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INTERNATIONAL SIRENIAN WORKSHOP

Exploring Issues Related to Sirenian Management, Research and Conservation

14 December 2003 at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC

You are invited to participate in the Second International Sirenian Workshop on 14 December 2003 from 12:30-5:00 PM in Auditorium IV. The workshop's aim is to foster communication between researchers, managers, and policy makers. Scientists and managers representing countries from all over the globe are invited to submit an abstract to speak at the workshop. Presentations should focus on information that will benefit studies that enhance and protect endangered sirenian populations and support advancement of our general understanding of sirenian biology. Presentations will be selected in an effort to represent global sirenian research and will be selected on a first come, first served basis. All presenters will be given 15 minutes, including time for questions, and are asked to send a copy of their abstract and presentation by November 30, 2003.

To register for this workshop, please send your name, affiliation, full address, including country of residence, phone number, and e-mail address. Please indicate if you would like to present at the workshop. The workshop will be limited to 100 attendees and there will be no registration fee if you pre-register. E-mail registration information should be sent to Nicole Adimey <Nicole_Adimey@fws.gov>.

Workshop Coordinators:

- Nicole Adimey, U.S. Fish and Wildlife Service, 6620 Southpoint Drive, South #310, Jacksonville, Florida 32216-0958 (phone: (904) 232-2580, ext. 123; fax: (904) 232-2404; e-mail: <nicole_adimey@fws.gov>)
- Bob Bonde, U.S. Fish and Wildlife Service, U.S. Geological Survey, 412 NE 16th Avenue, Gainesville, Florida 32601 (phone: 352-372-2571 x17; fax: 352-374-8080; e-mail: <Robert_Bonde@usgs.gov>)

FIRST ANNOUNCEMENT
SOCIEDAD MEXICANA DE MASTOZOLOGÍA MARINA
XXIX Reunión Internacional
para el Estudio de los Mamíferos Marinos

We are pleased to announce our next International Meeting, which will be held in the City of La Paz, Baja California Sur, Mexico, May 2–5, 2004, with the following characteristics:

DEADLINE FOR SUBMISSION OF ABSTRACTS: January 30, 2004.

WORKSHOPS or COURSES: We are asking for suggestions for the organization of workshops or courses that can occur before or after the meeting. Along with the proposals of subjects, you can suggest the exhibitors. Hector Perez-Cortes <hpcortes@yahoo.com> will be in charge of organizing the workshops or courses.

This is THE FIRST ANNOUNCEMENT, to publicize the deadline for submission of abstracts and dates of the meeting. Later a second announcement with more details of the meeting will be sent through the web page of SOMEMMA. For any questions or suggestions:

Diane Gendron - President of SOMEMMA <dgendron@ipn.MX>

Jorge Urban - President of the Organizing Committee <jurban@uabcs.MX>

Alejandro Gomez-Gallardo - Secretary of SOMEMMA and Organizing Committee <eagg@uabcs.MX>

- **E. Alejandro Gomez Gallardo U.** (Programa de Mamíferos Marinos, Dpto. de Biología Marina, Universidad Autónoma de Baja California Sur, Carretera al Sur km. 5.5, 23080, La Paz, B. C. S., MEXICO; Ap. Post. 19 B 23081; tel: (en ext. 119) 01 612 128-0440, 128-0432, 128-0569, 128-0342; fax: 128-0880)

SIRENIAN INTERNATIONAL

Sirenian International is a grassroots organization dedicated to worldwide manatee and dugong conservation through research and education. We support research, conservation, and education projects involving manatees and/or dugongs around the

world, with priority given to projects in developing nations where funding is traditionally difficult to secure; typical small grant awards are US\$500-\$1,000. We will be having a general membership/networking meeting at the SMM Meetings in Greensboro, NC, in December. For more information about our Call for Proposals, Membership, and/or our networking services and resources, please visit our website online at <<http://www.sirenian.org>> or e-mail <caryn@sirenian.org>.

The Culture Corner

. . . Being an Occasional Sampling of the Inexorable Penetration of Popular Culture by Sirenia

Starting next fall, 50 life-size fiberglass manatees, decorated by local artists, will be placed around the city of Jacksonville, Florida, where they'll be on display for five months.

The Sea Cows for Kids project is modeled after similar projects done in other cities, such as Chicago, which did a Cows on Parade theme, and Nashville, which did a Catfish Out of Water theme. [EDITOR'S NOTE: Washington, D.C., recently did a similar "Party Animals" project, with donkeys and elephants representing the Democratic and Republican parties, respectively.] It will raise money for the Otis Smith Kids Foundation, a local non-profit organization that helps disadvantaged children. The foundation is working with local community organizations, including the Cultural Council of Greater Jacksonville, to develop youth arts programs.

"Based on what we've seen, this project has been highly successful everywhere it's been," said Tim Murphy, executive director of the foundation. "We've received a lot of positive feedback about this project."

The manatee figures will be designed by Sally Corp., a local business that makes animatronic robots for amusement parks.

Murphy said the idea is to raise money through sponsorships. The sea cows will also be auctioned at the end of the project, in March 2005. For US\$5,000, local businesses or individuals can sponsor a sea cow. The money generated will pay for production costs and a \$750 honorarium to the artists selected to paint the sea cows, said Bonnie Upright, director of community development for the foundation.

Interested artists may submit two designs. A committee will decide on the designs that best represent the whimsical spirit of the project. There will be two figures available for design, an individual manatee and a mother with her calf. Drew Hunter, design director for Sally Corp., said the manatees will be about 6 feet tall, 7 feet with the concrete base. Artists are free to paint, sculpt or decorate the sea cows as they wish, as long as the structural essence of the creatures is not tampered with.

