout its range. Manta rays are particularly valued for their gill rakers, which are traded internationally. In 2018, NOAA Fisheries listed the species as threatened under the Endangered Species Act.

Population Status

Information on the global distribution of giant manta rays and their population sizes is lacking. Regional population sizes are small, ranging from around 100 to 1,500 individuals, and in areas subject to fishing, have significantly declined. Ecuador is thought to be home to the largest population of giant manta ray, with large aggregation sites within the waters of the Machalilla National Park and the Galapagos Marine Reserve. Overall, given their life history traits, particularly their low reproductive output, giant manta ray populations are inherently vulnerable to depletions, with low likelihood of recovery. Additional research is needed to better understand the population structure and global distribution of the giant manta ray.

Protected Status

ESA Threatened

- Throughout Its Range

CITES Appendix II

- Throughout Its Range

Appearance

Manta rays are recognized by their large diamond-shaped body with elongated wing-like pectoral fins, ventrally-placed gill slits, laterally-placed eyes, and wide, terminal mouths. In front of the mouth, they have two structures called cephalic lobes which extend and help to channel water into the mouth for feeding activities (making them the only vertebrate animals with three paired appendages).

Manta rays come in two distinct color types: chevron (mostly black back and white belly) and black (almost completely black on both sides). They also have distinct spot patterns on their bellies that can be used to identify individuals. There are two species of manta rays: giant manta rays (*Manta birostris*) and reef manta rays (*Manta alfredi*). Giant manta rays are generally larger than reef manta rays, have a caudal thorn, and rough skin appearance. They can also be distinguished from reef manta rays by their coloration.

Behavior and Diet

The giant manta ray is a migratory species and seasonal visitor along productive coastlines with regular upwelling, in oceanic island groups, and near offshore pinnacles and seamounts. The timing of these visits varies by region and seems to correspond with the movement of zooplankton, current circulation and tidal patterns, seasonal upwelling, seawater temperature, and possibly mating behavior.

Although the giant manta ray tends to be solitary, they aggregate at cleaning sites and to feed and mate. Manta rays primarily feed on planktonic organisms such as euphausiids, copepods, mysids, decapod larvae, and shrimp, but some studies have noted their consumption of small and moderately sized fish as well. When feeding, mantas hold their cephalic fins in an “O” shape and open their mouths wide, creating a funnel that pushes water and prey through their mouth and over their gill rakers. Manta rays use many different types of feeding strategies, such as barrel rolling (doing somersaults over and over again) and creating feeding chains with other mantas to maximize prey intake.

Giant manta rays also appear to exhibit a high degree of plasticity or variation in terms of their use of depths within their habitat. During feeding, giant manta rays may be found aggregating in shallow waters at depths less than 10 meters. However, tagging studies have also shown that the species conducts dives of up to 200 to 450 meters and is capable of diving to depths exceeding 1,000

meters. This diving behavior may be influenced by season and shifts in prey location associated with the thermocline.

Where They Live

The giant manta ray is found worldwide in tropical, subtropical, and temperate bodies of water and is commonly found offshore, in oceanic waters, and in productive coastal areas. The species has also been observed in estuarine waters, oceanic inlets, and within bays and intercoastal waterways. As such, giant manta rays can be found in cool water, as low as 19°C, although temperature preference appears to vary by region. For example, off the U.S. East Coast, giant manta rays are commonly found in waters from 19 to 22°C, whereas those off the Yucatan peninsula and Indonesia are commonly found in waters between 25 to 30°C.

Lifespan & Reproduction

Manta rays have among the lowest fecundity of all elasmobranchs (a subclass of cartilaginous fish), typically giving birth to only one pup every two to three years. Gestation is thought to last around a year. Although manta rays have been reported to live at least 40 years, not much is known about their growth and development.

Threats

Overfishing and Bycatch

The most significant threat to the giant manta ray is overutilization for commercial purposes. Giant manta rays are both targeted and caught as bycatch in a number of global fisheries throughout their range, and are most susceptible to industrial purse-seine and artisanal gillnet fisheries.

Efforts to address overutilization of the species through current regulatory measures are inadequate, as targeted fishing of the species still occurs despite prohibitions in a significant portion of the species' range. Also, measures to address bycatch of the species in industrial fisheries are rare.

Harvest for International Trade

Demand for the gills of manta and other mobula rays has risen dramatically in Asian markets. With this expansion of the international gill raker market and increasing demand for manta ray products, estimated harvest of giant manta rays, particularly in many portions of the Indo-Pacific, frequently exceeds numbers of identified individuals in those areas and are accompanied by observed declines in sightings and landings of the species of up to 95 percent.

