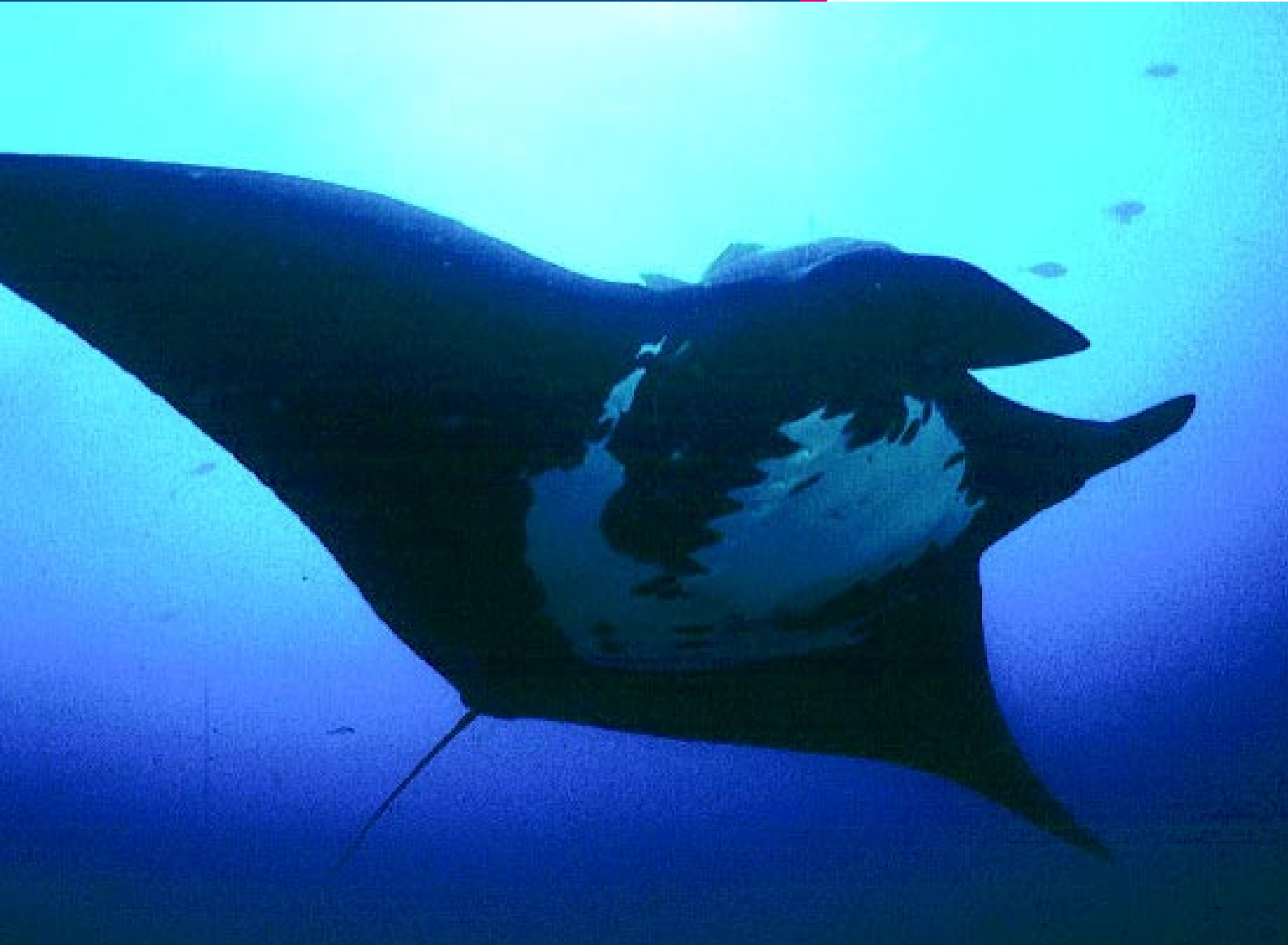


SHARK *focus*

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Supporting the
European Elasmobranch
Association



A Black Manta Ray. MICHELE HALL, HOWARDHALL.COM



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not all black
and white**

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Manta Rays



By ROBERT RUBIN AND
KATHERINE KUMLI

Bob Rubin and colleagues have been observing and conducting research on Manta Rays in the Sea of Cortez and the Eastern and Central Pacific for more than 20 years. Here they summarise their latest observations at Las Islas Revillagigedos, Mexico.



NATURAL HISTORY

The Manta Ray, *Manta birostris*, is one of the most intriguing and unique animals in the world's oceans. Its large size and unusual shape, coupled with the strange hornlike fins used in feeding, make it one of the sea's most spectacular creatures. Manta is the largest of all the rays and has a maximum confirmed wingtip-wingtip measurement of 6.7 metres (22 feet) and a weight of 2,000 kg (4,400 lbs). Mantas are thought to give birth to a single pup at two to three year intervals, suggesting a long gestation period. These pelagic fish are distributed around the world in warm seas and are often found near oceanic islands and submarine ridge systems, where upwellings support an abundance of plankton in otherwise nutrient-poor tropical oceans.

