



CARL F. BUCHERER SPONSORED PROJECTS

PACIFIC MEXICO: IDENTIFYING A CRITICAL MIGRATORY CORRIDOR (2015): Contributed to a tagging study in the Mexico Pacific which helped to demonstrate that oceanic manta rays are less transient in nature than previously thought. The study highlighted the need for conservation management measures for this species at a local or regional scale.

HOW TO SWIM WITH MANTAS FILM (2016): Funded the creation of a short film to educate tourists and operators in how to behave responsibly in the water with manta rays, to help increase the sustainability of manta tourism around the world.

YOU ARE WHAT YOU EAT - FINDING THE FOOD OF GIANTS (2017): Funded a research expedition in the Maldives which helped to determine that the local reef manta rays have a wider diet than originally thought, meaning that conservation measure should not be limited to surface feeding aggregation sites.

MALDIVES MARINE EDUCATION PROGRAMME (2018): Enabled our team to deliver a six-month marine education programme with 28 students from Dharavandhoo School in Baa Atoll, as well as smaller educational outreach classes for local schools in Laamu, and Lhaviyani Atolls.

SEARCHING FOR SHADOWS: UNCOVERING THE SECRETS OF THE CARIBBEAN BLACK MORPH MANTA RAYS (2019): Provided funding to enable the Manta Caribbean Project to conduct aerial surveys of the Mexico Caribbean Biosphere Reserve to locate further key manta ray habitats. Information crucial to identifying threats to manta rays in this region.

THE OPPORTUNITY OF A LIFETIME (2020): Funded a dedicated research vessel that enabled our researchers in the Maldives to get back into the field immediately after lockdown, giving us a unique opportunity to study this population without the usual pressures of tourism.

PACIFIC MEXICO: IDENTIFYING A CRITICAL MIGRATORY CORRIDOR

Year: 2015

Location: Mexico

Description: To examine the basic ecology of oceanic manta rays on Mexico's Pacific coast. Using satellite tags, we will examine both the fine- and large-scale movements of mantas in the region; identifying local hotspots and patterns of habitat use that occur with varying oceanographic conditions. We will determine if a migratory corridor for the species exists between the Bahia de Banderas (on the mainland) and the Revillagigedo Islands (offshore), identifying critical habitats that can be targeted to protect the species from bycatch fisheries in Mexican waters.

Outcomes: We conducted a successful tagging project, the results of which indicate that manta rays do not travel between the offshore islands and the mainland. Our data instead demonstrates that mantas from both locations made north-south movements during the same seasons, spent extensive amounts of time in deep-water pelagic zones, and made some monumental deep dives. These tagged mantas showed a high degree of site affinity, suggesting that mantas may form local subpopulations rather than being the prolific oceanic wanderers once assumed. In the absence of ecological data, population declines in oceanic manta have been addressed primarily with international-scale management and conservation efforts. Our research indicates that oceanic mantas are in fact subject to local-scale pressures from fisheries and bycatch and therefore are best managed at a local or regional scale. We published our results on the Gulf of California Marine Program's [Data Mares website](#) where it is a public educational tool. The results of this project also resulted in a scientific publication, '[Spatial ecology and conservation of *Manta birostris* in the Indo-Pacific](#)' by Joshua D. Stewart et al.

HOW TO SWIM WITH MANTAS FILM

Year: 2016

Location: Filmed in Maldives for use around the world.

Description: To produce a short film that teaches viewers how to interact with manta rays during snorkel and dive excursions, in accordance with the charity's *Manta Tourism Code of Conduct* and *Interaction Guidelines*. The film will serve as a global tool made available to tourism operators and resorts to play to members of the public during briefings, prior to manta focused excursions. To this end, the film aims to help prevent the occurrence of potentially negative impacts and disturbance on manta rays of because of tourism activity and thereby facilitating positive human-manta interactions.

Outcomes: The film was successfully shot and made available to over 20 affiliate projects of the Manta Trust, to use and distribute to operators in their regions. To aid distribution we also created a mini-website www.swimwithmantas.org from which operators can register to receive access to our free Manta Tourism Code of Conduct Media Kit. On this website the public can also watch the film, view our 10-step illustrated guide, access a list of responsible snorkel and dive operators and learn about the science that shaped our Code of Conduct. The film is available in English, French, Mandarin and Spanish.

YOU ARE WHAT YOU EAT – FINDING THE FOOD OF GIANTS

Year: 2017

Location: Maldives

Description: To determine the diet of Maldivian reef manta rays (*Manta alfredi*) through advanced methodologies (stable isotope and fatty acids analyses). Using the extensive photo-ID and behavioural data to establish how reef manta rays' behaviour adapts to different type and densities of planktonic prey available. The results of this study will provide important information on the feeding habits of these creatures and help determine the adaptability of the species, crucial to drive conservation initiatives.

Outcomes: Our team conducted a 10-day research expedition in Baa Atoll, Maldives in August. They used a CTD instrument to measure the conductivity, temperature and pressure of seawater and an Acoustic Doppler Current Profiler to measure water current velocities over a depth range so they could estimate the change in biomass abundance as well as determine the presence of manta rays at the site. They successfully collected 92 zooplankton samples at different locations in Baa Atoll and biopsy samples from 18 individual reef mantas. The project's results suggest that Maldivian reef manta rays have a wider diet than originally thought, and that conservation measures should not be limited to surface feeding aggregation sites.

