ProTECTOR, Inc. NATIONAL REPORT OF ACTIVITIES FOR THE 2019 RESEARCH SEASON

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LOMA LINDA UNIVERSITY

ProTECTOR

TAPS
TURTLE AWARENESS AND PROTECTION STUDIES

This report has been provided to the Honduran Department of Forest Conservation (ICF), and the Department of Fisheries (DIGEPESCA) in fulfillment of the requirements for the 2019 Honduras ICF research permit #2018-09-12 07.23.26, and DIGEPESCA research permit #149-2018. The permit was secured through the efforts of ProTECTOR, Inc. Country Director, Lidia Salinas.

This report has been authored by Stephen G. Dunbar and Lidia Salinas.

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I N T R O D U C T I O N

This report provides a brief overview of the activities of the Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR, Inc.) over the 2019 research season from June to October. Results of individual projects are presented in brief. All research efforts were carried out under national permits issued by the Honduras government through the departments of Fisheries (DIGEPESCA), the Secretariat of Agriculture and Ranching (SAG), and the Department of Forestry Conservation (ICF).

The research area encompassed all three of the Bay Islands of Caribbean Honduras. These include Roatán, Utila, and Guanaja (Fig. 1). Utila, the first and westernmost of the three islands, lies approximately 29 Km north of mainland of Honduras and is the smallest of the three Bay Islands, while Guanaja lies approximately 69 Km north of mainland Honduras, and is the easternmost of the islands. Roatán is the largest of the three Bay Islands sitting approximately 48 Km north of mainland Honduras, being 77 Km long and 8 Km wide (Fig. 1). We carried out research efforts on each of the three islands, in some cases with direct assistance from local community members, national non-governmental organizations (NGOs), and local municipal governments.

Once again, there were major delays and setbacks in data collection during 2019 as a result of a lack of clarity in the research permit issued, as well as lack of coordinated oversight on the part of the Institute for Forestry Conservation (ICF), which both issued the permit, as well as oversees the management of the marine protected area of the Bay Islands. The lack of clear directives from both the national and regional offices of ICF resulted in much confusion and misunderstanding among local protected area co-managers and local NGOs regarding the intent of the permit issued to ProTECTOR, Inc. These issues led to reducing the amount of time in which data could be collected, as well as to local organization-imposed restrictions on both where research could be undertaken, and on the types of research projects that could be carried out under said permit. There continues to be no standardization in how permits are applied for, reviewed, issued, or managed. There remains a strong need for national permits to be issued in an effective and timely manner if sea turtle and marine research is to be continued for marine conservation in the country.

