



## **2<sup>nd</sup> Hicatee Conservation Forum and Workshop in Belize** **“Progress Toward Long-term Conservation of *Dermatemys mawii*, the Hicatee”**

### **SELECT ABSTRACTS**

#### ***Dermatemys mawii* in Mexico: what was learned in 20 years in the Field and laboratory**

**Richard C. Vogt, PhD, INPA/CBIO**

From 1980 to 2000 *Dermatemys* was studied in Veracruz, Tabasco, and Chiapas, principally in the Rio Lacantun in Chiapas, and the Papaloapan Basin in Veracruz, upstream from Alvarado. Feeding behavior was documented from flushing stomach contents. Growth and movements from mark and recapture using trammel nets, fyke nets, and vhf transmitters. Incubation experiments were conducted in the laboratory. Experiments with different types of natural food items were conducted in the laboratory. A management program was set up on Nacajuca Tabasco where they were successfully raising this species in captivity. Populations were sampled from throughout their range and the species was determined to be critically endangered by 2000.

#### **SESSION 1 – CAPTIVE MANAGEMENT**

#### **The Hicatee Conservation and Research Center – lessons learned**

**Jacob Marlin, BFREE**

Over the past several years, two large breeding ponds and associated infrastructure have been constructed at BFREE establishing the Hicatee Conservation and Research Center (HCRC). In early 2014, 22 adult and sub-adults were relocated to the HCRC to establish a breeding population in Belize and, in June 2015, the first clutch of eggs producing seven healthy turtles. It has been our hope that captive hatched turtles should be available to restock depleted wild populations, create new populations, and at the same time take pressure off of wild populations by developing sustainable methods for farming Hicatee that can be implemented easily throughout Belize and the entirety of their range. Lessons learned during the process of developing this facility and caring for the captive population will be shared during this session. Particular focus will be given to discussion on enclosure design, water management, captive husbandry, food propagation, and nesting construction and materials.

#### ***D. mawii* in captivity in US zoos, past and present**

**Dustin Smith, North Carolina Zoological Park**

Although zoos and aquariums in North America have maintained the Central American River Turtle for approximately 50 years, this species has proven to be very difficult. With the exception of the Philadelphia Zoo maintaining a large group and hatching two clutches in the 1990's, there has been no additional reproduction. AZA facilities have kept about 40 specimens historically, and had little success in the early years. We have seen a greater longevity over the last couple decades, but due to a lack of imports/confiscations, we have a very small, unsustainable population. There are only 1.2 remaining in the US, being maintained at Jacksonville Zoo. Because this is a newly managed population, we are analyzing past diets, necropsy reports, and past husbandry techniques to improve on husbandry for the future and increase success.

## SESSION 2 – RESEARCH

### Recap of 2010 Belize country-wide survey

Thomas Rainwater, PhD, Baruch Institute of Coastal Ecology and Forest Science, Clemson University, USA

The Central American river turtle (*Dermatemys mawii*) is a large Critically Endangered freshwater turtle historically found in the coastal lowlands of southern Mexico, northern Guatemala, and Belize. Due to years of intense harvesting for its meat, *D. mawii* has been virtually eliminated from much of its former range in southern Mexico, while its status in Guatemala remains unclear. During April and May 2010, we conducted a countrywide survey in Belize to assess the current conservation status of *D. mawii* in what is believed to be its last stronghold. We surveyed approximately 30 localities from deep southern to extreme northern Belize, including 17 areas previously surveyed during the early 1980s and 1990s. Results indicate *D. mawii* is heavily depleted in most of Belize, but healthy populations remain in a few remote areas (including multiple, previously unsurveyed localities in southern Belize), especially those receiving some level of protection. While this mirrors the trend observed in previous surveys, the current findings are of particular concern because the number of localities where turtles were observed and the number of turtles observed at these localities were both much reduced compared to earlier surveys. Large turtles (reproductive adults) continue to be targeted during harvests, significantly reducing the most demographically important segment of the population. Further, interviews with fishermen and hunters indicate that laws and regulations enacted for the protection of *D. mawii* are largely ignored by locals, as broad-scale enforcement is difficult or impossible to achieve. In this presentation, we discuss survey results in the context of previous investigations, describe levels and sources of exploitation, and provide conservation recommendations.

