



2020

Year in Review

The Centre for Ocean Research and Education Foundation





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A Message from the CEO

Dear Friends of CORE,

What a strange and troubling year this has been and one that will certainly be remembered in the contemporary history of our world. Here in Eleuthera, we have been fortunate in that the remote nature of our island home has provided some safeguarding against the pandemic, and we are grateful for this as we continue to thrive as an organisation.

The Centre for Ocean Research and Education has navigated this year with confidence despite the uncertainty, and for me personally, it has been a period of contemplation that has allowed great clarity to my universal thoughts and attitude as a member of this global community. We have had a successful year in spite of the pandemic and I find myself grateful for the imposed hiatus that has come to define the year for many of us. While the first quarter of 2020 was like a freight train of field trips, media engagements, new collaborations and building from the immense momentum of 2019, I soon found myself working from home, dealing with concerned partners and colleagues, seeking resolution to our scheduled programming.

As the weeks became months, it became increasingly apparent that reprieve was a distant notion, and in order to survive, we had to remain industrious in all elements of running the organisation. This was illustrated through a range of creative changes we made to our education programs, and for me, a significant shift from fieldwork, to writing. This resulted in several published research papers for the year, and through modification to our operations, we have been able to persist in our mission throughout the communities of Eleuthera and beyond.

I am confident that normality will soon resume, and refreshed and motivated, we will remain a force for change in this, our island home.

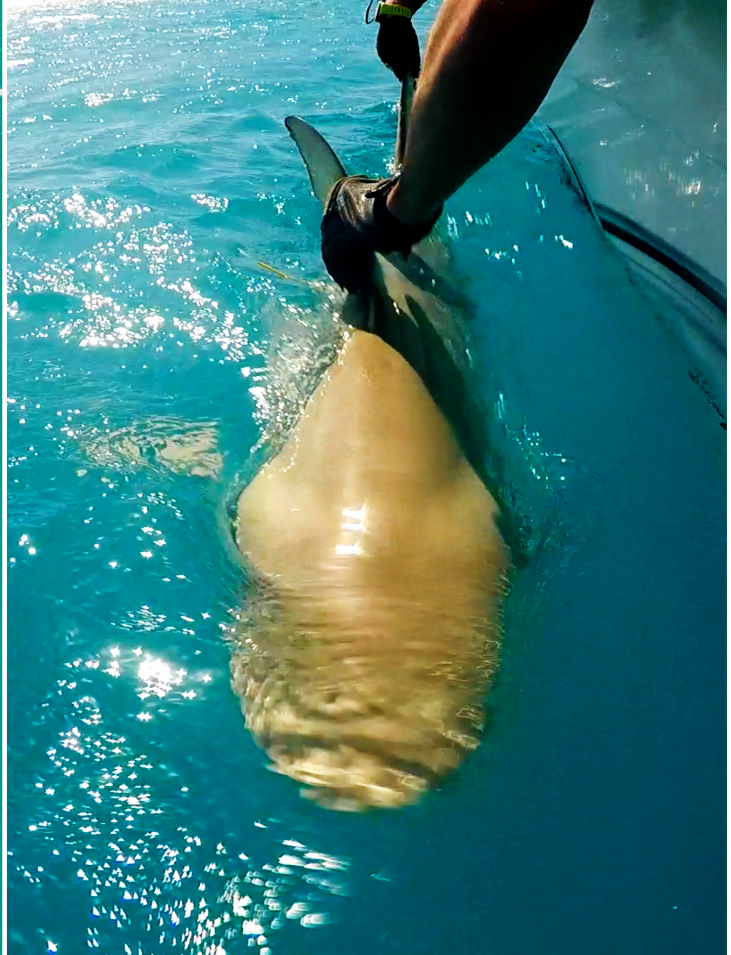
With my warmest regards,

Owen R. O'Shea

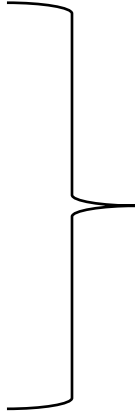
Dr. Owen R. O'Shea

CEO & Principal Research Scientist
The Centre for Ocean Research and Conservation