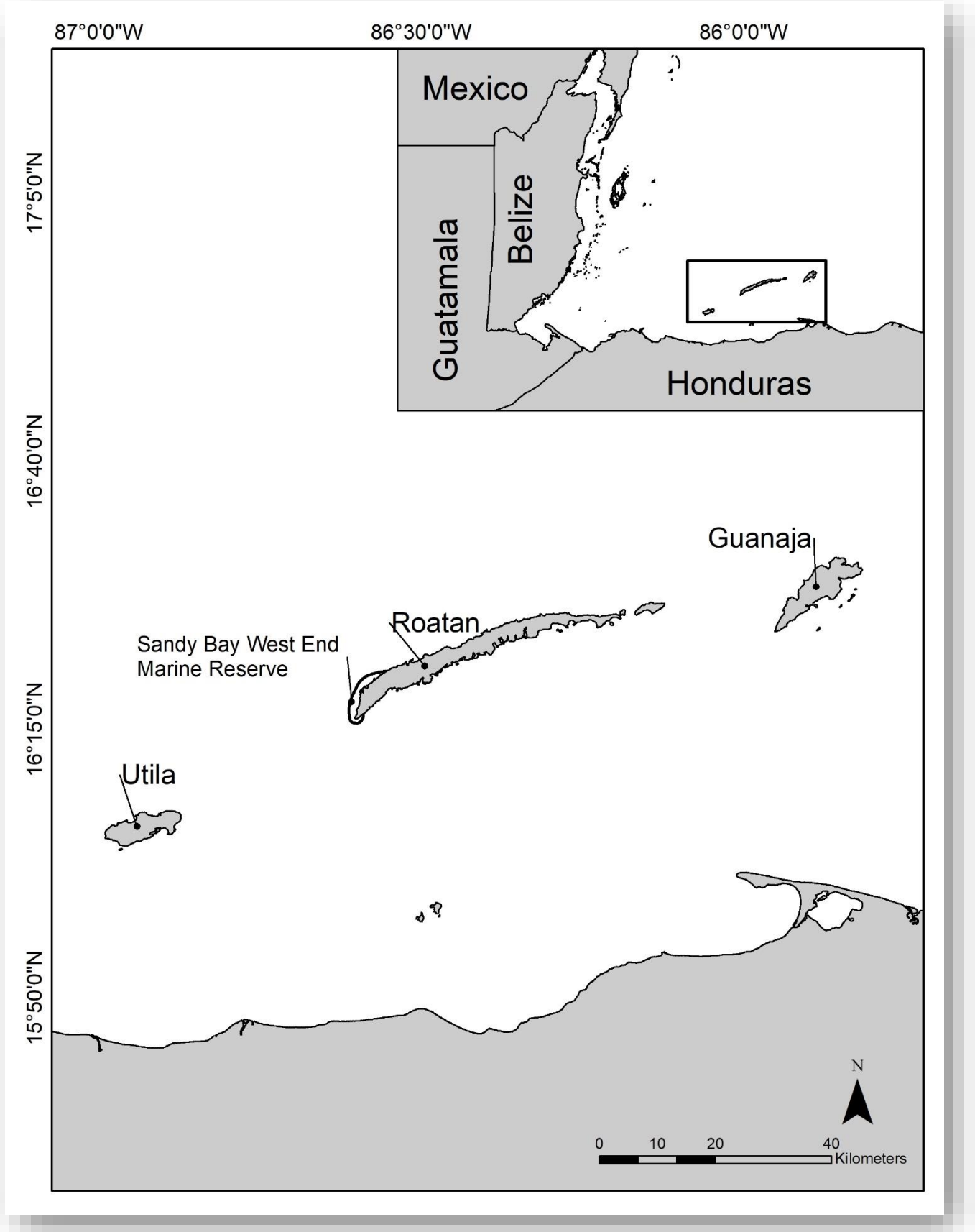


Fig. 1. A map of the research sites throughout the Bay Islands, including Útila, Roatán, and Guanaja. Inset, regional view of the north coast of Honduras.

INTERN TRAINING

During the 2019 research season, we facilitated 8 ProTECTOR, Inc. Interns (assisting for more than one month), and 5 Volunteers (assisting for less than one month). All ProTECTOR, Inc. Volunteers and Interns were placed at different research sites throughout the Bay Islands, with two working on the nesting beach in Utila for a portion of their time, and the remainder based in Roatán on various projects being carried out there. Delays in obtaining the research permit from the Honduran government and lack of clarity in the permit text, reduced the amount of work Interns and Volunteers were able to accomplish, once again compromising the ability of ProTECTOR, Inc. to collect the maximum amount of research data.

Our ProTECTOR, Inc. Interns and Volunteers for the 2019 season came from Canada and The United States, and included high school students with their guardians, current college students, and post-baccalaureate students seeking to enter graduate degree programs. Volunteers included: Razvan Orban, Sebastian and Voicu Tulai, Josephine Shannon, and Laura Yilmezcetin. Interns included: Mark Oliinik, Miranda Wredberg, Stephen Wilkinson, Walker Johnson, Zoe Aguila, Sean Richards, Tori Bolin, and Nellie Covert (see Fig. 2).

ProTECTOR, Inc. continues to seek to develop opportunities for Honduran students, government officials, and members of local NGOs to partner with ProTECTOR, Inc. to also gain valuable experience in undertaking research that can guide conservation decision-making within the country. Such experiences will continue to develop local capacity for the management of natural resources within the country of Honduras. However, lack of national funding to support transportation, accommodations, and resources required for most students and faculty from within the country to receive direct field training experience, continues to hamper efforts for broad-based capacity building for national scientists within the country.

INTERN TRAINING

Fig. 2. ProTECTOR, Inc. Volunteers and Interns are an essential part of the functioning of the organization, and assist with data collection, education outreach, and project development. ProTECTOR, Inc. Interns and Volunteers also help provide funding support of the organization. From top left to bottom right, 2019 ProTECTOR, Inc. Interns and Volunteers were: Walker Johnson, Nellie Covert, Sean Richards, Miranda Wredberg, Mark Oliinik, Tori Bolin, Zoe Aguila, Stephen Wilkinson, Laura Yilmazcetin, Voicu Tulai, Josephine Shannon, Razvan Orban, and Sebastian Tulai.