Other threats include marine debris/pollution, vessel strike, entanglement, and recreational fishing interactions.

Scientific Classification

Kingdom	Animalia

Phylum	Chordata
Class	Chondrichthyes
Order	Rajiformes
Family	Mobulidae
Genus	*Manta*
Species	*birostris*

How You Can Help

Follow Manta Ray Safe Handling and Release Guidelines

Manta rays are incidentally captured in a variety of commercial and recreational fisheries. Because fisherman may accidentally catch manta rays while fishing for other species, safe handling and release guidelines have been developed to reduce injury and harm to manta rays.

Report Manta Ray Sightings

If you encounter a giant manta ray, email us at: manta.ray@noaa.gov. Photos are very helpful and can be used to identify individual manta rays. Also, if you can report **where** you saw the manta, **how big** it was, and **what condition** it was in—this information will help us learn more about giant manta ray movements and habitat use and can inform recovery efforts for this threatened species.

Keep Your Distance

Be responsible when viewing marine life in the wild. Manta rays, in particular, are curious animals; however, please observe them from a safe distance. Never entice manta rays to approach you. Disturbing manta rays may interrupt their ability to perform critical functions such as feeding, breeding, resting, and socializing.

Additionally, collisions with vessels are a cause of injury to manta rays. If you encounter a manta ray, please reduce speeds to idle and slowly distance your vessel from the animal.

Reduce Ocean Trash

Entanglement in ocean trash (e.g., ropes and netting, packing material, garbage) can cause injuries to giant manta rays. Small plastic debris ("microplastics") can also be accidentally ingested by manta rays, which may harm this threatened species. Reduce marine debris that pollutes giant manta ray habitat.

- **Participate in coastal clean-up events**
- **Reduce plastic use**
- **Properly stow or dispose of fishing gear**

Learn more about marine debris ›

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In the Spotlight
Management Overview

The giant manta ray is listed as threatened under the Endangered Species Act (ESA).

In addition, all manta rays are listed under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Recovery Planning and Implementation

Recovery Action

Under the ESA, NOAA Fisheries is required to develop and implement recovery plans for the conservation and survival of listed species. NOAA Fisheries has developed a recovery outline to serve as an interim guidance document to direct recovery efforts, including recovery planning, for the giant manta ray until a full recovery plan is developed and approved. The recovery outline presents a preliminary strategy for recovery of the species and recommends high priority actions to stabilize and recover the species.

The major actions recommended in the recovery outline include:

- Improve understanding of bycatch and investigate best methods for safe release of giant manta rays caught in U.S. fisheries.
- Improve understanding of associated mortality rates in key commercial fisheries (including at-vessel and post-release mortality), including effects of various factors such as gear type, temperature, temporal and spatial fishing effort, etc., for informing future fisheries management strategies to reduce fisheries interactions and associated mortality.
- Improve understanding of taxonomy, population distribution, abundance, trends, and structure through research, monitoring, and modeling.
- Identify and protect key habitat areas, including breeding and nursery grounds through research, monitoring, modeling, and management.
- Improve understanding of movement and seasonal distribution to inform future management measures for minimizing impacts to the species during key life history functions.
- Investigate the effect of other threats to the species (e.g., foul-hooking, vessel strikes, entanglement, climate change, pollution, tourism) through research, monitoring, modeling, and management.

- Coordinate with partners and non-governmental organizations (NGOs) to reduce threats (e.g., foul-hooking, vessel strikes, entanglements, pollution, and tourism) through outreach and education in order to prevent additional mortalities.
- Coordinate with relevant regional fisheries management organizations to improve, where needed, reporting and compliance related to current conservation measures for giant manta ray to address bycatch mortality.
- Coordinate with international partners and NGOs to reduce primary threats (i.e., directed fisheries and bycatch) through outreach and education in order to prevent further declines in species' abundance and stabilize populations.
- Investigate areas with high concentrations of giant manta rays worldwide and identify areas of overlap with fisheries to help support international efforts to reduce giant manta ray bycatch.
- Review available information to determine if any countries continue to catch detrimental amounts of giant manta rays and/or are involved in the trade of gill plates. Work with CITES and international partners to improve compliance with requirements and prioritize outreach and coordination.

Species Recovery Contacts

Maggie Miller, Giant Manta Ray Recovery Coordinator

For more information on giant manta rays in our regions:

Calusa Horn, Southeast Region
Chelsey Young, Pacific Islands Region

Conservation Efforts

At the 2013 meeting of the Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Parties agreed to include all manta rays (*Manta spp.*) in Appendix II of CITES, with the listing effective on September 14, 2014. The inclusion of manta rays in CITES Appendix II will help ensure that the international trade in these species is legal and sustainable.