No other city has done a manatee for such a project, said John Wood, chairman and CEO of Sally Corp. Wood said he sees the project as a great way to bring the community together. "It's just a matter of community service, it's a worthwhile cause, it's for kids," he said. Those involved in the project also see it as a way to draw tourism to the area. It's no coincidence that the sea cows will be on display when the Super Bowl [football championship] comes to town in February 2005. "It was very much a part of our planning process to tie in with the Super Bowl and the exposure that our sea cows will get during that high-profile event," Murphy said.

Those interested in participating can apply by contacting the Otis Smith Kids Foundation, 1 San Jose Place, Suite 35, Jacksonville, FL 32257, phone (904) 889-6847, or logging onto www.seacowsforkids.com. Deadline for submissions is Nov. 28, 2003.

- **Tanya Perez-Brennan** (Source: *Florida Times-Union* [Jacksonville, FL], Oct. 7, 2003, city edition)

LOCAL NEWS

AUSTRALIA

Australian Initiative to Ensure that Dugong Hunting is Sustainable. -

At a meeting of the Barrier Reef Ministerial Council in Brisbane on 12 June 2003, the Great Barrier Reef Ministers resolved to refer the issue of the sustainable use of dugong and turtle to the Natural Resource Ministerial Council with a view to developing a nationally coordinated approach to the protection of dugong and turtle. The Ministers felt such an approach was necessary in view of evidence before the Great Barrier Reef Ministers of significant population decline of dugong and turtle species in the Great Barrier Reef Region and in the Torres Strait.

A catalyst for this initiative was research by my group and the presentations I gave at the Conservation, Biodiversity and World heritage Reef Advisory Committee and to senior staff of the Great Barrier Reef Marine Park Authority early this year.

The Australian Government Minister for the Environment and Heritage, Dr David Kemp, subsequently indicated that he wished to see significant progress on the issue of Indigenous take of dugong and turtle within 12 months, from July 2003. In response, an Australian Government Working Group (chaired by the Department of the Environment and Heritage) has been convened to address

Australian Government responses to the issue of Indigenous take of dugong and marine turtle species in Australian waters.

The Working Group has met twice to consider the issue and subsequent actions by the Australian government. I gave a presentation on my findings at the 10 September meeting of the Working Group. Unfortunately, some Indigenous members of the group are still unconvinced about the problem. However, many Indigenous leaders from hunting communities are supportive of government intervention to address the problem. - **Helene Marsh** (Dean of Postgraduate Studies, Professor of Environmental Science, James Cook University, Townsville, Qld., Australia; phone: 07 47 815575 (via PA please use before 3 pm), 07 47 814793 (direct line please use after 3pm); fax: 07 47815581; e-mail:

<helene.marsh@jcu.edu.au>

BELIZE

Belize Cares for its Third Orphaned Calf. -

On Saturday, 6 Sept. 2003, members of the Belize Marine Mammal Stranding Network (BMMSN) responded to a report of a manatee calf observed alone for two days under a pier in Belize City. It was rescued on Monday, 8 Sept. after an emergency plan was in place, and funds were secured.

The female calf was in very poor condition, appearing emaciated and rather weak. She was thought to be about 3-4 weeks old, measured 116 cm TL, and weighed 22 kg. Pedialyte was offered, and the calf drank the fluid immediately. She was fed oral rehydration fluid for two days; thereafter an infant's milk formula was given. The calf was given the name "Tiny" by the Hugh Parkey Foundation, who provided initial funds for her care.

Tiny was kept in an inflatable kiddie's pool and was monitored 24 hours a day by various BMMSN members and numerous volunteers including students from local colleges (St. John's College and University of Belize). Dr. Roberto Sanchez, vet for Dolphin Discovery in Puerto Venturas, Mexico, traveled to Belize to make an assessment and to bring in Multimilk® for Tiny's new formula. She is now in the care of Wildtracks, where she will be for about a year.

This calf rehabilitation is the third that Belize has ventured into. Hercules was reared in Mexico by Xcaret for a year, and Woody was taken care of in Belize by Wildtracks. The two were captured in 1999 and are now free-ranging in Southern Lagoon, Belize. They are both in good condition and are regularly monitored with the assistance of Wildlife Trust. The same course of action is intended for Tiny, by rearing her in a natural environment and introducing her to natural vegetation, in preparation for her release into Southern Lagoon in about two years.

BMMSN is a program under the Manatee Project of the Coastal Zone Management Authority and Institute funded by UNDP/GEF/ and EU. The primary member agencies that assist with this phase of Tiny's rehabilitation

are: CZMAI, Wildtracks, Belize Agricultural & Health Authority, and Animal Medical Centre; PACT and Save the Manatee Club also provided donations. All rehabilitation activities are carried through the generous donations of many local and international organizations, without whom, this project would not be possible. For further information, or to contribute towards this rehabilitation initiative, contact **Nicole Auil** or **Angeline Valentine**, Manatee Researchers of CZMAI <czmbze@btl.net>.