### Research and Monitoring of the Central American River Turtle (*Dermatemys mawii*) in northern Belize

Dustin Smith, North Carolina Zoological Park; Venetia Briggs-Gonzalez, University of Florida/Lamanai Field Research Center; Frank Ridgley, Zoo Miami; and Frank Mazzotti, University of Florida/Lamanai Field Research Center

The Central American river turtle (*Dermatemys mawii*), locally known as the “hicatee”, is a critically endangered species that has been extirpated from much its historical range of southern Mexico, northern Guatemala and Belize. While Belize is purported to be the last remaining stronghold, the current rates of harvesting is unsustainable and population numbers will continue to decline. As a result of the collective concern, the Lamanai Hicatee Conservation Initiative was formed in 2012 to conserve the hicatee in Belize while collaborating with government agencies and NGOs to ensure the species’ long-term survival. The Initiative was created through a partnership with Zoo Miami, the Lamanai Field Research Center, and the University of Florida and has received support from Mohamed bin Zayed Species Conservation Fund, Turtle Conservation Fund, and the Jacksonville Zoo. The initial goals of this project are to determine the demographics and population status of this species in the New River Lagoon. More specifically, we aim to learn the temporal and spatial movements of individuals throughout the lagoon, reproductive behaviors and how this area is being utilized.

Since starting in 2012 we have conducted over 20 surveys and captured more than 50 turtles as part of our mark/recapture study. We are using the standardized marking protocol of the National Hicatee Conservation Monitoring Network (NHCMN). We have outfitted a small subset of hicatees with VHF radio transmitters and have begun to track individuals to determine activity and spatial use of habitat in our study site and determine feasibility.

## **Ecological and Distribution Assessment of Hicatee in Southern Belize**

**Elmar Requena, Marty Alvarez, Cordelia Requena, Shamae Balona, Roberta Pennell, Rosendo Coy, Pastor Ayala, Marcus Tut, and Louis Ishim - Toledo Institute for Development and Environment (TIDE)**

The Hicatee (*Dermatemys mawii*; Central American River Turtle) is a critically endangered freshwater turtle endemic to the Yucatan peninsula. This turtle is also data deficient with major threats of over hunting and habitat loss. In June 2013, the Hicatee Research and Education Group (HRE) was awarded financial support by the Conservation Leadership Program (CLP) for the Future Conservationist project entitled "Ecological and Distribution Assessment of Hicatee in Southern Belize." This was a one-year project implemented in the Rio Grande watershed, Southern Belize. During this project, 60 Hicatee hunters were surveyed to examine the level of knowledge they had regarding the Hicatee and hunting locations. Data was collected on 11 Hicatee, and four of these were tracked using radio telemetry. Additionally, education and awareness campaigns were conducted in the communities of Elridge, Forest Home, and Cattle Landing, with the use of a Hicatee Mascot and printed educational materials targeting schools, community meetings and other public functions. An important achievement of this project was the networking among partner organizations in the research and awareness of the critically endangered Hicatee.

## **Central America River Turtle Current Status and Conservation Activities in Guatemala: A Brief Report**

**Rony Garcia Anleu, MSc., Gabriela Ponce Santizo, MSc. & Roan Balas McNab, M.A., Paul Calle, VMD, Dipl. ACZM, Brian D. Horne, Ph.D., Wildlife Conservation Society**

In 2007-2008, WCS Guatemala used Trammel Nets to determine the presence of *Dermatemys mawii* in different lagoons and rivers in the Maya Biosphere Reserve, with financial support of the Turtle Conservation Fund (García-Anleu R. et al. 2007). In this survey, WCS presented a new distribution map for the species in the region using data obtained in the field and literature data. There is not a great difference between the distribution of *Dermatemys mawii* reported by Lee (1996) and the distribution resulting from these initial surveys. Nevertheless, the fieldwork and interviews did provide some evidence of new distribution records that help to answer doubts of the presence of *Dermatemys mawii* in the headwaters of the Rio Azul in extreme northeastern Guatemala. Unfortunately, the scope of this initial survey was insufficiently broad to establish the conservation status of the species; anecdotal information from key informants hinted that in other areas of Guatemala the population has been severely reduced.