The U.S. Fish and Wildlife Service is the government agency designated under the ESA to carry out the provisions of CITES. NOAA Fisheries provides guidance and scientific support on marine issues given our technical expertise.

Key Actions and Documents

Actions & Documents

Determination on the Designation of Critical Habitat for Giant Manta Ray

We, NOAA Fisheries, have determined that a designation of critical habitat is not prudent at this time. Based on a comprehensive review of the best scientific data available, we find that there are no identifiable physical or biological features that…

- Notice (84 FR 66652, December 5, 2019)
- Bibliography for Manta Ray Critical Habitat Determination

Notice , New England/Mid-Atlantic, Pacific Islands, Southeast

PUBLISHED

December 5, 2019

Final Rule to List the Giant Manta Ray as Threatened Under the Endangered Species Act

We, NMFS, announce a final rule to list the giant manta ray (Manta birostris) as threatened under the Endangered Species Act. We have reviewed the status of the giant manta ray, including efforts being made to protect this species, and considered public…

- Final Rule (83 FR 2916, January 22, 2018)
- Proposed Rule (82 FR 3694, January 12, 2017)
- 90-day Finding (81 FR 8874, February 23, 2016)
- Endangered Species Act Status Review Report: Giant Manta Ray and Reef Manta Ray…
- Petition (2015)

Final Rule , National

EFFECTIVE

February 21, 2018

Science Overview

NOAA Fisheries and our partners conduct various research activities on the biology, behavior, and ecology of the giant manta ray. Some of our partners include federal agencies, nonprofits, and international organizations. The results of this research are used to inform management decisions and enhance our understanding of this threatened species.

Satellite Tagging

Scientists are using the most recent technology to track the movements of giant manta rays. Researchers with NOAA Fisheries and the Marine Megafauna Foundation are working together to place satellite tags on manta rays in south Florida. The team has successfully tagged several juvenile manta rays and the tags are programmed to stay on for six months. The tags are very carefully attached by scientists using techniques that are as minimally invasive as possible.

Photograph showing NOAA and Marine Megafauna Foundation researchers surveying for giant manta rays. All research activities conducted under FWC permit.

Photograph showing ventral side of manta ray named Gillie, taken by Jessica Pate, Marine Megafauna Foundation. All research activities conducted under FWC permit.

Photograph showing manta ray named Leo with Spot Tag, taken by Andrea Marshall, Marine Megafauna Foundation. All research activities conducted under FWC permit.

In 2019, a team of scientists completed a 3-day research cruise in the Flower Garden Banks National Marine Sanctuary in the Gulf of Mexico. The team conducted more than 20 dives throughout the sanctuary in an effort to find and tag a giant manta ray. The information provided by this satellite tagging efforts will help us determine the distribution of depth and temperature used by mantas, as well as evaluate residency and movement patterns.

Through our work with our partners, we have supported research to assess giant manta ray survivorship. Scientists are also using a special kind of satellite tag to assess survivorship of giant manta rays after being caught in artisanal gillnet and industrial purse seine fisheries. Results from this research can be used to develop standards for manta ray bycatch reduction and safe release practices, and inform management measures at a national and international level.

Tissue Sampling

Small tissue samples are collected during tagging or capture for genetic analysis. Genetics are useful in understanding population structure, diversity within the population, and genetic exchange between populations. For example, we are collecting genetic samples to help us determine whether there is movement and genetic exchange among giant manta rays along the U.S. east coast and in the Gulf of Mexico. We are also collecting tissue samples from mobula rays incidentally caught by fisheries operating in the Pacific to determine species composition and investigate genetic stock structure. Tissue samples are less than 0.5 oz and collected by scientists and trained fishery observers using non-invasive methods.

Gear Modification

Given that fishing mortality is the main threat to the species, NOAA Fisheries is funding studies to explore bycatch mitigation methods to decrease the number of interactions between fishing gear and giant manta rays. One such study is currently testing the efficacy of bycatch sorting grids to quickly and accurately sort and release mobula rays from purse seine vessels operating in the Pacific. Reducing the handling time of manta rays when caught by fishing vessels can help decrease post-release mortality rates. For this study, NOAA is partnering with the International Seafood Sustainability Foundation (ISSF), in collaboration with researchers from the University of California at Santa Cruz, AZTI research institute, industry partner American Tunaboat Association, and U.S. purse seine vessel owners.