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## U.S FISH AND WILDLIFE SERVICE CONSIDERS DOWNLISTING WEST INDIAN MANATEE FROM ENDANGERED TO THREATENED STATUS

On July 2, 2014 the U.S. Fish and Wildlife Service (FWS) published a Federal Register notice (79 FR 37707, July 2, 2014) of a 90-Day Finding on a Petition To Reclassify the West Indian Manatee From Endangered to Threatened. The petition was received from the Pacific Legal Foundation, on behalf of Save Crystal River, Inc., a non-profit citizens group in the Crystal River, Florida area. The petition suggests that FWS should move forward with their 2007 recommendation to reclassify manatees from endangered to threatened under the 1973 Endangered Species Act. FWS found that the petition presented substantial information that the action may be warranted and initiated a review of the status of the species. They will simultaneously complete a 5-year review of the species, which was last completed in 2007.

A 90-day public comment period was opened, ending September 2, 2014, to collect scientific and commercial data relevant to the status of the species. In a 12-month finding the FWS will evaluate the five listing factors to evaluate if threats to the species have been reduced enough to warrant reclassification from endangered to threatened. The five listing factors include: 1) The present or threatened destruction, modification, or curtailment of its habitat or range; 2) Overutilization for of existing regulatory mechanisms; or 5) Other natural or manmade factors affecting its continued existence. Based on the current timeline a determination will be published in late 2015.

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UNION INTERNATIONALE POUR LA CONSERVATION DE LA NATURE ET DE SES RESSOURCES

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

Commission de la sauvegarde des especes - Species Survival Commission



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## SIRENEWS DISTRIBUTION LIST

We are developing a distribution list for those interested in *Sirenews*. If you would like to receive copies of *Sirenews* via email each April and October please send your contact information (name, affiliation, email address) to [ctaylor@sea2shore.org](mailto:ctaylor@sea2shore.org).

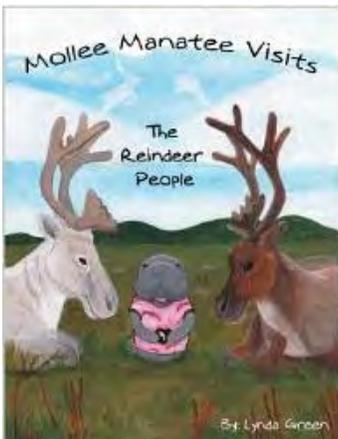
## 2014 PEW MARINE FELLOWS AWARD

Louisa Ponnampalam, Ph.D., was recently awarded the prestigious PEW Fellowship in Marine Conservation for her project *Understanding Dugong Ecology for Conservation of its Habitat*, based in Malaysia. Five fellows are chosen each year, and are awarded \$150,000 to conduct an original research-based marine conservation project. For additional information please go to: <http://www.pewtrusts.org/en/projects/marine-fellows>

## BOOK REVIEW

A review of the book *Sirenian Conservation: Issues and Strategies in Developing Countries* (2012). Edited by Ellen M. Hines, John E. Reynolds III, Lemnuel V. Aragones, Antonio A. Mignucci-Giannoni, and Miriam Marmontel; Foreword by Helene Marsh. Gainesville (Florida): University Press of Florida. \$100.00. xiv + 326 p.; ill.; index. ISBN: 978-0-8130-3761-5) is available in Vol. 89, No. 3 (September 2014) of *The Quarterly Review of Biology*. If you would like a pdf version of the review please contact Ellen Hines ([ehines@sfsu.edu](mailto:ehines@sfsu.edu)).

## BOOK ANNOUNCEMENT



*Mollee Manatee Visits the Reindeer People* is a different kind of children's book. Mollee is a charming and precocious manatee who is chosen to be an Ambassador for the good will of her species. She is sent to Mongolia in search of the illusive Reindeer People. In this exciting tale of adventure, Mollee learns valuable lessons about peace, happiness and compassion for all the world's creatures. She discovers that issues like extinction and climate change affect us all and she learns how the Reindeer People live in peace with another species. This is a first in a series that emphasizes the valuable connection between people and animals. The book is available at [www.amazon.com](http://www.amazon.com). –Lynda Green ([greenlynda@me.com](mailto:greenlynda@me.com))

## LOCAL NEWS

### AUSTRALIA

***Girringun Indigenous Rangers Monitor Dugong in Sea Country.*** Girringun Aboriginal Corporation Indigenous rangers have been working hard over the past few years to research and monitor dugong populations in Girringun managed Sea Country, with the monitoring program contributing directly to management priorities. With support from the National Environment Research Program and the

Australian Marine Mammal Centre, Girringun Rangers have been conducting monthly boat-based surveys to investigate occurrence, distribution and relative abundance of dugongs (and inshore dolphins). This project is one of the first of its kind for Australia, where Indigenous rangers are collecting robust scientific information to inform local management of a dugong population.

