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***Dermatemys mawii* (The Hicatee, Tortuga Blanca, or Central American River Turtle): A Working Bibliography**

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Thomas R. Rainwater³, and Frank J. Mazzotti¹

Abstract - *Dermatemys mawii* (Central American River Turtle), locally known in Belize as the “Hicatee” and in Guatemala and Mexico as Tortuga Blanca, is a large, highly aquatic freshwater turtle that has been extirpated from much of its historical range of southern Mexico, northern Guatemala, and lowland Belize. Throughout its restricted range, *Dermatemys* has been intensely harvested for its meat and eggs and sold in local markets. Despite being formally protected throughout their range, most *D. mawii* populations have disappeared in Guatemala and Mexico and continue to decline in Belize because of intensive overhunting, which now includes commercial harvesting. As the last remaining species of the family Dermatemydidae, the Hicatee is one of the top 25 most exploited turtles worldwide and is classified as critically endangered (facing an extremely high risk of extinction in the near future) by the IUCN and listed on Appendix II of CITES. Countrywide surveys in Belize in 2010 confirmed *D. mawii* populations are severely reduced in most areas, particularly in habitats more accessible to humans. These findings prompted the formation of the National Hicatee Conservation and Monitoring Network (NHCMN) in Belize in 2011. Through the NHCMN, plans were outlined for increased research, conservation, and educational efforts countrywide. Currently, relatively few data are available regarding several aspects of the life history of *D. mawii*, including growth, behavioral and feeding ecology, and reproductive biology. The purpose of this working bibliography is to provide a comprehensive list of literature pertaining to *D. mawii* with the goal of increasing scientific research, regulatory law enforcement, educational awareness, and species conservation.

Introduction

Dermatemys mawii (Central American River Turtle), locally known in Belize as the “Hicatee” and in Guatemala and Mexico as Tortuga Blanca, is a large, highly aquatic freshwater turtle (Figs. 1, 2) found along the coastal lowlands of southern Mexico, northern Guatemala, and Belize (Alvarez del Toro 1982; Ernst and Barbour 1989; Iverson 1992; Iverson and Mittermeier 1980; Lee 1996; Legler and Vogt 2013; TTWG 2014, 2017; Vogt et al. 2011) and is the only extant representative of the family Dermatemydidae (Iverson and Mittermeier 1980). Currently *D. mawii* is classified as critically endangered by the International Union for Conservation of Nature (IUCN 2016), listed as endangered under the provisions of the US

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Figure 1. Female *Dermatemys mawii* (Hicatee) captured and released in Northern Belize, Lamanai Field Research Center.



Figure 2. Male *Dermatemys mawii* (Hicatee) in breeding color, captured and released in Central Belize.

Endangered Species Act (USFWS 1983), and listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 2017). It is currently considered one of the top 25 most endangered turtle species in the world (Turtle Conservation Coalition 2011). *Dermatemys mawaii* has been and continues to be intensely exploited throughout its restricted range for its meat and eggs (Moll 1986; Polisar 1994, 1995), with populations having collapsed over recent decades and a very slow recovery, if any, in some protected areas (IUCN 2016). Local populations have become extirpated in Mexico and Guatemala, and Belize remains the only stronghold for the species (Campbell 1998, Rainwater et al. 2012). However, with a minimum 10-year generation time and a conservative annual take of 5%, a drastic population decline of 81.5% within 3 generations has been estimated (IUCN 2016). Current harvesting rates which now include commercial take, particularly of reproductive adults, will likely reduce the population even further and drive this species to extinction more rapidly (Polisar 1997, Rainwater et al. 2012, IUCN 2016).