Research Collaborations



Università di Padova, Italy

Mediterranean Shipping Company, Switzerland

Patterns in habitat use and residency of a multi-species shark community in the Western Bahamas and implications for management



Cape Eleuthera Institute, The Bahamas

*Impact of ocean acidification on queen conch (*Aliger gigas*) growth and maturity*



Memorial University, Canada

*Assessing ecological gradients driving population dynamics in the black land crab *Gecarcinus ruricola**



Wageningen University, The Netherlands

The impact of turtle grazing on the resilience of a tropical seagrass ecosystem



The University of Tampa, USA

Assessing the broad scale ecological dynamics of an anchialine ecosystem from The Bahamas

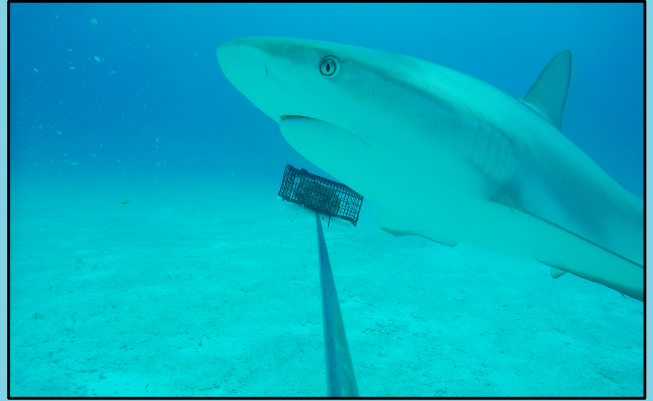
Research Spotlight

Title:

Patterns in long-term habitat use and residency of a multi-species shark community in the Western Bahamas and implications for management

Collaborators:

*Professor Marco Patruno and Antonio Beggiato: Università di Padova, Italy
Mediterranean Shipping Company, Switzerland*



The main objective of this study was to establish baseline data concerning a multi species shark community at a private island in the Western Bahamas that has been approved for Marine Reserve Status by The Bahamian Government. Specifically, we aimed to describe which species of shark are common to this area, their abundance and the habitats they are associating with. These data can then be used to design effective conservations strategies for this private cay, and allow for robust frameworks in managing the marine reserve. Results generated were further used to form the basis of an undergraduate dissertation for Antonio Beggiato, establishing a new and exciting international collaboration with the Università di Padova and his course mentor, Professor Marco Patruno.

In order to meet these objectives we used multiple survey methods including baited remote underwater video (BRUV) and passive acoustic monitoring. For the video surveys, we randomly selected 90 sites within a two-mile radius of the island and mounted a GoPro camera that pointed at a five foot ‘bait arm’ containing 1 kilo of frozen chum. When these frames are lowered into the water with long lines and floats, we point them down-current so the bait scent can disperse over a greater distance, with the hope of attracting predators which are then recorded in high resolution on the cameras.

These surveys allowed a rare insight into the underwater world, and it was far more than just sharks we observed. In total, over 3,500 individual fish were counted from 90 different species which included 41 individual sharks from six different species. These types of survey are effective because they are non-invasive, easy to replicate, are cost effective and allow a standardization, so data can be compared among multiple sites, facilitating new collaborations and research relationships.

The second element to this study was a little more intense and adrenalin fueled. Once we had assessed the video survey data, we were able to move forward with the physical capture of these sharks for the purpose of surgically implanting acoustic tags. In combination with multiple listening stations or ‘receivers’, these tags transmit a signal that when detected on a receiver, will log all of the information for that tag.

In order to determine what that detection limit is, we first spent several days testing the range on our equipment, considering variation in environment can influence this distance. Once we had a clear idea on the range over which these tags would transmit with reliable detections, we designed our array of receivers, allowing for optimal coverage of the underwater environment immediately surrounding this island.