Girringun Aboriginal Corporation (GAC) – now a fully incorporated not-for-profit organization – was established in 1996, and represents around 700 traditional owners across nine tribal groups. Girringun Aboriginal Corporation is based in Cardwell, North Queensland (between Townsville and Cairns) and through a recently declared Indigenous Protected Area, has co-management responsibilities over 1.2m hectares of Land and Sea Country in North Queensland. In December 2005, Girringun Traditional Owners signed the first Traditional Use of Marine Resource Agreement (TUMRA) in Australia for the management of traditional hunting of protected species in the greater Hinchinbrook Island area. GAC's third and current TUMRA agreement has expanded to take in the protection and maintenance of marine cultural resources and sites such as fish traps.

The urban coast of Queensland supports globally significant populations of dugongs, and the importance of the Great Barrier Reef (GBR) Region for dugongs was a reason for its world heritage listing. The area around Cardwell, particularly Missionary Bay adjacent to Hinchinbrook Island, is one of the most important areas for dugongs on the east coast of Australia. Dugongs and seagrass were particularly hard-hit along the urban Queensland coast in the summer of 2010/11. These events included the strongest La Niña weather pattern since 1973, major floods and Tropical Cyclones Tasha, Anthony and Yasi, all impacting the major dugong habitats to varying degrees. The Hinchinbrook region was severely affected, with the eye of Tropical Cyclone Yasi passing directly over the Cardwell region. Important seagrass beds were destroyed, and dugong and turtles faced starvation along the Queensland coast, with mortality rates much higher than those previously recorded in the Queensland stranding program.

Dugongs virtually disappeared from Girringun Sea Country – and from most of the urban Queensland coast - after the 2010/11 weather events. Determined to begin to assess the health of local dugong populations, Girringun Aboriginal Corporation began a collaborative project with James Cook University in July 2013, to investigate the status of dugongs (and inshore dolphins) in Girringun Sea Country and monitor any recovery. This status assessment importantly included determining whether dugong calves were present, which would provide an indication of population recovery. Initial workshops were held with Girringun Elders and Rangers to ensure the project objectives aligned with Traditional Owner aspirations for Sea Country research. Once approved and a Partnership Agreement had been finalized, the project proceeded with cultural mapping workshops to obtain local traditional knowledge of past and present dugong, turtle and seagrass distribution. Training workshops with Girringun Rangers, led and advised by Drs. Isabel Beasley and Helene Marsh from James Cook University respectively, were also conducted over numerous months to increase knowledge of methods and protocols necessary to conduct boat-based monitoring surveys for dugongs and other marine megafauna.

Although no dedicated surveys were conducted in 2012, no dugongs were sighted by rangers during regular Sea Country patrols, and no reports came in from the public. Boat-based surveys began in early 2013, with only one adult dugong sighted after over 1,000km of transect survey effort (Figure 1). In late 2014, dugongs began to be re-sighted during surveys, with 18 adult dugongs sighted, including one very important calf sighting, after 700km of transect survey effort (Figure 2, 3). These results were encouraging, with monitoring set to continue for the remainder of 2014 and throughout 2015, with additional funding from the Queensland Government.

The research is a valuable contribution to existing Traditional knowledge and management practices on country and has great potential to contribute new information about the status of dugong and inshore dolphin populations in remote-regions of northern Australia. Giringun Aboriginal Corporation hopes that the success of this project will encourage other Indigenous ranger groups and members of the research community in northern Australia to initiate collaborative scientific monitoring of dugong, turtle and inshore dolphin populations. This will effectively contribute to conservation and sustainability of dugong and turtle populations.