P R O J E C T S

Utila Nesting

The Utila nesting project is a continuation of a project ProTECTOR, Inc. has been carrying out since 2011 with assistance from the Bay Islands Conservation Association – Utila (BICA-Utila). Nesting hawksbills have been flipper tagged under the ProTECTOR, Inc. sea turtle research permit each year during nesting events. During 2019, restrictions applied to ProTECTOR, Inc. research by BICA-Utila because of a lack of understanding the general parameters of the permits from the Honduras government, restricted our ability to tag and blood sample nesting hawksbills, as well as to work with hatchling turtles from the nesting beach, and greatly hampered our efforts to continue to collect valuable information on nesting and hatching activities for this season.

The nesting beach at Pumpkin Hill, which Damazo & Dunbar (2014) have previously identified as the only known regular nesting beach in the Bay Islands, has undergone dramatic changes since the 2018 season. Fig. 3, 4, & 5 presents a series of images from 2012 and 2019, demonstrating the extent to which beach erosion and beach development have altered beach characteristics essential to maintaining regular hawksbill nesting on the island. Housing development has taken place on the beach, increasing the potential for additional house lighting and reduction of important vegetation on the beach.

We met with beach home owners, who reported they had spoken with BICA-Utila and suggested the removal of the beach vegetation that was at the upper edges of the beach flats along the western end of Pumpkin Hill Beach. Initially, BICA-Utila was hesitant to provide permission to clear the vegetation. However, when homeowners suggested that removal of the vegetation would make it easier for turtles to nest and hatchlings to escape from the nests on hatching, BICA-Utila personnel agreed that removal of the vegetation would, indeed be a positive development for the beach area. The result was that essentially all ground vegetation had been removed prior to the 2019 nesting season (Fig. 5). Although nesting did continue through the 2019 nesting season, it is likely that with the reduction of preferred habitat for hawksbill nesting (i.e. removal of ground cover vegetation, increasing beach development, and increasing beach erosion), the number of hawksbills returning to nest on Pumpkin Hill Beach is likely to decline over the next several nesting seasons.

Utila Nesting

Unfortunately, while the volunteers and local individuals working with BICA-Utila have been very willing to assist our research efforts, BICA-Utila management has continued to work in a less collaborative manner with ProTECTOR, Inc. and other organizations. This has led to a detrimental lack in the proper collection, management, analysis, and sharing of data critical to the conservation of important nesting habitat, and the recovery of hawksbill nesting in the Bay Islands. Although we have made every effort to request nesting data from BICA-Utila for the 2017 – 2019 seasons, we have received responses that suggest the organization has not been able to organize, locate, or report the data collected. This means that an understanding of trends and important re-nesting information for this nesting beach is severely limited by the loss of these data.