We spent around one week SCUBA diving to attach our receivers to the seafloor, creating an underwater listening ‘array’ of around 12 square miles – all we then needed was to physically capture sharks. We did this through baited fishing lines, of which we had four simultaneously deployed and checked every 20 minutes in order to avoid prolonged stress to any captured individual. Once caught, we brought the shark to the side of our research vessel, restrained it while still in the water using ropes for our safety as well as the shark’s. We took a range of measurements, identified its species and sex before making a small incision in its belly, and inserting an acoustic transmitter programmed to ‘ping’ every minute for around 8 years. The shark is then sutured with surgical grade filament. In addition, we tagged each shark with an external tag, so we, and other researchers in its range will be able to identify this animal.

We are hoping to continue this project for multiple years to build a high resolution picture of how sharks use this island and what seasonal variation in abundance and/or demographics occurs (if any). Once we have deployed all 50 of our tags, these receivers are downloaded every three months and our data updated. During our first download during June 2020, we detected 29 individual animals using this area, and collected data from several other researchers including blue fin tuna tagged several years ago in Canada! Antonio completed his dissertation and was awarded magna cum laude, gaining the highest possible academic achievement for his University.

We are incredibly excited to continue this work and to provide data critical to the ongoing management and conservation of not just sharks, but the whole environment within which this project has been established.

Educational Collaborations



Università di Padova, Italy

Undergraduate dissertation

Comparative technical assessments for surveying shark populations



Cape Eleuthera Island School, The Bahamas

Community outreach and international semester abroad program

*Impact of ocean acidification on queen conch (*Aliger gigas*) growth and maturity*



The Bahamas Ministry of Education

Gregory Town Primary School

Weekly marine science classes



The Harbour Island Green School, The Bahamas

Community Education and Outreach

Conservation biology of sharks and rays



Bahamas Out Island Adventures

Surf Camp XV: Community Education and Outreach

Conservation biology of sharks and rays



Memorial University, Canada

MSc & PhD Research programs

*An investigation into sustainable harvest in the black crab *Gecarcinus ruricola**



Rollins College, Florida, USA

Fourth year marine ecology field course

Field sampling methodologies in tropical marine ecosystems

Education Spotlight

Technical Internship Program Summer 2020

Our community based marine science programs took a different tack this summer due to restrictions impacting our ability to host groups in classroom spaces, and so we developed a four-week technical internship for students currently enrolled in biological science programs at colleges and universities.

CORE continues to manage a diverse portfolio of marine conservation research programs, and so we used these projects as training opportunities for students, offering an immersive learning experience that was entirely field based. We deployed baited remote video surveys (BRUVS) in multiple ecosystems, maintained our visual transect surveys within the shallow seagrass meadows of north Eleuthera and offered analytical ‘field workshops’ to develop our students’ critical thinking when considering ‘what do we now do with all these data’?!

This program was offered free of charge to Bahamians, and we had students from Hatchet Bay, Nassau and Governors Harbour, representing the University of The Bahamas, Florida International University and St. Francis Xavier University, Canada.





Part of the schedule in training for these young marine scientists was to provide an outreach event at the end of each week. We were able to do this with the immense support of the local community as well as local organizations, including Bahamas Out Island Adventures Annual Surf Camp and The Harbour Island Green School.