BRAZIL

Another Captive Pregnancy in an Amazonian Manatee. - Boo is pregnant again. This is her third calf since she became the first Amazonian manatee to conceive and give birth in captivity. "Erê" was born in April 1998 (*Sirennews* No. 30). After Erê, she had a stillborn calf and immediately adopted two orphans (Manaós and Tapajós), breastfeeding them simultaneously for two years. We are expecting the next birth to happen around November/December 2003, but we are waiting for the final results of hormone and ultrasound analyses to confirm the data. The Aquatic Mammal Lab of INPA has today four adult females: Boo, 29 years old; Tukano and her calf Tuã (18 months of age); Cambá, our largest female, who has never reproduced in 19 years of captivity; and Cunhantaí, an orphan raised on a bottle and now ready to reproduce. These results are due to the efforts of the researchers, staff and collaborators of the Aquatic Mammal Lab with the financial support of FINEP/Brazil and PPG7. - **Dr. Vera M.F. da Silva** (Laboratório de

Mamíferos Aquáticos-LMA, Av. André Araújo, 936, Petrópolis, Manaus, AM, Brasil; telefax: 55-92-6433184)

FLORIDA

Airport Detector Beeps Scanning Manatee. - SARASOTA, Fla., July 26 (UPI) -- Airport security went underwater in Florida to locate a medical thermometer lodged in a manatee.

Lab workers at the Mote Marine Laboratories in Sarasota fed two dime-sized thermometers to Buffett, a 1,800-pound manatee, to record his intestinal temperature July 1. They expected him to pass them both within eight days, but only one appeared, the *Sarasota Herald-Tribune* reported.

Manatee expert Deborah Colbert came up with the idea of using an airport metal-detecting wand to determine where the missing thermometer was exactly; so Chris Kelleher of the Sarasota-Bradenton International Airport agreed to get into Buffett's tank and wand him over.

The thermometer was found deep inside, and near the end of Buffett's intestinal tract. He eventually passed the gadget July 14, reassuring the scientists who feared it would cause an infection.

JAPAN

Lawsuit Filed to Halt U.S. Airbase Construction in Okinawa. - A coalition of conservation groups from both sides of the Pacific filed a lawsuit against the U.S. Department of Defense over plans to construct a new heliport facility on a coral reef on the east coast of Okinawa, Japan. Conservationists are concerned that the proposed 1.5-mile-

long airbase to be built on reclaimed land over a coral reef would destroy the remaining habitat of the endangered Okinawa dugong, a cultural icon of the Okinawan people.

The lawsuit (*Okinawa Dugong v. Rumsfeld* C-03-4350, filed in the U.S. District Court in San Francisco on Sept. 25, 2003) asks the Department of Defense to comply with the National Historic Preservation Act (NHPA) by conducting a complete public analysis to assess the impacts of the proposed project on the Okinawa dugong. The NHPA requires agencies of the U.S. government to conduct a full public process before undertaking activities outside the United States that might impact the cultural and natural resources of other nations.

At issue is the proposed relocation of the existing U.S. Futenma Air Station in Okinawa to the coastal area of Henoko. This area on the eastern coast of Okinawa is the site of sea grass beds upon which the Okinawa dugongs depend for their food.

"The American military base planned on this coral reef threatens the survival of the Okinawa dugong and should be reconsidered," said Takenobu Tsuchida of the Dugong Network Okinawa. "We are glad our friends in the United States have joined our efforts to preserve an essential icon of Okinawan culture."

Peter Galvin, Pacific Director of the USA-based Center for Biological Diversity, stated, "This population is considered the most isolated and imperiled dugong population in the world. The Okinawa dugong is so threatened that it has been classified as being nearly extinct." Galvin added "Scientists believe that only 50 dugong survive in the waters off Okinawa. This

project, if constructed, would very likely drive the Okinawa dugong into extinction."

"The United States must be sensitive to Japan's national treasures, as well as international obligations to protect the environment. The dugong has a rich history and holds a special place in Okinawan mythology and culture," said Takaaki Kagohashi of the Japan Environmental Lawyers Foundation. "The people of Okinawa deserve respect for their cultural and natural heritage just as Americans would expect government agencies to protect their natural treasures."

The coalition bringing the lawsuit includes, as U.S. plaintiffs, the Center for Biological Diversity and the Turtle Island Restoration Network, and four Japanese groups: Dugong Network Okinawa, Save the Dugong Foundation, Committee Against Heliport Construction - Save Life Society, and the Japan Environmental Law Federation. Earthjustice represents all the plaintiffs.

The waters off Okinawa are the northernmost home of the dugong. The Okinawa dugong has been listed by the government of Japan since 1972 as a "Natural Monument" under Japan's "Cultural Properties Protection Law." Since 1955, the dugong has been protected as a cultural monument by the autonomous Ryukyu Prefecture, due largely to its status as a revered and sacred animal among native Okinawans. The Okinawa dugong is also listed under the U.S. Endangered Species Act.

"For Okinawans, the dugong compares only to the American bald eagle in terms of cultural and historical significance," said Takuma Higashionna from the Okinawa-based Save the Dugong Foundation. "The myth of the

mermaid comes from sailors who saw the dugong. Historically, Okinawans believe the dugong to be a friendly harbinger of sea disasters such as tsunamis."

"Living here in Yambaru for seventeen years," said Ms. Anna Koshiishi, an individual plaintiff in the case, "I have learned many important things from nature. All life on the Earth has close connection and plays an important role. Every life is indispensable to keep the balance of this connection. To save the Okinawa dugong, which is a globally threatened species, is to save my own life."

The U.S. National Historic Preservation Act is international in scope. It establishes a policy that "the Federal Government, in cooperation with other nations," will "provide leadership in the preservation of the prehistoric and historic resources of the United States and of the international community of nations." Congress added Section 402 to the NHPA in 1980 to comply with U.S. obligations under the World Heritage Convention and to mitigate the adverse effects of federal undertakings abroad.