2012

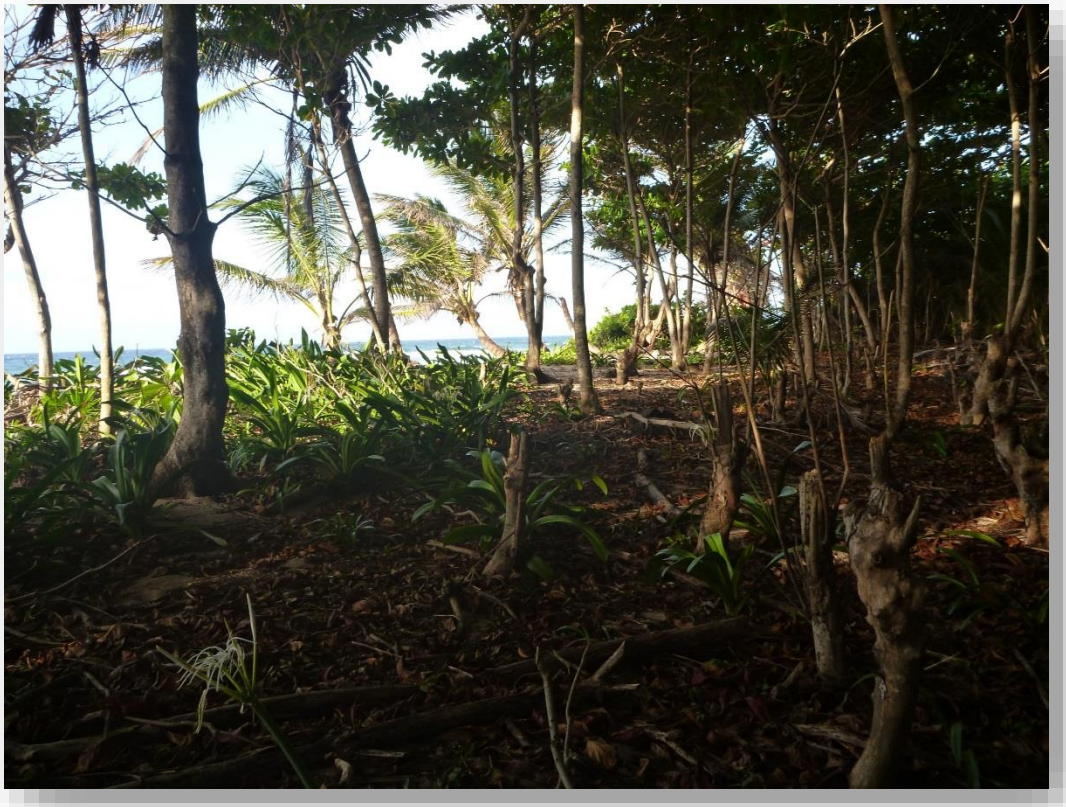
2019

Fig. 3. Pumpkin Hill Beach erosion has resulted in the visible loss of sand area on which sea turtles are able to nest, since 2012, when ProTECTOR, Inc. began to study nesting activity at this location. Anecdotal reports suggest the removal of inshore reef stone for use in housing developments on this beach and in other areas of the island, have likely exacerbated the rate of beach erosion at Pumpkin Hill Beach.

2012

2019

Fig. 4. A noticeable loss of tree vegetation at Pumpkin Hill Beach may also be reducing stability of the habitat. Without abundant tree cover, sand temperatures in potential nesting areas may increase, likely to cause a reduction in incubation development time, and a reduction in hatchling success and condition.



2012

2019

Fig. 5. The development of private housing along the nesting beach at Pumpkin Hill has resulted in the clearing of almost all of the underlying vegetation along the west end of the beach. This area has historically been the location where the majority of hawksbill nesting has taken place over the last decade. The underlying vegetation is preferred habitat for nesting hawksbills and its removal may negatively impact sea turtle nesting activity and hatchling success in the near future.

Guanaja Nesting Recovery Project

The Guanaja Nesting Recovery Project was established on June 28, 2018 at the request of community land owners who have watched the devastation of nests and nesting turtles over the past decade on the island of Guanaja. Through the 2019 season, monitoring of the nesting beaches around Guanaja continued with the oversight of the Green Island Challenge initiative, a highly competent conservation research partner with ProTECTOR, Inc.

The potential for light pollution on nesting beaches in Guanaja due to increasing housing and hotel development (as is currently taking place on Utila), is of concern. Previous studies (Witherington, 1991; Witherington and Martin, 2000; Salmon, 2003) have demonstrated disorientation in hatchlings during sea-finding due to beach lighting. For nesting recovery efforts to be successful, an evaluation of both beach home lighting, and of turtle orientation to light of different colors and wavelengths, is critically important. However, once again, the lack of clarity in the research permit issued by ICF to ProTECTOR, Inc. resulted in BICA-Guanaja resisting our ability to undertake research efforts and the collection of critically important nesting activities data. Although the permit provided permission for our research to take place in "Insular areas of the North Coast," BICA-Guanaja once again raised objections to the projects permitted, and received conflicting directives from the local ICF office in Roatán. These interferences resulted in a complete shut-down of this important study taking place on the island of Guanaja, and meant that the graduate student in charge of hatchling research was hampered by BICA-Guanaja in undertaking his research on the responses of hatchling sea turtles to beach lighting. This study is of vital importance in providing direction to land and business owners who are developing nesting beach areas on all Bay Islands, as well as to local ecosystem managers for the management of nesting habitats around the islands. As a result of permit challenges, little research work was accomplished during the 2019 research season on the nesting beaches of Guanaja, and another opportunity to understand the complexities of turtle nesting in the Bay Islands, and how best to manage the resources critical to the recovery of nesting in this region was lost.

Guanaja Nesting Recovery Project

Although some basic observational nest monitoring overseen by Crys Guerra and Anuar Romero of the Green Island Challenge initiative were able to continue, critical research efforts into the genetic haplotyping of nesting turtles and hatchlings, as well as the advancement of our understanding of hawksbill hatchling vision and responses to light, were severely curtailed by the lack of coordination and communication among ICF offices.

Roatán Turtle Sampling in the SBWEMR

Injuries to marine turtles in areas of high tourist and fisheries boat traffic have been documented in some areas of the Caribbean (Lutcavage, et al, 1997; Hazel, et al, 2007; Barrios-Garrido, & Montiel-Villalobos, 2016). The development of marine protected areas (MPAs) may not fully protect turtles from the threat of boat strikes if boat traffic is unassessed, unregulated, and remains unconnected to sea turtle behaviors. In the Sandy Bay West End Marine Reserve (SBWEMR), boat activities consist of dive boating, pleasure boating, speed boating, and water taxis, all of which have been unstudied for their impacts on sea turtle behaviors and activities within the SBWEMR. Additionally, the number of turtle boat strikes has not been analyzed in relation to boat traffic in this area.