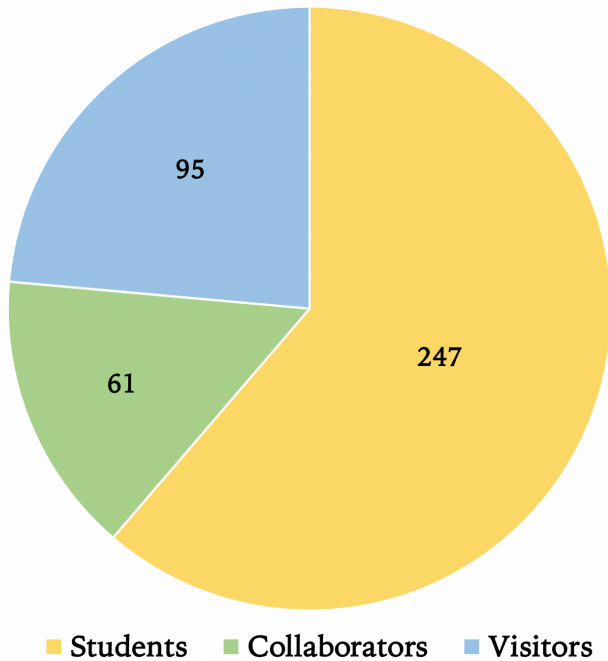
We engaged with 76 Bahamians during the four weeks we ran this program before those prior restrictions from the Spring were once more enforced. There were several resounding elements for us as an organisation during the process of planning and running this program including the identification of local students who are enrolled in tertiary education both here and internationally which was a fantastic way to create new relationships within the communities. We also received dozens more enquires from all over the island, including the far south from families looking for summer programming for their children. This continues to highlight the need for local outreach initiatives as well as proving CORE's visibility on an island- wide scale. This is already providing fresh motivation for summer 2021!

None of this would have been possible without the financial support of The Morning Glory Foundation who continue to support us despite adverse times. In addition, local advocates for CORE including Tom and Liz Glucksman, Kristal Ambrose and Will Simmons who we continue to work with closely. We are so excited to bring these programs back to the communities during this time.



Reach and Impact

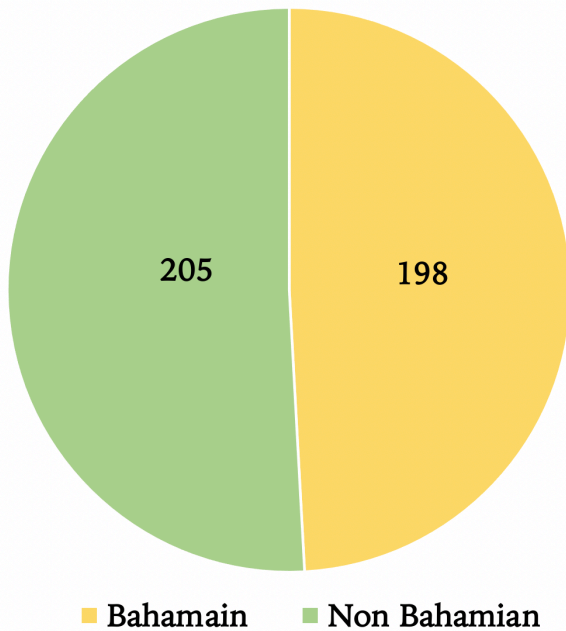
Total Demographics at a Glance



Despite the challenges of this year, we have maintained a strong presence both locally, and working with our international collaborators.



The first quarter represented 58% of our total demographic for the year before we shut down between March and July.



We were however, able to deliver on our obligations to both our grant providers and the community and hosted our traditional summer education programs, as well as the delivery of online lectures and workshops.



Student Profile

- Gaybrielle Smith -

*Assessing the impact of ocean acidification
on maturity in queen conch from The
Bahamas*



Can you tell us a little about the project you are working on with CORE?

We're currently looking at the effects of simulated ocean acidification events on the growth and sexual development of the queen conch (*Aliger gigas*). Sexual maturity characteristics in conch are important indicators for relevant policies and regulations because it gives us an idea of whether the organisms' have enough time to produce their next generation before they are fished. But why is the queen conch so important? Well, after the spiny lobster, queen conch is the most valuable fishery in The Bahamas, so it's a highly relevant species to the Bahamian economy. Because the queen conch is already heavily exploited and overfished here, the population is becoming more and more vulnerable and we may start to see a visible decrease in their numbers. This affects us because we rely on conch meat and products as a source of revenue, and even more so conch is an inseparable part of our identity as Bahamians, whether or not we consume it. So creating policies to address and adjust for differences in their growth as a result of the effects of global warming on oceans is pivotal in conserving this species. Additionally, during the course of this study, we hope to further explore the cultural value of conch by engaging with the local community.

Where does your passion for marine science come from?