"Given the obvious impacts on the dugong and its habitat from construction of the new base, the Department of Defense should consult with Japanese environmentalists and Japanese cultural officials in a fully public process before moving ahead with this project," said Martin Wagner of Earthjustice, who is representing the coalition in the United States.

"With a globalizing economy, environmental issues have become borderless," said Kagohashi of the Japan Environmental Lawyers Foundation. "Not a few environmental problems need to be addressed by international

collaboration. This cooperation between the Japanese and U.S. environmental organizations and environmental lawyers illustrates this new style of international collaboration. We believe wildlife and human beings live in one big house called the Earth. The dugong's name as a plaintiff in this case will show how we are all connected." - (Source: press release, Center for Biological Diversity (USA), Earthjustice (USA), and Japan Environmental Lawyers Foundation (Japan). The lawsuit can be read online at: <http://www.earthjustice.org/news/documents/9-03/dugongcomplaint.pdf>)

PHILIPPINES

The Dugongs (Dugong dugon) of Hinatuan Bay, Surigao Del Sur, Mindanao, Philippines. - Modern records support the presence of dugongs (*Dugong dugon*) in Hinatuan as far back as 1950, but they most likely inhabited the area even before this date. Over the past several decades, dugong numbers have slowly decreased due to (1) illegal fishing techniques such as dynamite and cyanide fishing; (2) extensive uncontrolled use of fish corrals and illegal mesh size fishing in protected areas; and (3) illegal over-expansion of fish ponds.

For decades, government environmental agencies in the Philippines assumed the population was extinct in Surigao. As a result, no new endeavours were initiated to protect or preserve this endangered species in the Surigao del Sur region. Initial research indicates that, in the Surigao region, dugongs can only be found in Hinatuan. They appear to be extinct in the surrounding areas of Surigao del Sur, with unconfirmed recent reports in Sairgao Island.

In April 2001, a dugong calf was killed in a fish corral accident, and after conducting interviews with local people, it was found that 2 other baby dugongs had been killed in the previous 6 months. National non-government and governmental agencies were contacted, who acknowledged that they were unaware of the presence of dugongs in the Hinatuan area, and stated that they had terminated recent surveys 200 km south of this area.

From October 2000 to July 2002, seven dugong calves and 2 subadult dugongs were killed, and one calf tagged and released by fishermen, all in Hinatuan municipal waters. This is strong evidence that either the population has not gone extinct, or that the area has been re-populated in recent years. But, with 5 calves killed in the past year, and increasing fishing intensity, is there hope for continued recovery? Only conservation on both local and international level can save dugongs from extinction.

Between the year 2000 and August 2002, dugongs (*Dugong dugon*) were documented in Hinatuan, Surigao del Sur, Mindanao, in the Philippines, and surveys are ongoing. The historic range of the dugong included most coastal areas of the Indo-Pacific (Reeves et al., 1992). Today, only relict populations remain and these are separated by large areas wherein dugong populations are either close to extinction or are already extinct (Marsh, 1993). The rationale behind the project was to complement existing methods of dugong biology studies, to document a previously undocumented population, and to formulate with national agencies (particularly the Pawikan Conservation Project, PCP) a plan to help conserve this species in Hinatuan Bay. The

dugong is classified by the IUCN-World Conservation Union since 1982 as vulnerable to extinction (Hilton-Taylor, 2000). The dugong is also listed in Appendix 1 of the Convention on International Trade on Endangered Species (CITES) of the Wild Flora and Fauna (except the Australian population, which is listed in Appendix II).

Methods. Hinatuan, in Surigao del Sur (8°22.1' N; 126°20.0' E), is located at the mouth of the Hinatuan River on the eastern coast of northeastern Mindanao (Fig. 1). It is bounded on the east by the Pacific Ocean, has an unbroken coastline with white beaches and thirteen islets, and is located only a few nautical miles from the Philippine Trench. Hinatuan consists of a number of mainly coastal barangays (villages): Talisay, Loyola, Tidman, Mahaba Island, San Juan, Cambatong, Port Lamon, Langka, Pangasinan Island, and Cabgan Island. The people of surrounding barangays and islands say that they regularly see dugongs in the area.

With colleagues and government officials, I carried out interviews of local fisherfolk on a regular weekly basis. I visited areas daily to collect information, and gave educational workshops and training in association with the PCP. When a fisherman sighted a dugong or one was caught in a fish corral (permanent fishing structure placed in water) it was reported to the Centre of Empowerment Resource and Development (CERD). I carried out monthly surveys of seagrass beds with a uniform methodology (English et al., 1997). Physical measurements of dugongs and collections of samples were made where possible, and all samples given to the PCP, Protected Area & Wildlife Bureau (PAWB) of the

Department of Environment and Natural Resources (DENR).

Dugongs have been sighted and caught in Hinatuan for many years, with records as far back as 1950 (DENR, 1995). In 1986 three dugongs were caught in Port Lamon while swimming together. In 1999 at Pagasinan Island, a 300 kg dugong was caught and slaughtered and its meat was sold for P20/25 per kilo (US\$.40 or .50). A local fisherman (1998) reported a dugong for sale in the local market that was approximately 250 kg. But slaughtering and selling dugongs is not done anymore in the open market; if anything this practice has gone underground and the animal is eaten locally. In 1975, in the area of Tidman, dugongs were seen quite regularly, and one report from the local government documents that a single dynamite fisherman killed no less than 10 dugongs. In 1999 dugongs could be seen near the Hinatuan River mouth. There are many accounts of fishermen who say that in their lifetime and in their fathers' generation there used to be many more dugongs in Hinatuan. There are even accounts that during certain times of the year, when spear fishermen were in the water, dugongs would "tenderly embrace" the spear fishermen.