Over the past 4 years, we have been assessing boat traffic and the behaviors of turtles in response to boat traffic within the SBWEMR. We divided the SBWEMR into 3 zones and 14 sectors (Wright, et al, 2017) (Fig. 6), and counted the intensity of boat traffic of 4 types of boats.

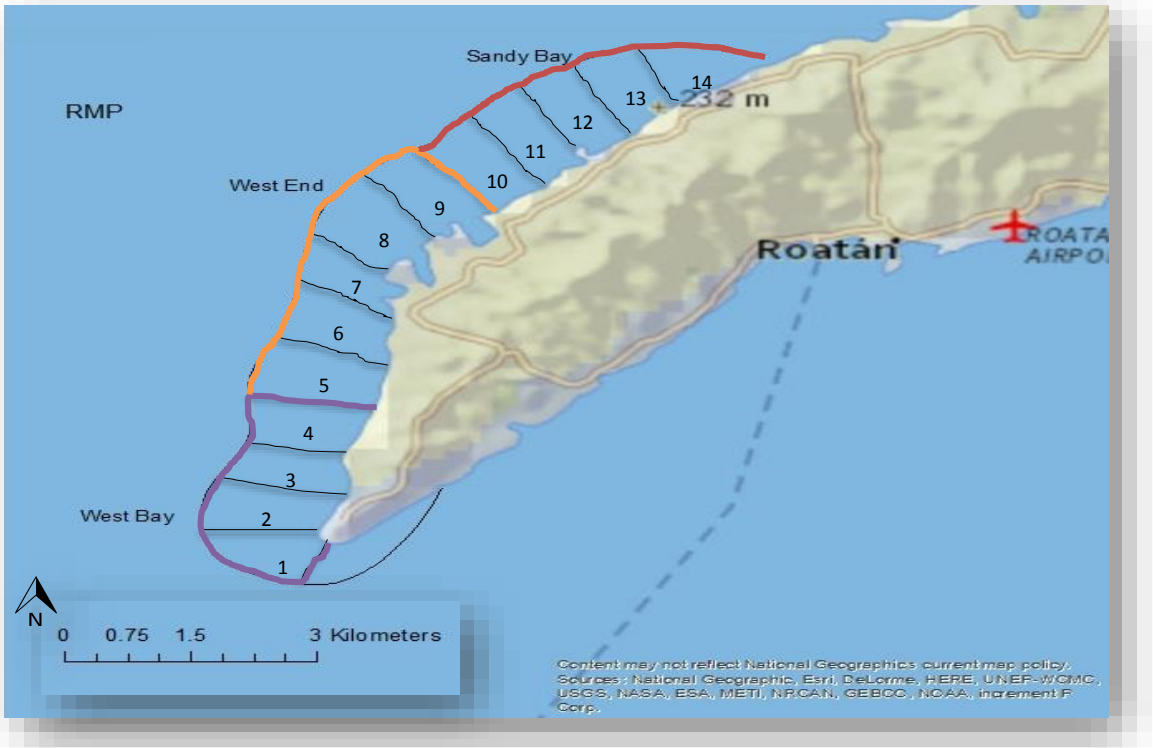


Fig. 6. The SBWEMR divided into 3 zones and 14 sectors for surveying boat traffic intensity within the marine reserve (from Wright, et al, 2017)

Roatán Boat Traffic Project in the SBWEMR

We also undertook turtle sightings counts during the same times in which boat traffic surveys were done and connected boat intensity with turtle sightings. We found that in areas where there was high boat traffic, there were also high numbers of turtle sightings. From direct observations of turtles both when no boats were present, and when boats were present, we observed no significant differences in behaviors during feeding, swimming, and resting activities. Additionally, we have seen almost no evidence of boat strikes on turtles in the SBWEMR, and have received only two reports of turtles sighted with evidence of propeller strikes in the 4 years since the initiation of the study.

Although further analyses are required, these results may initially indicate that turtles within the SBWEMR have altered their behavior to both ignore boat sounds while feeding, swimming, and resting below the surface, and to avoid boat strikes at the surface. Still, there is need to further regulate boat traffic speeds within the marine reserve to maintain low numbers of boat strike incidents.

Further recommendations for protected area managers have been provided through this study, which has been published in the Journal of Ocean and Coastal Management (Wright, et al, 2020).