In Belize, a comprehensive survey of *D. mawaii* was conducted in 1983 and 1984 (Moll 1986) that found the species was still common to abundant in areas sparsely populated by humans but declining in more-developed areas where turtles were more accessible to hunters. Further research conducted from 1989 to 1991 indicated that exploitation of *D. mawaii* persisted in the more populated areas of northern Belize and that the level of harvesting was not sustainable (Polisar 1992, 1994, 1995, 1997; Polisar and Horwich 1994). As a result, in 1993 the Belize Fisheries Department drafted nationwide comprehensive legislation for the protection and management of *D. mawaii* that included year-round possession limits, a brief closed (non-hunting) season, a complete prohibition on selling and purchasing *D. mawaii*, and a series of protected zones in the major waterways of northern Belize (Polisar 1994, 1995, 1997; Polisar and Horwich 1994). In 2010, another countrywide survey of *D. mawaii* found populations were severely reduced in most areas, but small populations existed in a few remote areas where some level of protection exists and human activity was minimal (Rainwater et al. 2012). In several localities where *D. mawaii* once existed in large numbers, these turtles were by then uncommon or rare, and continued hunting still targeted large, reproductive adults, further endangering existing populations (Rainwater et al. 2012). These findings prompted the formation of the National Hicatee Conservation and Monitoring Network (NHCMN) in Belize in 2011. The NHCMN consists of government and non-governmental agencies, scientists, students, and naturalists with the goals of education and outreach, legislation and enforcement, and science. As a result, over the last 6 years additional surveys have been conducted across the country by local research centers, such as the Lamanai Field Research Center and Toledo Institute for Development and the Environment, and field studies have been initiated (V. Briggs-Gonzalez et al., unpubl. data; Requeña et al. 2015, Smith 2015). Regular surveys of local markets have been implemented to detect and deter illegal sales of *D. mawaii*. Law enforcement has increased, resulting in several arrests and turtle confiscations (Fig. 3). Additionally, annual countrywide educational awareness campaigns have been launched (Fig. 4; McLoughlin 2013), particularly during



Figure 3. Eight live *Dermatemys mawii* (Hicatee) confiscated by Belize Fisheries Department officers.

Figure 4. Hicatee (*Dermatemys mawii*) sticker distributed nationwide to promote educational awareness in Belize.



times of the year when Hicatee are harvested and consumed as part of specific traditional and cultural events. A Hicatee Conservation Research Center has been established to examine the reproductive biology of Hicatee as well as various aspects of the species' captive husbandry (Rainwater et al. 2011).

Since 2011, legislation has been revised to reflect the initiative of the NHCMN to include a closed season from May 1st to 31st, a reduced harvest limit of 3 turtles per person or 5 per vehicle, catch size limits of females no greater than 43 cm and no less than 38 cm, and the prohibition to sell or purchase *D. mawii* (Government of Belize 2011). Furthermore, nets are prohibited for use in capture, and Hicatee captures are prohibited in a list of specified areas that include parts of the Belize River, New River, Sibun River, Rio Bravo, Cox and Mucklehany Lagoons, headwaters of Mussel Creek, Northern and Southern Lagoons and tributaries (Government of Belize 2011). Poaching still occurs, but with increased enforcement efforts and greater local involvement, there seems to have been a decrease (McLoughlin 2013; R. Quintana, Belize Fisheries Department, Belize City, Belize, pers. comm.; Rainwater et al. 2011, 2012).

The purpose of this working bibliography is to provide a comprehensive list of literature pertaining to *Dermatemys* with the goal of increasing scientific research, regulatory law enforcement, educational awareness, and species conservation. Published works on *D. mawii* are limited, but information is also available in reports and pilot studies that exist in gray literature. We conducted exhaustive literature searches using Google Scholar and Web of Science with "*Dermatemys*" and "turtle" used as keywords, in addition to Google searches for "Hicatee" and "tortuga blanca"; particularly for gray literature. Authors of more recently published work were contacted to provide additional papers that were not accessible. Papers, theses, and reports are organized under relevant categories. In several instances, *D. mawii* is not the target species, but important information concerning this species is included in the reference.

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