In early February 2010 WCS detected that the level of water in the El Peru Lagoon (close to the WCS permanent field station in Laguna del Tigre National Park) was decreasing at an alarming rate. Periodic visits to register the water level were conducted using photographs as reference. During this extremely dry season turtle tracking at El Perú lagoon was conducted to establish turtles' survival and habitat use. During approximately three months El Perú lagoon was isolated from the San Pedro and San Juan Rivers and its water surface area decreased by 80%. Seven VHF tagged individuals were detected in the eastern section (the deepest section) of the Lagoon during boat searches at different times. This region is covered with vegetation such as *Bucida buceras* and *Pachira aquatica*, including fallen and live trees and leaf litter. Turtles were detected but never seen; it appeared that they were buried in the bottom of the Lagoon. At this shore WCS also found several nests predated by mammals.

In 2015, we confirmed species distribution in two sites in Izabal Department, and in Lachua National Park located in Alta Verapaz Department. These localities are added in a new distribution map for the country extending to southwest species distribution in Guatemala. In addition, we confirmed the presence of the species in Petén Itzá Lake; it was

believed that it was eradicated from this Lake several years ago. All individuals captured were measured and weighed and a tissue sample was taken for genetic analysis in the near future

During the last years, WCS Guatemala has evaluated ways to improve the nesting success of the species in Laguna del Tigre National Park. In early 2012, Dr. Paul Calle and Christopher Hutson of WCS's Zoos and Aquarium and Dr. Brian Horne from WCS's Global Conservation Program visited Guatemala and participated with us in a workshop discussion about *Dermatemys mawii* egg incubation and hand raising protocols to use in our field station. Thanks to this support, hatchling success was close to 100% in 2012, in contrast to 28% in 2011.

The Guatemalan government, through its Wildlife Department/Protected Areas Council (CONAP) worked in conjunction with us to coordinate logistics for the development of the management plan. Twenty persons from different institutions attended the main workshop, including several participants from CONAP Guatemala and Zoo La Aurora, national NGO's and University of San Carlos de Guatemala, WCS Global Conservation and Zoos and Aquarium. The presence of many members of different Departments of CONAP showed the great interest of the Guatemala government on the Management Plan. A conceptual model to ensure conservation of *D. mawii* in Guatemala was constructed during the workshop identifying two conservation objectives: (1) maintain viable populations of the species and (2) maintain actual habitat of the species in Guatemala. Based on these two objectives main direct threats were discussed and specific interventions were enlisted by participants. An important product of the workshop is that most of interventions are assigned to one or more institutions or even persons to be developed. We believe that this promotes the implementation of the interventions in the short term. Finally, key knowledge gaps for future research were identified and enlisted to be used as reference when conducting research on the species. We produced a first draft of the Management Plan based on workshop results that is under review by workshop participants. We expect to have a final version in a couple of months to be presented to CONAP authorities and partners.

### **Wild diet of *Dermatemys mawii* assessed by stomach contents analysis**

**Nichole Bishop, PhD student, University of Florida**

*Dermatemys mawii* is an herbivorous species of freshwater turtle. Herbivory in reptiles is relatively rare and dietary studies for *D. mawii* are limited. Therefore, the purpose of this study was to describe the wild diet of *D. mawii* through stomach contents analyses. Turtle stomach contents were collected from butchered turtles (n=77) harvested from rivers and lagoons in north central Belize. Each food item was identified and volume was measured by displacement. An index of relative importance was calculated for each type of food item and used in analyses along with % volume and % frequency of occurrence. *D. mawii* are primarily folivorous with approximately 70% of their stomach contents consisting of leaves by volume. There were significant differences in diet composition between turtles harvested in lagoons and those harvested in rivers, suggesting that *D. mawii* are feeding opportunistically on what is locally available. Seasonal differences in diet were also present between turtles harvested during the rainy season and those harvested during the dry season indicating that *D. mawii* may be utilizing seasonally flooded regions. Finally, there were no significant differences in stomach contents between juvenile and adult turtles suggesting that juvenile and adult turtles may have similar digestive efficiencies, despite differences in size. The results of this study are important for captive management of *D. mawii* as both plant part and species consumed were identified and quantified based on the stomach contents of wild turtles.