**-Whitney Rassip (Tumra@giringun.com.au), Sean Walsh and Karman Lippitt**

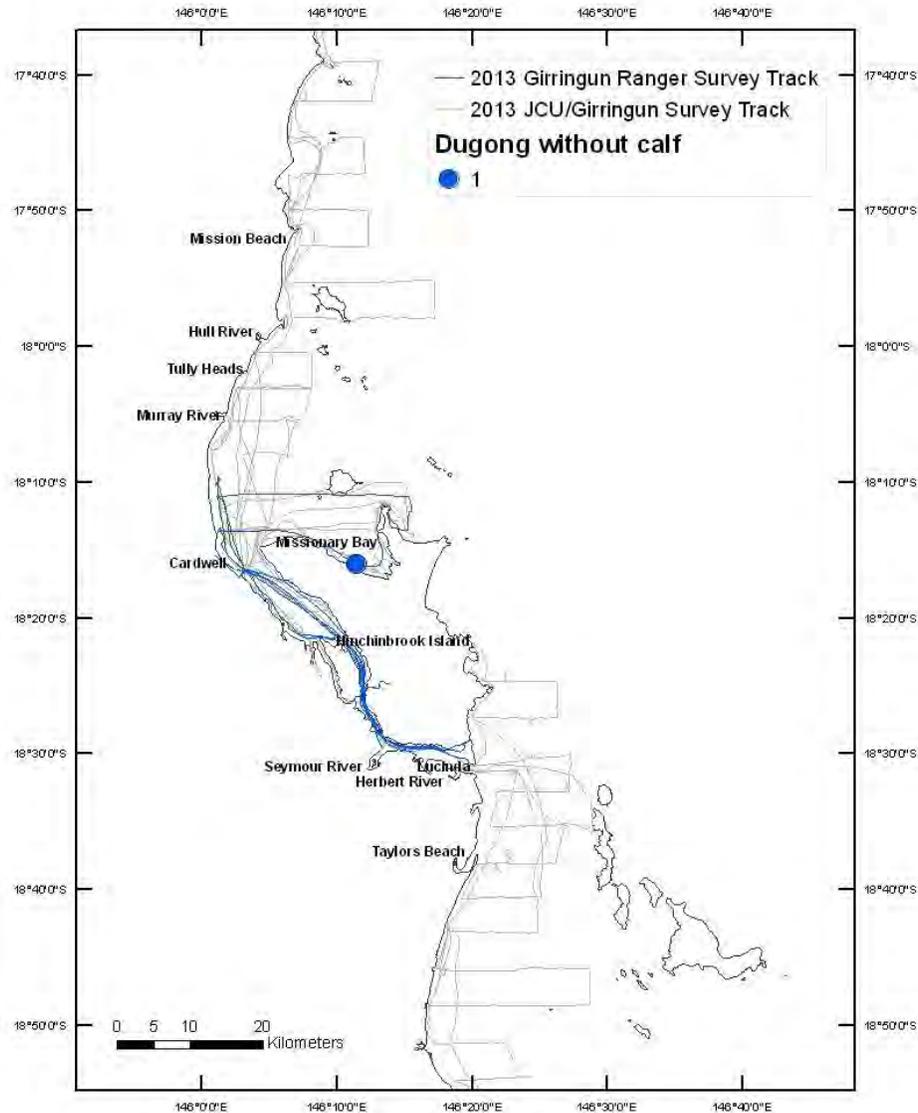


Figure 1. Location of single dugong sighting during 2013 survey effort.

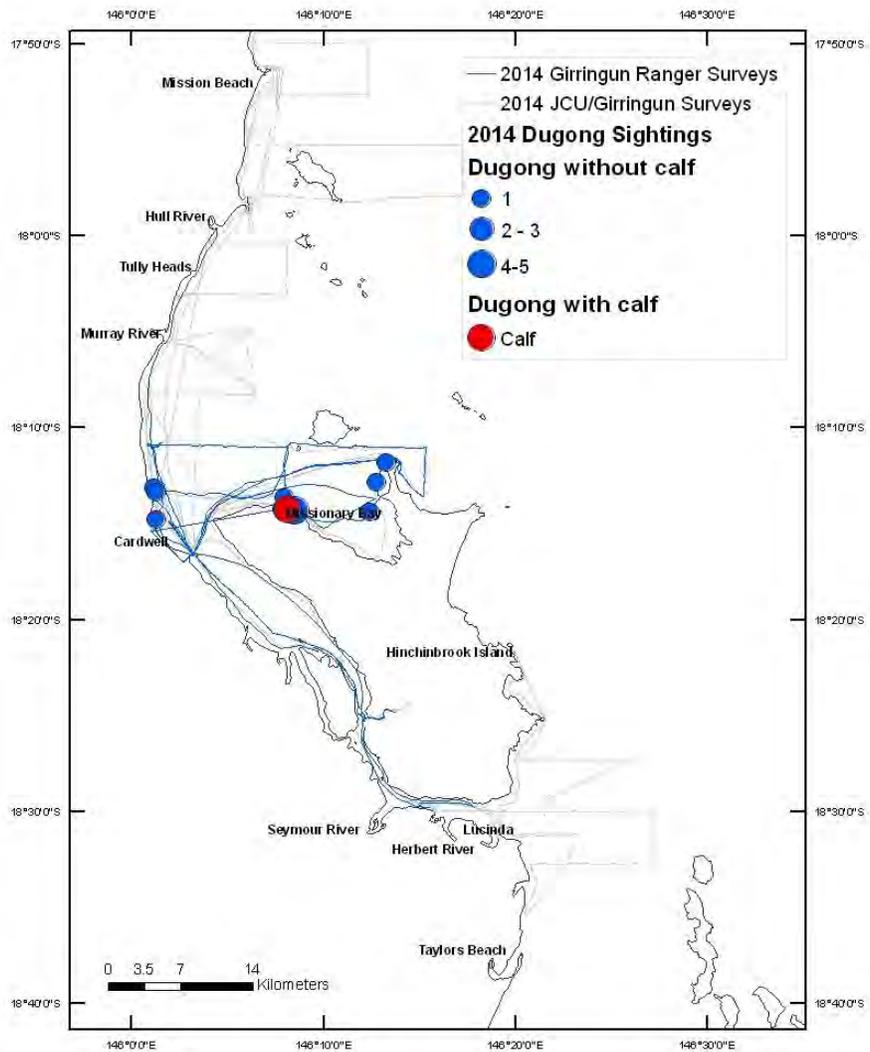


Figure 2. Locations of 18 dugong sightings during 2014 survey effort.