MALDIVES MARINE EDUCATION PROGRAMME

Year: 2018

Location: Maldives

Description: To expand the Maldives Manta Conservation Program's Marine Education Programme (MEP) and learn how to better engage Maldivian girls with marine conservation and the oceans. In 2017 the MEP ran a four-month course in Baa Atoll to provide young Maldivians with a greater understanding and appreciation of the marine environment, and the opportunity to carry out hands-on conservation. Funding will enable us to run the course with a new school; conducting pre and post-treatment surveys to evaluate the MEP's effectiveness at generating ecologically aware individuals that can mitigate environmental issues and assist sustainable development. Conservation activities will focus on reducing the region's use of plastic, improving waste management and conducting beach cleans.

Outcomes: Our Maldives Manta Conservation Program team carried out a full marine education programme with 28 students from Dharavandhoo School in Baa Atoll. The students completed modules on Maldives Marine Ecosystems, Coral Reef and Megafauna, Waste Management and Ecosystem Conservation over a 6-month period, as well as taking part in activities such as snorkelling on coral reefs, making coral frames, visiting the local turtle rehabilitation centre and conducting local coral and fish surveys. Our surveys identified a consistent and significant gender disparity in the Maldives, with the girls scoring lower on average than boys in all categories. Encouragingly though, they also showed that our female students' marine environmental engagement, attitude and knowledge scores increased significantly after the programme. We were also able to conduct smaller educational outreach classes for local schools in Laamu, and Lhaviyani Atolls, and in November we organised and held the first ever Manta Festival in the Maldives attended by over 1000 people, 11 local schools, and guest of honour, former president Mr Mohamed Nasheed. You can watch a short film about this project [here](#).

SEARCHING FOR SHADOWS: UNCOVERING THE SECRETS OF THE CARIBBEAN BLACK MORPH MANTA RAYS

Year: 2019

Location: Mexico

Description: To conduct a series of aerial surveys of the Mexican Caribbean Biosphere Reserve and surrounding areas in 2019. Currently we can predict the presence of manta rays within the Biosphere Whale Shark Reserve where they are observed feeding during periods of the whale shark season. However, our records also indicate that mantas exploit the surrounding areas within the region which also require monitoring and sampling. Due to the distance between locations, it would be more efficient to scope these areas by air to determine other key aggregation sites which could be further sampled by boat. The Manta Caribbean Project hope to not only locate further key foraging grounds, but to find the first cleaning stations in the region. Cleaning is important to manta ray survival and sociality, but without access to cleaning stations we have been unable to learn about this major aspect of the behavior of this population.

Outcomes: Three initial aerial surveys were conducted in September 2019, though the project is now on hold due to the COVID-19 pandemic. No manta rays were sighted during these excursions, however the Manta Caribbean Project did record valuable data on the presence of other fauna, such as whale sharks, and of commercial vessels and fishing activities within the Biosphere Reserve. This information is crucial for understanding what commercial pursuits take place during the different months of the year, and in what locations, and therefore identifying possible threats to manta or devil rays in the region. The Manta Caribbean Project are planning to carry out further aerial surveys using the remaining funding from Carl F. Bucherer in May-June 2021.

THE OPPORTUNITY OF A LIFETIME

Year: 2020

Location: Maldives

Description: For the first time in 15 years our researchers have been unable to get into the field to collect data, meaning we are going to have a hole in our database. This hole will impact our abilities assess the long-term trends in the life history strategies of this population, and the short-term impacts of the global pandemic and the subsequent reduction in tourism activities in the Maldives. Funding for a dedicated research vessel will help us to minimise the size of this data-gap and will allow the Manta Trust to enter a new and exciting phase of exploration – a unique chance for our team of scientists to be first in the water since the global lockdown. How will things have changed over four months without tourism or ranger management? Will the manta rays have thrived? Or will there be signs of illegal fishing activities? Will the manta rays interact in the same way with us? By being ahead of time, we will get a chance to observe manta rays without the distraction and disturbance of tourism.

Outcomes: Our Maldives Manta Conservation Program (MMCP) acquired a research vessel and resumed research activities from the August 15th to November 30th. During this time, 931 surveys were conducted to locate manta rays in Eastern Baa Atoll. MMCP surveys were carried out either by observers (830 surveys) or Remote Underwater Video systems (101 surveys). Surveys were conducted at Hanifaru Bay, one of five key manta aggregation sites, and a dozen other sites around the eastern border of Baa Atoll. Being back in the field allowed the MMCP team to reach an important milestone in manta research, identifying the 5,000th reef manta ray in the Maldives. MMCP researchers were also able to: deploy 101 remote underwater video systems across seven different sites, deploy two long-term underwater time-lapse cameras to contribute to our Eyes on the Reef Project, contribute manta measurements and ultrasound scans to an ongoing PhD project underway at the University of Cambridge and continue training and learning from a local intern with aspirations of progressing into an ocean science educator.