**Utilizing growth rates to determine the onset of sexual maturity of *Dermatemys mawii* at the Hicatee Conservation and Research Center at BFREE**  
**Nichole Bishop, PhD student, University of Florida**

Hicatee turtles (*Dermatemys mawii*) are a critically endangered species of freshwater turtle endemic to Central America. Captive breeding has been identified as a potential avenue for saving this species from extinction, however, little is known about the reproductive biology of hicatee turtles. The purpose of this study was to determine at what size hicatee turtles reach the onset of sexual maturity. Changes in growth can be used to determine partitioning of energy in an organism's energy budget. As an organism matures, energy is diverted from growth to maturation of reproductive organs. Therefore, changes in growth rate can be used to determine the onset of sexual maturity. Growth rates for hicatee turtles were calculated by measuring the change in carapace length from one measurement period to the next (~5month intervals). Body size was determined by using the calculated carapace length (based on growth rate) at the midpoint of the growth interval. Body size and growth rate were then plotted and a segmented regression analysis was utilized to determine at which point the slope of the data change indicating the onset of sexual maturity. Based on these data, the *onset* of maturity for *Dermatemys mawii* begins at a straight carapace length of approximately 33.6cm. These data were corroborated with previously collected morphometrics on wild hicatee turtles.

**Field Research on *D. mawii* in Mexico**  
**Ms. Andrea Del Rocio Barcenas Garcia**

The populations of the White Turtle (*Dermatemys mawii*) are decreasing, the prevailing threats on the species are overexploitation and habitat loss. The objective in this study is to propose reintroduction sites for the *D. mawii* in the lower Papaloapan River Basin, according to a habitat suitability model, based on some aspects of the traditional knowledge. Through the interviewing process, six rivers were selected to explore and register the occurrences; helped by a local guide and geo-reference via GPS. We got 199 occurrences (32 by capture, 80 as potential sites and 7 sighting.), we used the occurrences and seven variables, to do the model with a Maxent algorithm 3.3.3k and ArcGIS 10.2. This model had a high performance (AUC: 0.939). The edaphological data were the most influential variable. The HSM model had the extension 40,765 ha, distributed in 5 levels of suitability (Very low, Low, Medium, High, Very high). To validate this model we made eight samplings in two rivers with high fitness, there was no catching White Turtle, could mean a decline in their populations in the region. Suitable sites are concentrated in the river systems of Tlacotalpan, Veracruz, these will only be suitable if you work directly with communities.

**SESSION 3 – LAW ENFORCEMENT**

**Updates on proposed regulations, law enforcement, what is being permitted and promoted in Belize**  
**Ms. Felicia Cruz, Belize Fisheries Department**

Fisheries management started on January 1, 1965 through the Fisheries Unit Laboratory, which became a Department in 1987 and management was facilitated through the enactment of the Fisheries Act of 1977 and its subsidiary legislation. There has been subsequent amendments since: Chapter 210, 210s & 211 Revised Edition 2003. The Conservation Compliance Unit, which is the enforcement division of the Belize Fisheries Department, has been in existence since the early 1990s and is responsible for sanctioning violators and deterring and mitigating crime against the Fisheries laws and

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regulations of Belize. The Department's enforcement arm has been instrumental in its approach towards curbing the illegal capture and trade of the Hicatee. Still, there are various challenges in achieving a more efficient and effective control over the illegal handling of the Hicatee, believed to be caused by the over-consumption of the Hicatee by humans. As a result, partnering with Conservation Organizations and the Grassroots Communities is the way to go in order to ensure the continued existence and replenishment of this species.

#### **SESSION 4 – EDUCATION and OUTREACH**

### **Raising national awareness of the Hicatee (*Dermatemys mawii*) and public support for its protection in Belize**

**Elmar Requena , Toledo Institute for Development and Environment (TIDE)**

Throughout 2013-2016, the Toledo Institute for Development and Environment (TIDE) conducted a national awareness campaign that was initiated in 2012 by Ya'axché Conservation Trust. Initially Ya'axché created and disseminated a radio commercial and visual communications (billboards and bumper stickers). Thereafter, TIDE broadcasted the same radio commercials, as well as a two-hour episode of "Belize Watch" (a popular primetime show on TV and radio) dedicated to Hicatee conservation. An estimated 40,000 people (over 10% of Belize' population) listened to the radio commercials and TV show. This national awareness campaign was funded by the Conservation Leadership Program and Turtle Conservation Fund.