Figure 3. Dugongs sighted during boat-based surveys.



Giringun Rangers and project partners

## BRAZIL

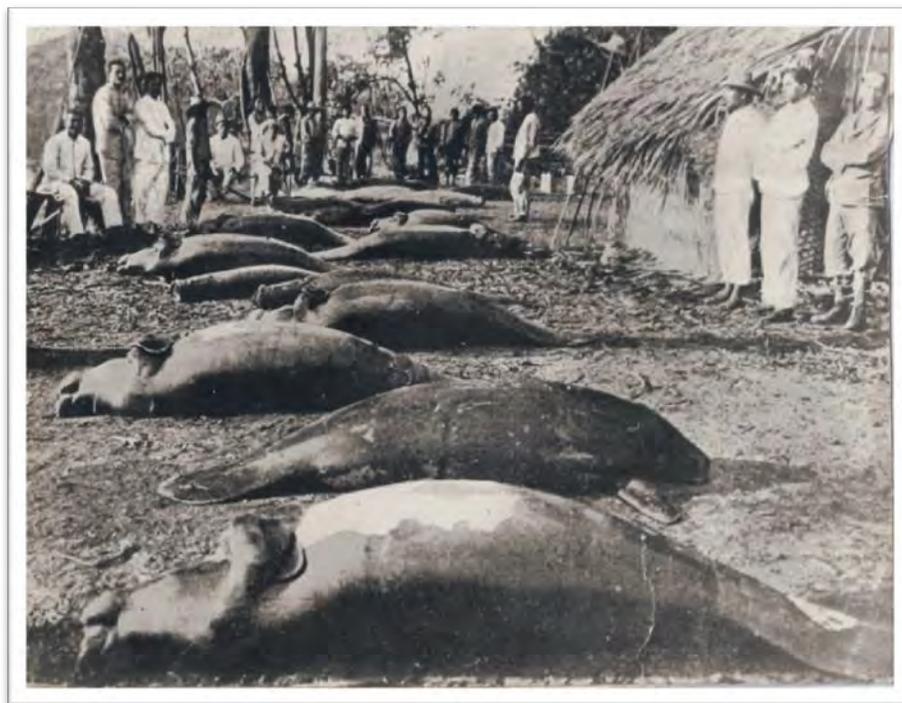
***Conservation prospects for the Amazonian manatee in the lower Purus River, Central Amazon, Brazil.*** *Trichechus inunguis* was one of the most exploited species in the Brazilian Amazonian, mainly in the Purus river basin, where its abundance and hunting pressure on a commercial large-scale is historically reported. The exploration was so intense that in 1944 Pereira recommended the establishment of protected areas to promote Amazonian manatee conservation in the low Purus River. Unfortunately it took 59 years, but finally with the creation of the Sustainable Development Reserve Piagaçu-Purus (RDSPP), this protection has been achieved. Protected by law since 1967, the Amazonian manatee is still hunted in the region not only for subsistence but also to sustain the illegal trade of its meat in cities near the reserve and in Manaus.

In 2014, Friends of the Manatee Association (AMPA), the Aquatic Mammals Laboratory of the National Institute of the Amazonian Research (INPA) and the Piagaçu Institute (IPi) started a pioneering project in the RDSPP to evaluate the hunting aspects, conservation and ecology of the Amazonian manatee, with support from the communities living in the floodplain and *terra firme* lakes, the main habitats of the manatee. This project is using a multi-methodological approach such as lectures, meetings, participatory mapping, interviews with key informants to ensure the involvement of the communities in the project, and direct/indirect observations of species presence.

Currently, after seven months of field work, we have identified 32 manatee hunters (29-75 years old). According to the interviews, in the last ten years (2004-2014) approximately 460 manatees were killed in the reserve. In areas where IPi has systematically worked with the local communities on sustainability projects (for example the *Arapaima gigas* management), the activities of manatee hunters have been considerably declining in recent years. Alternatively, in the Jari Lake, where the institution has had few interactions with the community, the hunting pressure is still alarming, with an estimated 180 manatees killings during the 2010 drought season. All residents reported having consumed manatee meat in the past, some recently. Moreover, they suggest an increase in the manatee population inside the reserve, and do not believe in the real possibility of extinction of the species.

The illegal use of natural resources compromises the success of protected areas. We use support from local communities as a tool to establish a network between residents and researchers to reduce manatee hunting and directly affect efforts to conserve this endemic and vulnerable species. It is expected that the results of this project provide information for an effective and long term protection plan for the Amazonian manatee. This is the beginning of a larger project, which aims to release manatees in the RDSPP, in order to recover the natural populations of this species.