Photo Identification (PID) in the SBWEMR

Studies begun in 2014 (Dunbar, et al, 2017) in the SBWEMR continued in 2019 with the collection of digital photographs of individual sea turtles (both tagged and untagged) taken during SCUBA diving (Fig. 17). These photos were submitted to a computer database for a computerized matching process that provides six potential matches. These matches can then be manually compared by viewing the test photo to the resulting match photos, and verified by eye.

Throughout the 2019 season we were able to test the matching program by submitting new face and head photos of *E. imbricata* to our hawksbill PID database of more than 2,130 photos of hawksbill individuals.

Photo Identification in the SBWEMR

From these tests, we were able to correctly match new images to individuals in the database, up to 96.3% of the time. These studies, as well as recommendations for increasing the number of images captured and submitted to our database by citizen-scientists, are provided in the published report of this study in the Journal of Experimental Marine Biology and Ecology (Dunbar, et al, 2020).

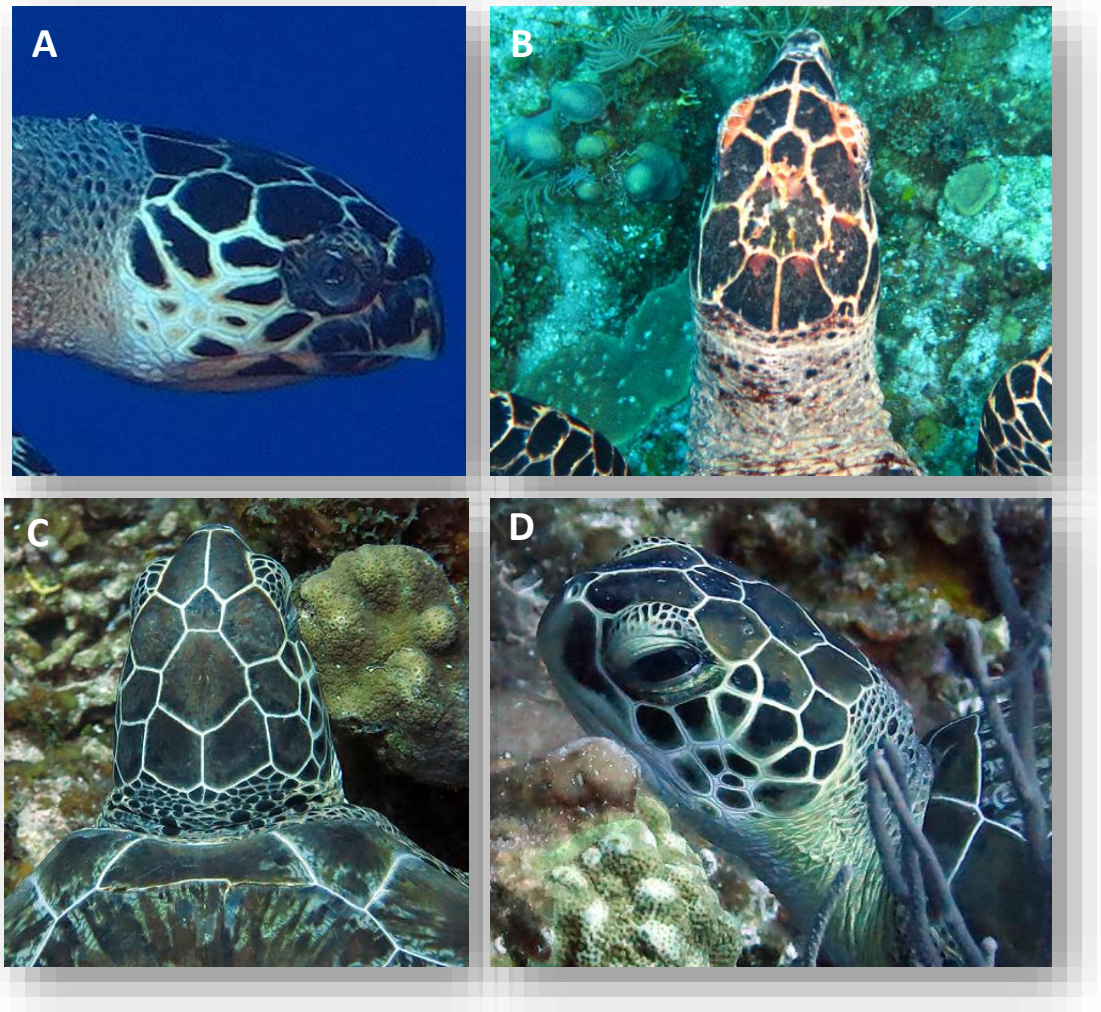


Fig. 7. Face and head photos of hawksbill (*E. imbricata*) (A, B), and green (*C. mydas*) (C, D) turtles taken during diving observations for use in the computerized photo ID (PID) matching system. The computerized system allows the identification of individuals residing in the SBWEMR over time, and will eventually assist in modelling resident population changes within the marine reserve.