Dugongs are continually seen in Hinatuan, but their habitat and numbers are being depleted annually. Reports can go undocumented, as local people until recently did not understand the significance of the dugong and the threats that affect it. As a result, the dugongs of Hinatuan are presently threatened with extinction.

Recent information from interviews now documents that the areas of Campa and Harip in the north of Hinatuan see dugongs on a regular basis. In Harip they are seen every month all

year round, with the last reported sighting April 10, 2002. In Campa the last reported sighting was of an “adult and four smaller ones”. More research is required, but I suspect that Campa could be where the dugongs rest when not feeding.

Results. The current data show that individuals and small groups of dugongs are seen at regular intervals in certain areas of Hinatuan. The main places dugongs were spotted are as follows: Cabgan Island and Maowa Island; Langka, Pisotan, and Mahaba Island; Pagasiinan Island, both Singapore and San Juan; Maowa Island, Mawmawaon Island, and Tipdos Island; and areas of Port Lamon, Campa, and Harip as far as Baculin.

Seven dugong calves have been killed since October 2000. The number of dugongs in Hinatuan waters, in my opinion, is between 10 to 20 individuals (see Figs. 1-2). The majority of mortalities have been dugong calves, new to the area and falling victim to the multitude of inshore fish corrals. These are the single most important factor in killing and trapping dugongs and turtles in Hinatuan. In the case of dugongs, up to 75% of the mortality is due to fish corrals.

Discussion. Education and advocacy campaigns and training, run by the author, colleagues and the PCP for the education of local officials and fisher folk, have borne fruit. In August 2001, a dugong calf was caught in a local fisherman's net. He promptly placed a makeshift tag in the tail of the dugong and set it free. This incident shows the beginning of cooperation with dugong conservation from the local fisher folk of Hinatuan. In August 2002, two dugongs were caught in a fish corral in Barangay Campa, and immediately the office of

CERD was contacted and the dugongs were set free, where normally they would have been killed. Usually, when a dugong has been killed the carcass is eaten, but in two out of the last three mortalities (data are still forthcoming on one mortality) the bodies have been buried and not consumed, perhaps a show of support and respect for the project at hand. In light of the recent findings, presentations and training, the local government enacted policies and legislation to increase the protection of turtles and dugongs, and gave resources to the author in the form of transport and gasoline on a regular basis.

A pattern can be observed in the data and distribution of sightings. Most adults (large dugongs, >200 kg) are seen in Port Lamon, Pangasiinan Island, San Juan, Loyola, and Cabgan Island. In these areas few calves or juvenile dugongs are seen. In comparison to other areas, more dugong calves have been seen from Mahaba Island, Langka, to Maowawoan Island and Maowa Island. While this area has the highest number of mortalities and sightings of dugong calves, there are few reports of adults residing in the area. On another occasion, four dugong calves were seen jumping and playing in these waters and again no adults were seen. This area in particular is sheltered, with little wave exposure, has extensive mangroves and sea grass beds, constitutes one of the biggest marine sanctuaries Hinatuan has, and is turbid enough so the dugongs are not easily seen. This locality is a possible dugong nursery area and is of paramount importance to the survival of the dugongs in Hinatuan.

It is my opinion that there are two zones in Hinatuan with which the dugongs interact. These can be referred to as feeding zones and safety zones.

Recent information gathered in March and April 2002 now suggests Campa as the safety zone. This recent evidence requires more investigation but is plausible, as this is close to the feeding grounds of Pangasiinan Island and Port Lamon. The safety zone can be described as an area where the dugongs reside when they are not feeding. It is when they leave their safety zone on their way to the feeding zone that they become vulnerable to inshore fisheries, especially fish corrals.

As of yet there are no dugong population estimates for the Philippines. The fact that the population in Hinatuan was undocumented or assumed extinct shows that there could be other areas in the Philippines where dugongs reside and are still surviving in isolated patches. Areas where dugongs once lived and are now assumed to be extinct should be investigated once more to clarify whether they have in fact succumbed to extinction. As has been shown in Hinatuan, lack of reported sightings does not mean extinction.

Conclusion. Information gained from interviews shows that dugongs were very common in Hinatuan in the 1950s, after which their numbers rapidly declined. Statements like "I used to see lots of them and now not as much" and "My father used to speak of seeing lots of them" were commonly heard. The biological surveys also seem to document a rapid and sharp decline in the Hinatuan population. However, there are no quantitative data available on mortality due to lack of resources. Further research in Hinatuan is needed to document a possible dugong nursery area. This is urgent, as rampant dynamite fishing is a major contributor to the accelerated decline of dugongs in the Philippines.

Today, there are at least three major areas in the Philippines that may harbor a viable population of dugongs: Palawan, Queson-Isabela, and southern Mindanao (DENR, 1995). Dugongs are reportedly extinct in other areas such as the Visayas and western Luzon (DENR, 1995). More funding is needed in the Hinatuan area for further research by the PCP, and more collaboration should be initiated to complement its work with national and international groups and governments. I have proposed that Hinatuan be recognized as a "Critical Habitat" under Philippine Republic Act 9147 to create a protected area for the population.