**-Diogo Alexandre de Souza<sup>1,2</sup>, Vera Maria Ferreira da Silva<sup>1,2</sup>, Jone Cesar Fernandes da Silva<sup>2</sup>, Eduardo Matheus Von Muhlen<sup>3,4</sup>, André Pinassi Antunes<sup>1,3</sup>, and Felipe Rossoni Cardoso<sup>3</sup>** (1- National Institute of Amazonian Research (INPA); 2- Friends of Manatee Association (AMPA); 3- Piagaçu Institute (IPi); 4- Federal University of Rio Grande do Norte (UFRN); Email: diogo.peixeboi@gmail.com)



The result of Amazonian manatee hunting in the Ayapuá Lake, low Purus River –  
“O Paíz das Amazonas” film by Silvino Santos (1922).



The current hunting of Amazonian manatees in the reserve, 2005.



Amazonian manatee hunting – Ayapuá Lake, 2005.

***Learning with Omar: lessons from a semi-captive orphaned manatee and its environment on the east coast of Pará, Brazil.*** Omar, the orphaned manatee (*Trichechus manatus manatus*) rescued on 20 July 2013 after stranding on a beach in Marajó Island (see Sirenews 61), has now completed a year living in his semi-captive environment. As of August 2014, he weighs 70 kg and is 1.40 m in length, representing a 49% increase in weight, a considerable growth in just one year (Figure 1). Omar receives three baby bottles filled with a recipe of soy-based milk and probiotics daily. In addition, fresh green “grass” is offered on a daily basis, consisting of a variety of local plants, commonly found in the surroundings. They include *Blutaparon portulacoides* (A. St.-Hil.) Mears (Amaranthaceae), *Cyperus* cf. *polystachyos* Rottb. (Cyperaceae), *Eleocharis geniculata* (L.) Roem. & Schult. (Cyperaceae), *Crenea maritima* Aubl. (Lythraceae) and *Echinochloa polystachya* (Kunth) Hitchc. (Poaceae). The botanists of Museu Paraense Emílio Goeldi, to which we are deeply indebted, have identified these plants.

The semi-captive environment has a permanent flow of freshwater, covering an area of approximately 220 square meters with a maximum depth of 2 meters. During the peak of the dry season in November 2013, Omar was transferred to a 5500 liter pool for two months (Figure 2). He had a continuous weight gain during this period in the pool. As mentioned in our last communication, a fungal dermic disease, probably associated with a bacterial infection, recently affected Omar. He was treated topically with ketoconazole (20mg/g) cream and Iodopovidona. We noticed a rapid recovery as the lesions have been eliminated from much of his body.

It is noteworthy to mention the sympathy of the local community of Passagem Grande, in Salvaterra, and surroundings, for caring about Omar. We took this opportunity to emphasize the need for Sirenian conservation along the Marajó Island coast during our education campaigns in local schools. Results were positive as Omar soon became an illustrious visitant, and is valued as a symbol of the municipality. As an example, Omar has been depicted on several occasions including the celebrations for Independence Day on 7 September.

For biologists, veterinarians, and technicians, it has been a challenging situation since the arrival of Omar in July 2013. Everybody is deeply involved in the care of this young manatee and he has turned into a local celebrity. There are still many challenges that we face prior to the final reintroduction of Omar into his natural environment. We are in need of sponsors for the entire process, from building a semi-captive holding facility to subsequent post-release monitoring that will require a specialized team and logistical support. Omar is now the symbol of the desirable return of manatees along the coast of Marajó Island. We take this opportunity to thank the officials of the Marine Extractive Reserve of Soure, Brazilian Environment Agency and the Prefecture of Salvaterra for kindly supporting Omar's rehabilitation. -**Maura E. M. Sousa**<sup>1,3</sup>, **Salvatore Siciliano**<sup>2</sup>, **Renata Emin-Lima**<sup>1</sup>, **Alexandra F. Costa**<sup>1,4</sup>, and **Bruna M. L. Martins**<sup>1,5</sup> (<sup>1</sup>Museu Paraense Emílio Goeldi, Coordenação de Zoologia, Setor de Mastozoologia, Grupo de Estudos de Mamíferos Aquáticos da Amazônia (GEMAM); <sup>2</sup>Escola Nacional de Saúde Pública/FIOCRUZ and Instituto Megafauna Marinha; <sup>3</sup>PPG em Biologia Ambiental, UFPA, Universidade Federal do Pará–UFPA, Campus de Bragança; <sup>4</sup>PPG em Ecologia Aquática e Pesca (PPGEAP) – UFPA, Instituto de Ciências Biológicas, Cidade Universitária José da Silveira Netto; <sup>5</sup>PPG em Ecologia e Conservação da Biodiversidade, Universidade Estadual de Santa Cruz–UESC)



Figure 1. Omar, the orphaned manatee rescued in Marajó Island, in its semi-captive environment.  
Photo by Rodrigo Baleia.



Figure 2. Omar in the pool during the dry season in Marajó, November 2013. Photo by T. Giarrizzo.