Tissue Sampling of Turtles in the SBWEMR

During the 2019 research season, we were able to hand capture and flipper tag *E. imbricata* and *C. mydas* individuals. From each of these turtles, we collected tissue samples (Fig. 8, 9, 10) for additional studies undertaken at Loma Linda University, including haplotype analyses, heavy metal contamination analyses, and stable isotope analyses. Additional studies on tissue samples will be continued in 2019. Unfortunately, in 2019, we were unable to export tissue samples out of Honduras into the United States because of a delay in the issuing of the US Fish and Wildlife CITES Import permit. Those tissue samples remain in Honduras awaiting export to the US in 2021 due to the compounding delays brought on by the global COVID crisis in 2020.

Fig. 8. ProTECTOR, Inc. Volunteers and Interns assist with the measuring and sampling of a captured hawksbill turtle. Hands-on experiences with sea turtles through the ProTECTOR, Inc. Intern and Volunteer Program facilitate connections with marine habitats and organisms that will stimulate the support of marine protected areas in Honduras and around the world.

Tissue Sampling of Turtles in the SBWEMR

Fig. 9. ProTECTOR, Inc. Volunteer, Sean Richards, assists Stephen Dunbar with the collection of epibionts from a captured hawksbill. The study of epibiont species on turtles may reveal information about where turtles have travelled, and their potential health status.

Fig. 10. ProTECTOR, Inc. Volunteers, Razvan Orban (2nd L) and Sebastian Tulai (2nd R), along with Interns Tori Bolin (L) and Nellie Covert (R), pose with Stephen Dunbar and a hawksbill that has been measured, tagged, weighed, and sampled. The turtle is returned to the water close to where it was captured.

Education Outreach

An important aspect of the work of ProTECTOR, Inc. in the conservation of sea turtles, is the work of education outreach to local communities and schools. In 2019, we provided education outreach on Roatán through four main methods. First, we provided talks to community gatherings, such as the children's program in the community of Diamond Rock and held at the Diamond Rock Seventh-day Adventist Church (Fig. 11) . Second, through school visits in the area of Gravel Bay and Flower's Bay (Fig. 12). Third, through direct contact with tourist visitors who visited the research laboratory area at Splash Inn, and lastly, through Turtle Education talks ("TEd Talks") every 2 weeks facilitated by Splash Inn in West End, Roatan. (Fig. 13).

ProTECTOR, Inc. seeks to both educate and involve local communities in sea turtle conservation research, by providing opportunities to understand the results of research efforts, and to become involved in assisting ProTECTOR, Inc. in carrying out local research and conservation projects and activities.

Fig. 11. Education outreach at a children's gathering in the community of Diamond Rock. Here the children are acting as nesting sea turtles, trying to crawl up on a "polluted' beach that entangles and hinders them. Fun activities, such as these, can make lasting impressions on children and parents of the impacts beach pollution can have on nesting and hatching turtles.

Education Outreach

Fig. 12. Sharing sea turtle stories, pictures, and ProTECTOR, Inc. stickers with an elementary school class in Gravel Bay.

Fig. 13. Stephen Dunbar sharing findings of the ProTECTOR, Inc. conservation research with visitors and community members in the West End of Roatan. These "TEd Talks" provide visitors and local community members opportunities to understand both what research ProTECTOR, Inc. is undertaking throughout the Bay Islands, and why. These talks are also an opportunity for visitors to understand the current status and plight of sea turtles in the waters of Honduras.

C O N C L U S I O N S

Although permits for the 2019 research season were provided in September 2018, the lack of a permit renewal in time to continue work after the September permit ended, along with the lack of coordination between ICF offices in Roatán and Tegucigalpa greatly inhibited our ability to conduct the maximum amount of research possible. We continue to emphasize to all agencies of the government of Honduras the critical importance of the research and conservation efforts being carried out by ProTECTOR, Inc. However, it is evident that there is need for comprehensive reform to research permit application process. Time and again, ProTECTOR, Inc. has demonstrated that well-developed sea turtle research is needed for turtle and marine habitat conservation efforts to be successful. Despite valiant efforts by several national government agencies and non-governmental organizations (NGOs) to undertake conservation measures (beach hatcheries, nesting beach monitoring, efforts to reduce illegal trade of turtle products), these efforts are likely to continue unsuccessfully without evaluating their impacts through continual research.