Though I was born and grew up Grand Bahama, I didn't have a healthy relationship with the ocean, mainly due to my mother's fears that translated to me. Despite this, I still held genuine curiosity about oceans and their function as part of our global ecosystem. While I never had a burning passion to pursue marine science in those days, my appreciation grew slowly and organically, culminating in being accepted into the Bachelors' program at The University of The Bahamas. My passion for conservation comes from simply observing the way of the world around me as it relates to the needs of my country. Though we, as a species have excelled immensely throughout history, our compassion for others always seems to lag behind our "progress". Whether that be compassion for each other or compassion and respect for the environment we're blessed to be a part of. We're in such a rush to expand and dominate that we often don't think of the consequences that may be linked to our practices. Though in the case of The Bahamas, we're becoming stagnant in a natural world that's changing quickly and we need to be able to adapt. Over the years there has been an increased focus on the preservation of our marine resources, but we're still finding it hard strike a balance between our cultural and economic needs and that of our ocean counterparts. There remains much work to be done and I believe through both formal and informal conservation work we can consider our societal advancements more holistically.

Being Bahamian, do you think you have a responsibility to further our understanding of conch in a Bahamian context?

Yes, I do feel that I have a personal responsibility, especially now as a marine scientist, to share new insights into the role of conch in The Bahamas and consequently elements that may negatively affect our relationship with conch. I think it is also important to seek guidance from my fellow Bahamians and help them to realise the role conch plays in our history and within our own lifetime, not only as it pertains to food and economic gain but also how we interact with conch culturally and it's importance in marine ecosystems. As a Bahamian, I think it is very important that we never forget about, or overlook our culture. Issues like these are rarely black and white, so the most viable solution may take some time and needs to assess all aspects of the Bahamian society and worldview and we cannot do this without the help of the Bahamian people.



As part of Gaybrielle's training to undertake this research project, CORE sent her to the University of Rhode Island where she spent three days training in the lab of Dr. Hollie Putnam, a colleague and collaborator in the global seafood security research network.

Gaybrielle worked in a graduate laboratory with Dr. Putnam's PhD students, and learned all of the meticulous lab techniques required to successfully manage this project.

What do you see as the greatest challenge to conservation in The Bahamas?

I think the lack of education about our natural environment in general and about the ocean itself poses one of the greatest challenges to conservation in The Bahamas. We're not as connected to our surroundings as we should be and we easily get caught up in the way of the world, almost forgetting that there is a whole other world outside with so much to see and learn. We've forgotten our roles as stewards of the environment. If we aren't knowledgeable about our surroundings and how it affects our way of life and our relationships with each other then we're bound to repeat our mistakes. We must be able to convince our fellow Bahamians of the importance of these resources and of maintaining sustainable practices



Media and Communications

Published Peer Reviewed Research Articles

Article Global status and conservation potential of reef sharks

Received: 5 November 2019 | Accepted: 17 March 2020
DOI: 10.1111/jfb.14325

REGULAR PAPER

Journal of Experimental Marine Biology and Ecology
Journal homepage: www.elsevier.com/locate/jembe

Linking local movement and molecular analysis to explore philopatry and population connectivity of the southern stingray *Hypanus americanus*

Tanja N. Schwanck^{1,2} | Maximilian Schweinsberg¹ | Kathrin P. Lampert³ | Tristan L. Guttridge^{4,5} | Ralph Tollrian¹ | Owen O'Shea^{6,7}

A list of authors and their affiliations appears at the end of the paper.