**Which aquatic plants of the intertidal zone do manatees of the Amazon estuary eat?** Soure Beach and Salvaterra Beach, on Marajó Island, Brazil, are flooded every tidal cycle for six hours, so even though the areas are virtually dry during some stages of the daily tidal cycle, the plants of this region are still regarded as aquatic (aquatic macrophytes of wetlands) (Irgang et al., 1994). These plants develop in sandy soil, but also in small clay, peat and rocky areas, i.e., in the intertidal zone (Suguio, 1992). In these areas there is a predominance of intertidal families Cyperaceae (tiriricas), Poaceae (grasses) and Lythraceae (maritima *Crenea* Aubl.), which manatees feed on.

Identification of these plants is hampered by changes caused by grazing of the manatee themselves (information from fishermen) and the biometric (size) and phenotypic (shape and appearance) variations caused by the type of substrate and the flood level experienced in these areas. Using the method of phytosociological inventory and floristic survey, we identified 18 different species of aquatic plants (Table 1) in the area, nine of which are already in the literature as being grazed by manatees; however, it is believed that all may serve as part of the manatee diet.

Omar, a young manatee (*Trichechus manatus manatus*) who is in rehabilitation in the town of Salvaterra, receives some aquatic species as supplements to his daily food intake, such as: *Blutaparon portulacoides* (A.St.-Hil) Mears, *Cyperus cf. polystachyos* Rottb. (Cyperaceae), *Eleocharis geniculata* (L.) Roem. & Schult. (Cyperaceae), *Crenea maritima* Aubl. (Lythraceae) and *Echinochloa polystachya* (Kunth.) Hitchc.

This is the beginning of a study with the goal of determining the abundance and seasonality of aquatic plants, as well as comparing them with samples of stomach contents and feces of native manatees in order to determine the feeding habits of these animals in the Amazon estuary region.

Table 1. List of aquatic vegetation in the inter-tidal zone occurring in the towns of Salvaterra and Soure, Brazil

<b>Família</b>	<b>Espécie</b>	<b>Autor</b>
Acanthaceae	<i>Aviaceria germinans</i>	(L.) L.
Amaranthaceae	<i>Blutaparon portulacoides</i>	(A.St.-Hil.) Mears
Apocynaceae	<i>Rabdadenia biflora</i>	(Jacq.) Müll.Arg.
Combretaceae	<i>Laguncularia racemosa</i>	(L.) C.F.Gaertn.
Cyperaceae	<i>Cyperus ligularis</i>	L.
Cyperaceae	<i>Cyperus polystachyos</i>	(Rottb.) P.Beauv.
Cyperaceae	<i>Eleocharis geniculata</i>	(L.) Roem. & Schult.
Cyperaceae	<i>Fimbristylis dichotoma</i>	(L.) Vahl
Cyperaceae	<i>Fimbristylis spadicea</i>	(L.) Vahl
Cyperaceae	<i>Rhynchospora hirsuta</i>	(Vahl) Vahl
Gentianaceae	<i>Schultesia guianensis</i>	(Aubl.) Malme
Leguminosae	<i>Machaerium lunatum</i>	(L.f.) Ducke
Lythraceae	<i>Crenea maritima</i>	Aubl.
Plantaginaceae	<i>Bacopa aquatica</i>	Aubl.
Poaceae	<i>Spartina alterniflora</i>	Loisel.
Poaceae	<i>Sporobolus virginicus</i>	(L.) Kunth
Rhizophoraceae	<i>Rhizophora racemosa</i>	G.Mey.
Rubiaceae	<i>Spermacoce verticillata</i>	L.

**-Alba Lúcia Ferreira de Almeida Lins<sup>1</sup>, Ely Simone Cajueiro Gurgel<sup>1</sup>, Maria de Nazaré do C. Bastos<sup>1</sup>, Maura Elisabeth M. de S.<sup>2,3</sup>, Renata Emin-Lima<sup>2</sup>** (<sup>1</sup>Museu Paraense Emílio Goeldi, Coordenação de Botânica; <sup>2</sup>Museu Paraense Emílio Goeldi, Coordenação de Zoologia, Setor de Mastozoologia, Grupo de Estudos de Mamíferos Aquáticos da Amazônia (GEMAM); <sup>3</sup>PPG em Biologia Ambiental, UFPA, Universidade Federal do Pará–UFPA, Campus de Bragança)

## CARIBBEAN

***Interactions between the Antillean manatee and other vulnerable marine species with artisanal fisheries in Caribbean small-scale fisheries.*** Despite the high conservation value of the Wider Caribbean Region (WCR) as a breeding and feeding ground for cetaceans, sea turtles and the Antillean subspecies of the West Indian manatee (*Trichechus manatus manatus*), very little is known on the magnitude of their interactions with artisanal fisheries as one of their most potential sources of additional mortality. Artisanal fisheries in the Caribbean are poorly known. They target multiple species using a diversity of gear, including gillnets, beach and seine nets, hand- and longlines. Caribbean small-scale fisheries face common issues including resource overexploitation, fleet conflicts (with industrial and recreational fisheries) and lack of management that could be due to weak institutions, unclear legal management instruments, lack of capacity and enforcement and limited involvement of fishermen in the management process. Due to the widespread distribution and the major social and economic importance of artisanal fisheries in the WCR and their potential for interacting with vulnerable megafauna, bycatch may be a major issue that needs to be further investigated.