An important element of research carried out by ProTECTOR, Inc. is the involvement of our ProTECTOR, Inc. Volunteers and Interns. These individuals from around the world actively participate in the research conducted throughout Honduras and constitute a critical component of our annual research, conservation, and educational outreach. These volunteers and interns also have opportunities to work alongside local community and government members in establishing and carrying out projects that provide positive returns for the conservation of sea turtles throughout the country. Our 2019 ProTECTOR, Inc. Interns and Volunteers were highly successful in assisting in collecting in-water, as well as nesting beach information that continue to clarify the plight and status of sea turtles in the country of Honduras. ProTECTOR, Inc. is seeking to expand our Intern and Volunteer programs through increasing web and social media presence, and has extended invitations to national students, academic faculty, and government agents in Honduras to become involved in sea turtle conservation research through our efforts. While both national students and academic faculty at UNAH have demonstrated intense interest in partnering with ProTECTOR, Inc. in carrying out research efforts for sea turtles and other marine organisms, with the exception of the Municipality on Guanaja, both local and national government agencies remains apathetic toward being involved, or finding ways to provide support for the conservation of endangered sea turtle species within their waters.

C O N C L U S I O N S

The long-term ongoing nesting beach studies on Utila were again disrupted during the 2019 season, with ProTECTOR, Inc. researchers unable to undertake permitted research on the island. This was partially a result of lack of clarity in the research permit regarding what research projects were permissible to be carried out by ProTECTOR, Inc. While the permit provided general permission to carry out sea turtle research, it was not specific on what life stages work could be done. Rather than support the open nature of the permit issued by the ICF office in Tegucigalpa, the Roatán ICF office could not clarify the situation, and thus, also insisted that experimental work that was not explicitly stated on the permit could not be undertaken. This reduced our ability to continue to collect vital information on the dynamics of the female population nesting on Utila, and is likely to hamper our understanding of how beach development, and the changes in beach characteristics are impacting both nesting turtle populations, and the success of hatchlings in that area.

With support from the Green Island Challenge initiative the Guanaja Nesting Recovery Program continued to engage local community members in reducing turtle meat and egg consumption, and improving the prospects of recovering sea turtle nesting on the beaches of Guanaja. Under the leadership of Anuar Romero and Crystal Guerra, there continues to be high interest in recovery efforts among both community members and the municipal government, and excellent participation in undertaking both daily and nightly monitoring patrols. This project also continues to provide opportunities to assess potential nesting beaches and the threats associated with turtle nesting, as well as to study the responses of hatchlings to different colors of light, as well as to assess the haplotype diversity of both females and hatchlings in the region.

In 2019, we continued to undertake projects in the Sandy Bay West End Marine Reserve (SBWEMR). These included the collection of habitat data throughout the marine reserve and investigating the relationship of boat traffic to sea turtle behavior at and below the surface, as well as the connection of boat traffic to incidents of boat strikes. Thus far, we have found little evidence for a relationship between boat traffic and boat strike injuries to turtles. We also have seen little response by turtles below the surface to boat activity.

We were also able to continue to identify individual turtles through our computerized photo-ID system. This system will allow us to continue to track the growth and movements of juveniles within the SBWEMR over time.

RECOMMENDATIONS

The following are recommendations to the Honduras government and managing directors for the Bay Islands marine protected areas (MPAs):

1. To avoid the loss of important research and data collection throughout the year, research permits should be provided to legitimate research organizations (national or international) with proven track records in research and conservation, within the stated legal period of 2 months after the receipt of the research permit application.

2. Government agencies responsible for research permitting should have open and clear lines of consistent communications among national and local offices, and among local NGOs to ensure critical research on natural resources is maintained without interruption from local environmental organizations. This should be done in consultation with the research organization at regular intervals.

3. MPA managers should fully cooperate and collaborate with research organizations in conducting research and implementing conservation strategies based on annual results of research efforts, and to comply with the national strategy for the conservation of sea turtles developed by Honduras.

4. To increase capacity of MPA co-managers, local NGOs should facilitate training events and workshops that utilize the data and information that result from ongoing sea turtle research within the country and the region.

5. In collaboration with the National Autonomous University of Honduras (UNAH), the central government of Honduras should establish a funding mechanism for student internships with ProTECTOR, Inc. that provide undergraduate students in Honduras opportunities to participate in research efforts on sea turtles throughout the country in conjunction with ProTECTOR, Inc. The training and capacity building of Honduran students will greatly improve natural resources leadership and decision-making at the national level, both now and in the immediate future.

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A C K N O W L E D G M E N T S

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N O T E S