Discusses of over-exploitation have devastated shark populations, leaving considerable doubt as to their ecological status. The impact of that on these sharks has been inferred from catch records, incidental fisheries, whereas the less information is available about their life history and biology. Here we address the knowledge gap regarding movement of 22 free-living, untagged southern stingray sharks in a shallow reef tract in the Bahamas to estimate the conservation status of reef sharks globally. Our results reveal that the population of free-living sharks had no reef shark populations, we observed no sharks on almost 20% of the surveyed reefs. Reef sharks were absent completely absent from reefs in several regions, and shark depletion was strongly related to socio-economic conditions such as the size and proximity of the nearest market, poor governance and the density of the human population. However, opportunities for the conservation of reef sharks remain shark sanctuaries, closed areas, catch limits and abundance of reefs and mangroves were associated with a substantially higher relative abundance of reef sharks. These results reveal the need for policy guidelines for the conservation and management of reef shark populations. From direct to close management of fishing, indirect implementation of governance conditions. Reef shark populations will only have a high chance of recovery by engaging key stakeholders aspects of tropical fisheries.

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REGULAR PAPER

FISH BIOLOGY

Journal of Experimental Marine Biology and Ecology 528 (2020) 151377

Contents lists available at ScienceDirect

Journal of Experimental Marine Biology and Ecology

Journal homepage: www.elsevier.com/locate/jembe

Drivers of octopus abundance and density in an anchialine lake: A 30 year comparison

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⁶The Center for Ocean Research and Education (CORE), PO Box 2403, St. George's, Barbados, the Barbados

1. MacNeil MA, Chapman DD, Heupel M. et al...O'Shea OR (2020). Global status and conservation potential of reef sharks. *Nature* 583: 801 – 806.

2. O'Brien D, Taylor ML, Masonjones HD, Boersch-Supan PH and O'Shea OR (2020). Drivers of octopus abundance and density in an anchialine lake: a 30-year comparison. *Journal of experimental marine biology and ecology* 528: 151377.

3. Schwanck TN, Schweinsberg M, Lampert KP, Guttridge TL, Tollrian R and O'Shea OR (2020). Linking local movement and molecular analysis to explore philopatry and population connectivity of the southern stingray *Hypanus americanus*. *Journal of Fish Biology* 96: 1475–1488.

4. O'Shea OR, Meadows MH, Wrigglesworth EE, Newton J and Hawkes LA (2020). Novel insights into the diet of southern stingrays and Caribbean whiptail rays. *Marine Ecology Progress Series* 655: 157 - 170.

Conference Presentations

Bahamas Natural History Conference (BNHC) online webinar series (2020)

1. *Octopus abundance in an anchialine lake from The Bahamas*, D. O'Brien et al.
2. *Looking back to look forward: Connecting science to the community in the development of the proposed Seahorse National Park*, H. Masonjones & M. Pinder.

CORE featured in two documentaries this year highlighting two research projects we are involved in with National Geographic and WIRED magazine.

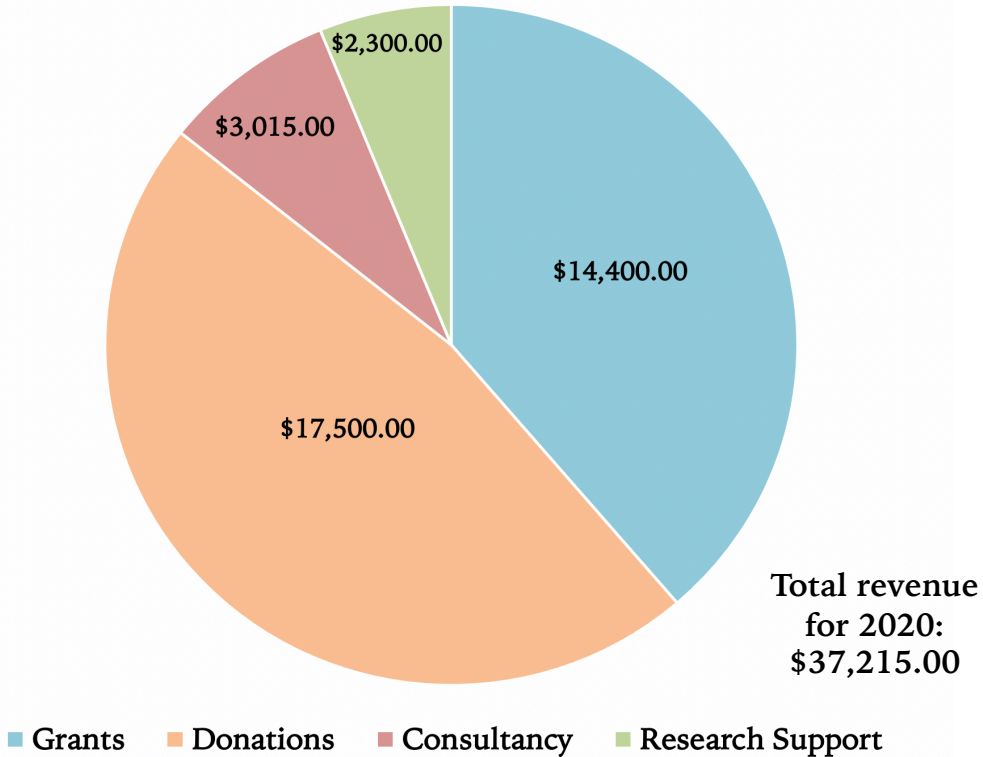
Currently, CORE has seven further research articles under peer review in international journals. These papers are the culmination of our recent collaborations with The Smithsonian Institution, Wageningen University and Florida International University. Updates can be sourced from our website.