Within the framework of the SPAW Action Plan for the Conservation of Marine Mammals (MMAP) in the WCR and its Regional Management Plan for the West Indian Manatee, the SPAW-RAC has initiated a study on one of the main threats region-wide for the West Indian manatee, i.e. bycatch and poaching. This study, the “Manatee Bycatch Pilot Project”, consists of a questionnaire that has been submitted to fishermen in Belize, Colombia, the Dominican Republic, Haiti and Mexico. The aim of this preliminary project was to investigate bycatch, hunting and use of Antillean manatees, other marine mammals and sea turtles in this region.

A total of 896 interview surveys with fishermen were conducted in the region, including 55 from Belize, 40 from Mexico (state of Quintana Roo), 192 from Haiti, 508 from Colombia (in Magdalena and Sinú river basins) and 101 from the Dominican Republic. Overall, this preliminary study highlights that manatees and sea turtles are still hunted in the region, despite the prohibition of their capture in most of the sampled countries and the decline of the consumption of their meat. Bycatch occurs in most countries, but at a relatively low level. However, given the low size of manatee populations in the region, captures may not be sustainable but more quantitative data are needed. Fishermen also perceived an increasing occurrence of either incidental or intentional captures of manatees in Belize. This pattern seems to be the opposite of Colombia and the Dominican Republic, where captures are perceived as decreasing. The perception of the trend in manatee abundance is contrasted between Hispaniola Island (Haiti and Dominican Republic) and the mainland, where populations are believed to decrease for the former and increase for the later. Cetacean bycatch occurs in the region also, but in apparently low numbers (mostly coastal dolphins, especially the common bottlenose dolphin, *Tursiops truncatus*).

For the first time in the WCR, a region-wide study investigated the interactions between artisanal fisheries and vulnerable megafauna, including marine mammals (especially the Caribbean subspecies of the West Indian manatee) and sea turtles. Previous studies have been mainly conducted at the national level, especially on manatee bycatch and poaching, but no previous studies exist on cetacean and sea turtle bycatch, exploitation and use in these small-scale fisheries. This pilot project also provides new

information on the use of manatees and other marine megafauna as well as some factual information on trends of their abundance as perceived by fishermen. Results from this study will be incorporated in a manuscript that will be submitted for publication in early 2015. For more information, please contact Jeremy Kiszka (Florida International University, jkiszka@fiu.edu). -**Jeremy J. Kiszka**<sup>1</sup>, **Nicole Auil Gomez**<sup>2</sup>, **Dalila Caicedo**<sup>3</sup>, **Haydee Dominguez**<sup>7,8</sup>, **Sandra Jean**<sup>4</sup>, **Benjamin Morales-Vela**<sup>5</sup>, **Gaëlle Vandersarren**<sup>4</sup>, and **Jean Wiener**<sup>6</sup> (<sup>1</sup> Marine Sciences Program, Florida International University, North Miami, USA; <sup>2</sup> Southern Environmental Association, Placencia Village, Belize; <sup>3</sup> Fundación Omacha, Bogotá, Cundinamarca, Colombia; <sup>4</sup> CAR-SPAW Regional activity center for the SPAW Protocol (SPAW-RAC), Saint-Claude, Guadeloupe, FWI; <sup>5</sup> El Colegio de la Frontera Sur, Chetumal Q. Roo, Mexico; <sup>6</sup> Fondation pour la Protection de la Biodiversité Marine (FoProBiM), Haiti ; <sup>7</sup> Duke University, Beaufort, North Carolina, USA; <sup>8</sup> CIBIMA-UASD, Ciudad Universitaria, Santo Domingo, Dominican Republic.

***First Region-Wide Aerial Surveys of Antillean Manatees (Trichechus manatus manatus) in the Caribbean Waters of Mexico, Belize, and Guatemala, Central America.*** Nine observers representing six countries (Belize, Colombia, Guatemala, Mexico, Nicaragua and the United States) conducted the first ever international (trans-boundary) aerial survey of Antillean manatees in the Caribbean waters of Mexico, Belize and Guatemala, Central America from May 2–10, 2014. Surveys were flown to map distribution and estimate manatee abundance in the three countries. Observers counted a total of 419 manatees, 83 in Mexico, 298 in Belize and 38 in Guatemala. This was the first time a survey was conducted simultaneously over the region, although manatee surveys have been conducted separately for each country. This project was initiated by Lighthawk, a non-profit environmental organization that supports environmental protection efforts by making flight services available to conservation groups. Lighthawk provided the aircraft and pilot, and helped coordinate the logistics to conduct surveys which began in Holbox, Mexico in the Yucatan Peninsula and ended in Bahía de Omoa in Guatemala.