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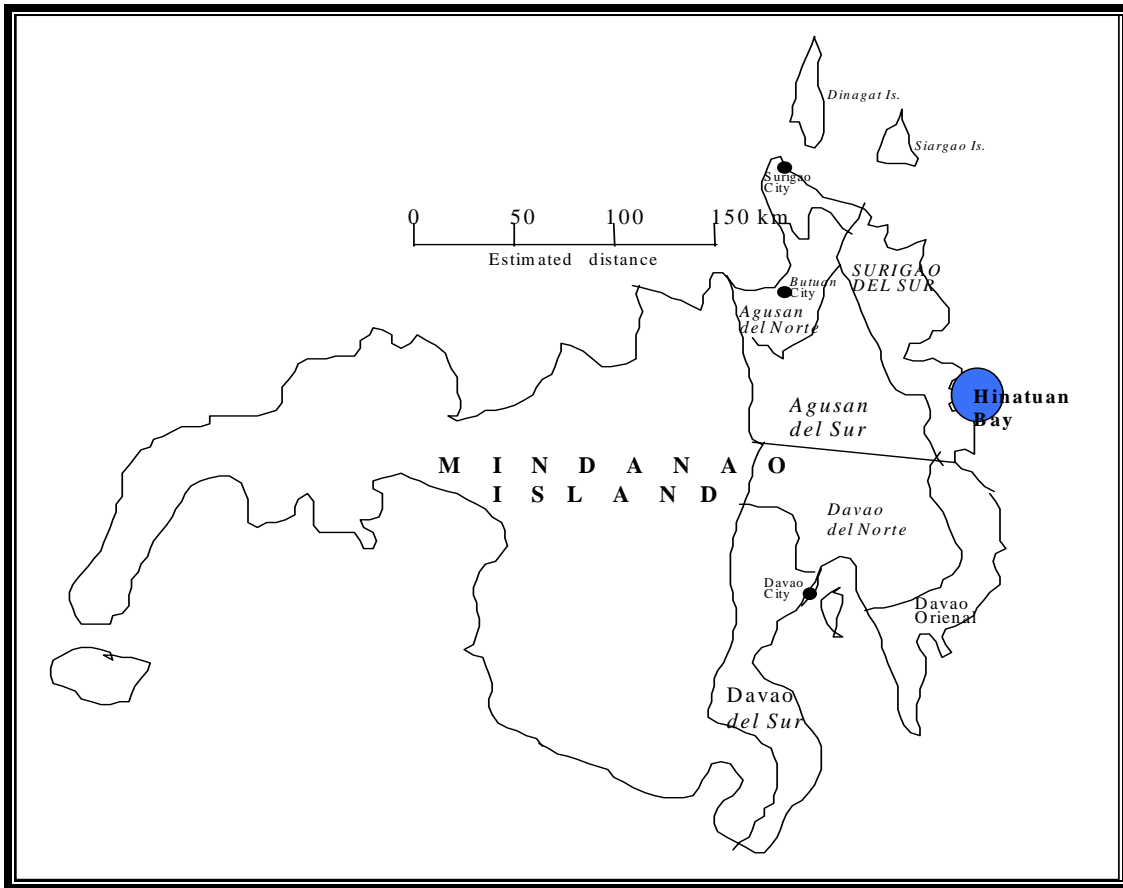


Figure 1. Hinatuan Bay, Surigao Del Sur, Mindanao, Philippines. (Map c/o CERD)

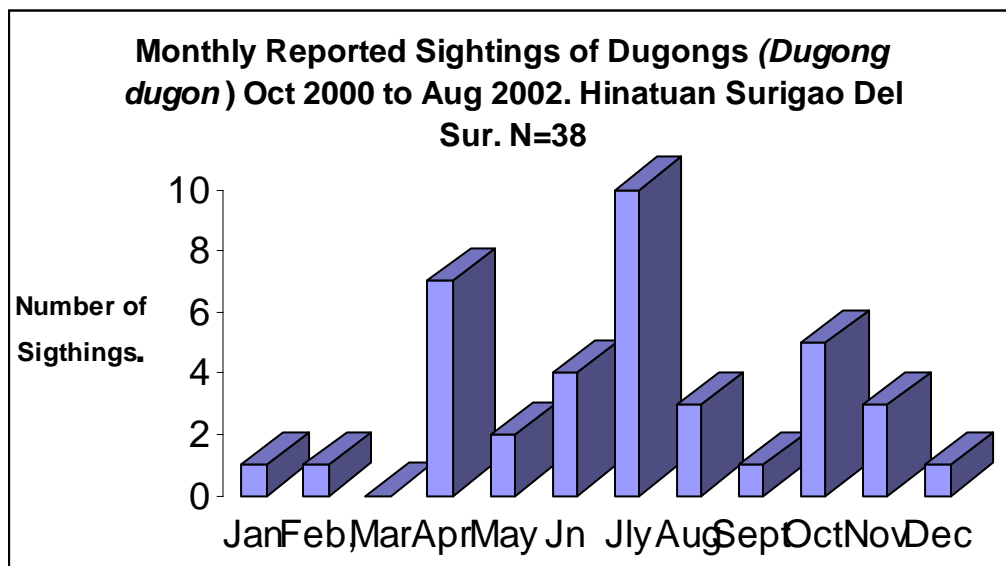


Figure 2. Sightings of dugongs from October 2000 to July 2002, Hinatuan, Surigao Del Sur, Mindanao.