In January, our CEO was invited on a press cruise and gave several interviews to the international media on CORE's contribution to an ecological monitoring project in the Western Bahamas.





Finances at a Glance



Revenue Sources

There have been a host of challenges for us as an organization during 2020, and we were only permitted to operate for five months this year. Global restrictions on travel, local lockdowns and the suspension of services throughout The Bahamas saw many of our research projects and education programs temporarily suspended until 2021. This has inevitably been reflected in our revenue streams for 2020.

However, CORE remains committed to the delivery of research and education among the communities of this island and we were awarded three grants for applied research and community education initiatives. In addition, we have been incredibly grateful to receive significant donations, gifts and in-kind support that has allowed us to persist and maintain our presence in the community.

Species Spotlight

The Whale Shark *Rhincodon typus*

During a field trip to the Western Bahamas during March 2020, CORE field technicians, students, dive crew and CEO were deploying acoustic receivers as part of a long term monitoring project and by chance, came across this sub-adult whale shark.

This is the world's largest fish and can reach sizes of 16m or 50 feet in length, although this individual was approximately 5m (15 feet). Despite their size, they are completely harmless, and feed on plankton, filter feeding in the currents, just like this individual was when we encountered him.



This gentle fish was silently drifting in about 6m of gin-clear water over a sandy bottom and the team spent over an hour snorkeling with him, following as he moved backwards and forwards, feeding in the current.

The beautiful spot patterns that grace its body are completely unique to each individual, like a fingerprint and citizen science projects exist all over their range, where photos can be taken and submitted to online databases in an attempt to learn more about this elusive fish.

The International Union for the Conservation of Nature (IUCN) considers this species as endangered, yet we know very little about the life history of the whale shark.



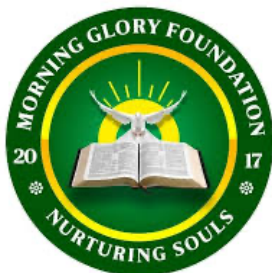
Special Thanks

We are indebted to our donors, grant providers and supporters who continue to advocate for CORE. This has been exceptionally humbling this year considering global events have affected so many.

CORE received further funds from the International Atomic Energy Agency to continue our work on Queen Conch as part of a global assessment of climate change and food security.

This year we were also fortunate to have received two grants from The Morning Glory Foundation that have directly been used to establish and deliver community science and education programs.

On behalf of our students, collaborators and our Board of Directors,
Thank You.



IAEA

International Atomic Energy Agency

Atoms for Peace and Development



CORE is committed to establishing ongoing educational initiatives and community outreach throughout The Bahamas through conservation driven applied marine research. We are able to provide these initiatives at zero cost to the community through traditional grants and with thanks to our donors who continue to advocate for us.

We are constantly seeking ways in which to diversify our funding portfolio, so please contact us should you wish to make a contribution or assist us with our fundraising strategies

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