Eleven separate segments were surveyed over approximately 40 hours; 3 survey days in Mexico, 4 days in Belize, and 2 days in Guatemala. Surveys were conducted following previously established survey flight paths, using dual observer protocols in which each observer's sightings were recorded independently of one another. Each observer recorded relevant environment information including visibility (turbidity), sea state using the Beaufort scale, cloud cover, and glare. These covariates will be used to calculate observer detectability to help estimate manatee abundance in each country, and region-wide.

We are currently mapping and analyzing the 2014 data. We hope to continue to work with Lighthawk to conduct surveys to better estimate regional abundance and distribution for Mexico, Belize, and Guatemala. Future work may include conducting surveys during different seasons of the year, and expanding the surveys to other Central American countries to help us better assess regional changes in both distribution and abundance over time.

Partners and observers: Armando Ubeda, Lighthawk; Humberto Bahena and Benjamin Morales-Vela, El Colegio de la Frontera Sur - (*Mexico*); Nicole Auil-Gomez, Southern Environmental Association; Nataly Castelblanco and Holly Edwards, Oceanic Society; Samir Rosado and Angeline Valentine, Oak Foundation; Zoe Walker, Wildtracks - (*Belize*); Heidi Garcia, Oscar Hugo Machuca and Ester Quintana-Rizzo (USF), Fundación Defensores de la Naturaleza - (*Guatemala*) –**Holly Edwards** (Holly.Edwards@MyFWC.com)

## ABSTRACTS

**Complementary methods to estimate population size of Antillean manatees (*Sirenia Trichechidae*) at Ciénaga de Paredes, Santander, Colombia.** Arévalo-Gonzalez, G.K., D. Nataly Castelblanco-Martínez, P. Sánchez-Palomino, H.F. López-Arévalo, M. Marmontel. J. 2014. *Threatened Taxa* 6(6): 5830-5837.

Information on manatee population size in Colombia is limited. This study was aimed at determining manatee population size in the Ciénaga de Paredes (Colombia) by three different methods: boat-based survey, side-scan Sonar (SSS) surveys and local interviews. Manatees were counted during breathing events by direct observation during the dry season, with the number of sightings per hour (NSH) and maximum number of simultaneous sightings (MNSS) used as occurrence indices. In 2002, we obtained an average NSH of 27.62 (SD=12.34) and the MNSS was 18; in 2010 the values were 55.71 (SD=29.79) and four respectively. Using linear-transect SSS data we estimated a population size of 12 individuals (%CV=27.3). The local community claimed that no hunting or entanglements had taken place in the area for over 20 years. These methods have pros and cons in terms of investment, effort, efficiency and community involvement, and their efficiency may vary in different seasons. Applying them in a complementary way and at greater spatial and temporal scales could enhance the accuracy of results. **Keywords :** Ciénaga de Paredes, distance sampling, population size, side-scan sonar, *Trichechus manatus*.

**Feeding Ecology of the Amazonian Manatee (*Trichechus inunguis*) in the Mamirauá and Amanã Sustainable Development Reserves, Brazil.** Guterres-Pazin, M.G., M. Marmontel, F. C. W. Rosas, V. F. V. Pazin, and E. M. Venticinque. 2014. *Aquatic Mammals* 40(2): 139-149. DOI 10.1578/AM.40.2.2014.139.

The Amazonian manatee (*Trichechus inunguis*) is an exclusively herbivorous freshwater mammal. Between 1994 and 2008, 230 fecal and 16 stomach content samples from wild Amazonian manatees were obtained. The material was collected during both dry and wet seasons in the sustainable development reserves of Mamirauá (MSDR) and Amanã (ASDR) from floodplain and *terra firme* and *igapó* (not subject to long-term flooding) habitats, respectively. Species constituting the diet of the Amazonian manatee were identified through a comparative analysis with a reference collection of epidermis from 69 plant species of potential consumption by the species. Forty-nine plant species were identified in the species' diet. In the MSDR, 32 plant species were found—18 during the dry season and 28 during the wet season. In the ASDR, 48 species were identified of which 40 occurred in both periods. A total of 30 new species were added to the Amazonian manatee diet known to date. The species that were found most frequently in the material were *Hymenachne amplexicaulis*, *Oryza grandiglumis*, *Paspalum repens*, *Azolla caroliniana*, and *Limnobium spongia*. Poaceae was the family with the greatest frequency of occurrence (91.5%). Plant species most consumed present emergent or floating habits. There was a difference in the composition of plant species found in manatee feces between the dry and wet seasons ( $p = 0.0002$ ) but not between floodplain and *igapó*. Results show that the Amazonian manatee feeds on a great variety of plant species during the wet and dry season alike, and both in floodplain and *igapó* environments. Therefore, food availability alone does not represent a determining factor to explain the seasonal migration of the species. **Keywords:** aquatic plants, central Amazon, diet, floodplain, *igapó*, seasonality, *Sirenia*

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