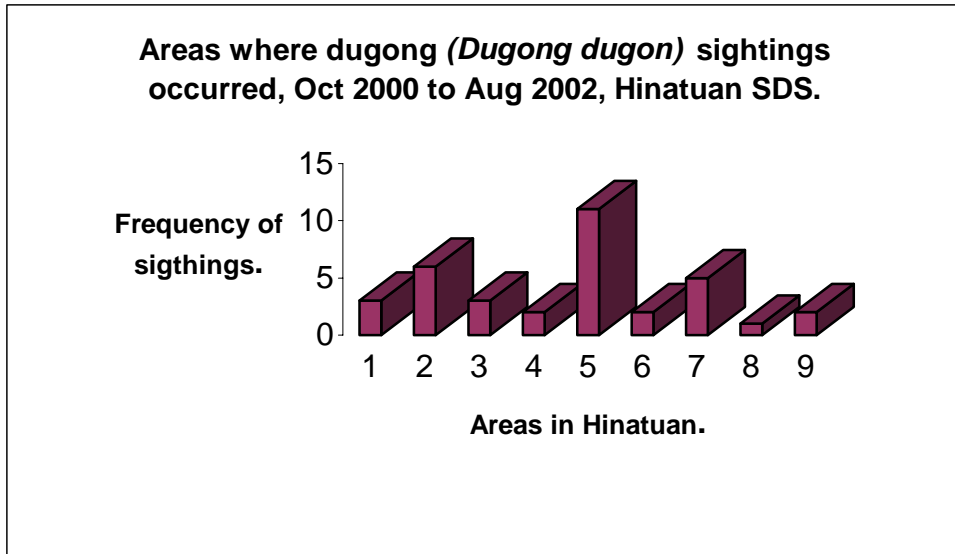


Figure 3. Area 1. Maowa Island, Area 2. Cabgan Island. Loyola Sanctuary. Area 3. Langka, Area 4. San Juan Area 5. Pangasiinan Island, Area 6. Lacasa, Area 7. Mahaba Island, Area 8. Baculin, Area 9. Campa, Harip. Although this graph shows no sightings of dugongs in the Port Lamon area, Port Lamon is an extensive feeding ground for transient dugongs that reside extensively around Pangasiinan Island and inshore Port Lamon waters, as well as in Campa. The sanctuary area and surrounding environs have extensive beds of *Halophila* sp. which the author observed to have been regularly grazed.

Table 1. Summary of dugong mortalities from October 2000 to July 2002.

Area	Date	Size Approx.	Weight Approx.	Baby (B)	Adult (A)
Maowa Island	Oct 20 th 2000	1 meter	35 kg	B	
Langka	April 21 st 2001	1 meter	35 kg	B	
Langka	August 12 th 2001	1 meter	20 kg	B	
Pangasiinan Island	October 2000	1 meter	35 kg	B	
Lacasa	June 2001	1.3 meter	45 kg	B	
Lacasa	Later 2000	Unknown	unknown	B	
Lacasa	August 2000	Unknown	Unknown	B	
Mahaba Island	December 14 th 2001	197cm	250 kg		A
Baculin	May 26 th 2002	Nearly 2 meters	100 kg		A

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- **Rowan Byrne** (Voluntary Service Overseas, <www.vso.org.uk>, P.O. Box 2440, QC Central Post Office, 1164 Quezon City, Manila, Philippines, and Center for Empowerment & Resource Development, Inc. (CERD), in conjunction with Mr. Gary Cacho, Fisheries Officer for CERD. Author's e-mail: <dugongresearch@yahoo.com>)

TANZANIA

Tanzania's Sea Cow Population Near Extinction. - Tanzania's small population of sea cows are rapidly facing extinction due to entanglement and drowning in gill nets, a report says.

"It is clear that dugongs are now critically endangered in Tanzania, and without immediate concerted conservation effort, they will almost certainly become nationally extinct in the near future," according to a report by the World Wildlife Fund (WWF) and the U.N. Environment Program.

Released July 29, 2003, the report is based on testimony from local fishermen who say that since January 2000, only 32 dugongs have been spotted. A majority of the animals seen by fishermen were already dead, after becoming trapped and entangled in fishing nets.

Dr. Amini Ngurasu, dugong research coordinator for WWF, said in an interview that donors and universities are reluctant to fund research on dugongs because there are so few of them left, unlike other regional endangered species like the sea turtle and dolphins. Ngurasu said he has never seen a live dugong.

Tanzania's dugong population is estimated at less than 100, a level so low that scientists doubt they can save the animal, the report said. In the 1960s, herds of 20 to 30 dugongs were frequently seen along the Tanzanian coast. Fishermen reported capturing up to five dugongs in any given day. But from the year 2000, only eight to 10 dugongs are captured every year in Tanzania, the report said.

"The perception in all areas along the Tanzania coast and its islands is that it may already be too late for dugong populations to recover," said the report that recommended setting up dugong sanctuaries and educating fishermen on the importance of protecting the animal. - **George Mwangi** (Associated Press)

ABSTRACTS

Lago Amanã: destino estival de manatíes amazónicos en la Amazonia Occidental brasileña.

Miriam Marmontel¹, M.G. Guterres², A.C.O. Meirelles³, J. Calvimontes⁴, and F.C.W. Rosas⁵.