FOOD/FEEDING BEHAVIOUR

Mantas feed on zooplankton and small schooling fish. While swimming, the highly flexible cephalic fins (on either side of the mouth) are 'rolled up', creating a 'hornlike'

appearance. While feeding, these fins uncoil and are used to direct water and plankton into the mouth. In the presence of divers, Mantas frequently uncoil the nearest cephalic fin and move it back and forth in the water, suggesting some form of sensory perception.

COLOUR: TWO FORMS, MANY PATTERNS

Presently we recognise two distinct colour forms: chevron and black, each with its own colour pattern on the upper and lower surfaces. This allows us to classify Mantas by form when viewing the animals from above or from below. Neither pattern or colour type are associated with the age or sex of an animal.

Variations in both colour form and body size appear to be geographically specific. In the warm regions of the tropical Pacific Manta populations usually contain only the chevron form. In the colder regions, populations often contain both the black and chevron forms and individuals are usually larger than those found in warmer waters.

Chevron form

The underside is predominantly white with a wide grey border along the trailing edge of the "wings" (see diagram below). There may be black spots behind the gill openings and on the belly. The upper surface is dark blue-black with white triangular patches on the "shoulders". The wing tips and the forward edge of the dorsal fin are often white and a white V extends forward from the dorsal fin.

Black form

This pattern occurs less frequently and is characterised by a blue-black underside with a "blaze" of white between the gill openings. "Arms" of white may extend from the belly out onto the wings, curving forward alongside the gill openings, giving a rough impression of a human face with upraised arms. Additional small white markings may be found. The top surface is completely blue-black.

PHOTO-IDENTIFICATION

Within each of the colour patterns there is significant

not all black and white...



MAIN PHOTO: **A Chevron Manta.** HOWARD HALL, HOWARDHALL.COM
ABOVE: **Two unknown Chevron Mantas with their dorsal surfaces visible.** TERRY MAAS, FREEDIVE.NET.

variation which enables us to use photographs to identify individual animals. Additionally, we have found that each animal's specific pattern remains unchanged with age, permitting us to repeatedly identify animals over time.

For over a decade now we have used the colour patterns to study Mantas off the Revillagigedos Islands to determine distribution of individuals and their population dynamics. This work has confirmed that body colour patterns are a valid and robust method of identifying and researching individual Manta Rays in the wild.

POPULATION INFO

Our studies of the Revillagigedos Islands population have identified at least 127 individuals. The chevron form is approximately three times more abundant than the black form – a ratio that has remained surprisingly constant in all of our study areas.

Of the 127 animals, 27 have been seen more than once, suggesting a degree of

population stability and site fidelity. Three of the re-sighted animals have been seen over periods of ten years or more. One Manta has been seen over a 15-year time span, which, to our knowledge, establishes a longevity record for this species.

Black Mantas are re-sighted more frequently than expected from their percentage in the population. Although they constitute less than a quarter of the population, they represent 41% of the re-sighted animals. In addition, 39% of the Black Mantas have been re-sighted as compared to 16% of the

chevron form. It has not escaped our notice that these numbers may suggest that Black Mantas may have a higher degree of site fidelity than Chevron Mantas at these locations.

ANIMAL MOVEMENTS

Comparative photographic data have shown that animals move between islands. Twenty-two per cent of the re-sighted animals have been seen at both Socorro and San Benedicto

islands, some 46 km apart. One individual was observed at San Benedicto and then re-sighted thirty days later 134 km to the west at Roca Partida.

During the summer of 2000 acoustic tags were attached to two Mantas at Cocos Island (Costa Rica) and the animals were tracked over a period of several days, during which time they swam at speeds of between 1.9–4.8 km/hr. The faster speeds are similar to those reported for large whales during annual migrations, and would enable animals to travel between the most distant of these islands, 400 km apart, in less than three and a half days.

CONSERVATION

Because of their large size and the small size of their food, Manta populations are numerically small. Like most sharks, their long gestations and small litter sizes mean that Mantas have limited ability to withstand even low levels of fishery exploitation.

A major conservation goal of photo-identification is to determine habitat use and migration routes, in order to encourage policy decisions that will protect the animals and their entire habitat. After a severe population decline associated with poor fishing practices during the late 1980s, Manta Rays appear to be re-entering the Sea of Cortez. The study area has recently been expanded to include the Sea of Cortez and Cocos Island, to determine whether Mantas from these areas also visit the Revillagigedos.

Dr Robert Rubin, Professor of Biology at Santa Rosa Junior College in California, has been observing and conducting research on Manta Rays in the Sea of Cortez and the Eastern and Central Pacific for more than twenty years. Katherine Kumli is a research associate and data manager for his Pacific Manta Research Group, pursuing graduate studies in biology.



Future prospects

In the upcoming year, we plan to use a variety of tracking and recording tags to determine distributions, movements, and patterns of diving and feeding. In addition, we plan to continue our photo-identification work, and request your support.

If you encounter Manta Rays anywhere in the world, please contact us to confirm the date, location, sex, colour form (chevron or black), water temperature, and behaviour – and if possible also send photos! Our email address is r Rubin@santarosa.edu