In addition, TIDE printed and displayed three banners during a period of eight months. These banners are currently being displayed at strategic locations. TIDE also aired a 60 seconds radio commercial informing the Belizean people that the Hicatee is in danger of extinction, and calling on them to show their support for Hicatee conservation by liking the "Save the Hicatee" Facebook page. The commercial was aired at least 24 times on Love FM (the most popular station in Belize) during the Belize National Cross Country Cycling Classic, one of Belize's most popular sporting event. This awareness was conducted during Easter when the Hicatee is traditionally eaten. These awareness activities were funded by Turtle Survival Alliance.

As a follow up to the national awareness campaign, TIDE cared for and released four Hicatee back into the wild, along with primary school children from hunting communities of Elridge and Forest Home. After the Hicatee release, students performed a puppet show. The objective of the school participation was to increase awareness and promote stewardship in the protection of this endangered species.

#### **Education and Outreach Efforts in northern Belize**

**Dustin Smith, North Carolina Zoological Park; Venetia Briggs-Gonzalez, University of Florida/Lamanai Field Research Center; Frank Ridgley, Zoo Miami; and Frank Mazzotti, University of Florida/Lamanai Field Research Center**

The critically endangered "Hicatee" turtle (*Dermatemys mawii*) has declined throughout its entire range of Mexico, Guatemala, and Belize. Because the cause for the decline has been primarily human consumption, there is an important need for range-wide educational and outreach campaigns. In addition to field work, our main goal is to widely educate local schools and communities about this critically endangered turtle and its plight.

Our educational outreach focuses on local communities and with continued collaborative support we plan to generate more educational information for both public and academic use. The educational materials developed have been used

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throughout the country, but we hope that they can be adapted for use in Mexico and Guatemala as well. To date, thousands of our activity guides have been distributed and re-printed for public, educational use.

This work by the Lamanai Hicatee Conservation Initiative, is a collaborative effort between Zoo Miami, Lamanai Field Research Center, and University of Florida. It has received financial support from the Mohamed bin Zayed Species Conservation Fund, the Turtle Conservation Fund, and Jacksonville Zoo.

## **Education and Outreach Efforts**

### **Felicia Cruz, Belize Fisheries Department**

In accordance with the mission of the Belize Fisheries Department “To provide the country and the people of Belize with the best possible management of aquatic and fisheries resource, with a view to optimize the present and future benefits through efficient and sustainable management”, education and awareness, as well as enforcement is vital in achieving the duty of the Department. The Central American Fresh Water turtle (the Hicatee) is in danger of disappearing due to the illegal and unsustainable harvest of the turtle, the lack of present scientific data, and limitations in informing the Belizean citizenry and visitors on the status of the Hicatee and the danger it is faced with. Despite confronted with such challenges, there are several entities that share the same objective to prevent the continued decline of the Hicatee. Consequently, in December 2010 the first terrestrial network of its kind involved in raising awareness of Hicatee in communities was formed. This network, the National Hicatee Conservation and Monitoring Network, is comprised of both non-government and government organisations who has engaged in nationwide outreach campaigns and outreach at national events, educational institutions, in communities and at other events.

## **Workshop 1 – IUNC RED LIST MEETING**

### ***Dermatemys* and the IUCN Red List of Threatened Species**

#### **Peter Paul van Dijk, Global Wildlife Conservation**

The purpose of this working session is to provide the workshop participants with an introduction to the purpose and evaluation process of the IUCN Red List of Threatened Species, followed by a re-assessment of *Dermatemys mawii*. The Hicatee was last assessed in 2006, when its status was changed from ‘Endangered’ to ‘Critically Endangered’. The full current assessment is available at <http://www.iucnredlist.org/details/6493/0>

Updated information will be sought from Participants on *Dermatemys* population trends in the various countries and river drainages where it occurs, significant updates in distribution and biological knowledge, changes in threats and impacts, and conservation measures in effect and recommended. Some aspects of the update may need to be finalized by email after the workshop, but the aim is to arrive at an outline updated assessment by the close of the session.