¹*Instituto Desenvolvimento Sustentável Mamirauá, C.P. 38, 69470-000 Tefé, AM, Brasil*

²*Pxboi@terra.com.br*

³*Associação de Pesquisa e Preservação de Ecossistemas Aquáticos AQUASIS*

⁴*Universidade Nacional Agraria “La Molina”, Lima Peru*

⁵*Instituto Nacional de Pesquisas da Amazônia, Manaus, Brasil*

Entre junio 1994 y septiembre 2001 fueron capturados y radio-marcados 5 manatíes amazónicos (*Trichechus inunguis*) en las reservas de desarrollo sostenible (RDS) Mamirauá y Amanã, en la Amazonia occidental brasileña, con el objetivo de determinar habitat crítico y desplazamientos sazonales. Los especímenes, todos machos adultos, midieron entre 189 y 257 cm en el momento de la captura. Hecha la biometria, colecta de materiales y marcación, cinturones provistos de radio-transmisores con VHF con frecuencia única en la faja de 174 MHz fueron adaptados a los animales. “Matintim”, “Zé Taboca”, “Ticuã”, “Chico Ariramba” y “Zé Sabazinho” fueron monitoreados por períodos que variaran entre 4 años y 10 meses (en el caso del último capturado). El seguimiento fue realizado por medio de receptores manuales o provistos de scanner, y antena portátil tipo yagi de 3 elementos, abordó de embarcaciones de diversos tamaños, torres, casas flotantes o avionetas. El desplazamiento de 3 animales, hasta en cuatro ocasiones, desde el lago Mamirauá hasta el lago Amanã (distancia aproximada 130-150 km) durante el período de vaciante, y su retorno al Mamirauá durante la creciente, confirmó la existencia de una ruta migratória entre las dos reservas. El seguimiento de “Zé Sabazinho” durante la *arribação* (migración) para el lago Amanã y su retorno al Paranã do Castanho (área donde fue capturado, distancia aproximada 70-80 km) indican una segunda ruta migratória, interna a la RDS Amanã. Estos datos señalarían la necesidad de los animales de tener dos ambientes distintos (várzea y agua blanca en Mamirauá, y *terra firme* y agua negra en Amanã) para su ciclo de vida, y sugieren que el lago Amanã, con sus pozos profundos, sea un local de concentración de manatíes amazónicos provenientes de diferentes lugares durante el período de seca.

Este trabajo fue posible con apoyo del IDSM, MCT y Petrobras Petróleo Brasileiro S.A.

Filogeografía do Peixe-boi Marinho (*Trichechus manatus*) e Peixe-boi Amazônico (*Trichechus inunguis*).

Juliana de Abreu Vianna¹; Marmontel, M.²; Santos, F.R.³

¹*Lab. de Biodiversidade e Evolução Molecular, Universidade Federal de Minas Gerais, Brasil*

²*Projeto Mamirauá, Brasil*

³*Lab. de Biodiversidade e Evolução Molecular, Universidade Federal de Minas Gerais, Brasil*

O peixe-boi marinho (*Trichechus manatus*) é o mamífero aquático mais ameaçado de extinção no Brasil. A espécie ocorre desde a Flórida nos Estados Unidos, América Central, Caribe, até o Estado de Alagoas no Brasil, sendo que na costa brasileira a população desta espécie está estimada em menos de 500 indivíduos. O peixe-boi amazônico (*Trichechus inunguis*), espécie também ameaçada de extinção, é endêmica da bacia Amazônica. Ambas espécies, pertencentes à ordem Sirenia, estão seriamente ameaçadas pela caça indiscriminada e destruição do seu hábitat. Neste estudo, foram sequenciados 410 pb da região controladora do DNAm de 79 amostras de peixes-bois amazônicos do Brasil, 29 de peixes-bois marinhos do Brasil, duas da Guiana Francesa, cinco dos Estados Unidos e três de Dugongo (*Dugong dugon*), espécie também pertencente à ordem Sirenia. Os dados foram analisados juntamente com outras 72 seqüências de peixe-boi marinho de outros 6 países previamente publicadas. Foram encontrados 21 haplótipos de peixe-boi amazônico, com uma alta diversidade quando comparada à espécie marinha no Brasil que apresentou apenas dois haplótipos, sendo que 18 haplótipos foram encontrados para o peixe-boi marinho considerando-se as populações dos demais países americanos. Das amostras analisadas três amostras de peixe-boi marinho, uma do Amapá e duas da Guiana Francesa, apresentaram haplótipos tipicamente da espécie amazônica. Uma amostra de peixe-boi amazônico procedente de Belém, Pará, apresentou haplótipo característico do peixe-boi marinho da costa brasileira. A análise do DNA mitocondrial foi complementada com estudos de microssatélites e RAPD confirmando a hipótese de introgressão entre as duas espécies. Além disso, todos indivíduos com indicativo de hibridização são procedentes da região próxima à foz do rio Amazonas, área de simpatria das espécies. Estes resultados ressaltam a erosão genética do peixe-boi marinho na costa brasileira, tanto em relação às demais populações desta espécie em outros países quanto em relação à outra espécie compatriota da região amazônica. Além disto nossos dados demonstram a ocorrência, de certa forma freqüente, de hibridização entre as duas espécies que pode ser outro fator de ameaça à conservação das duas espécies.

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Belize Coastal Zone Management Authority & Institute's Manatee Research Program: <http://www.coastalzonebelize.org/pr_manatee.html>

The Call of the Siren (Caryn Self Sullivan): <<http://www.sirenian.org/caryn.html>>

Caribbean Environment Programme, Regional Management Plan for the West Indian Manatee: <<http://www.cep.unep.org/pubs/techreports/tr35/ct35indx.htm>>

Caribbean Stranding Network: <<http://netdial.caribe.net/~mignucci/>>

Columbus (Ohio) Zoo manatee exhibit: <<http://www.colszoo.org/animalareas/shores/>>

manatee_coast/index.html>

Dugongs: <**<http://home.t-online.de/home/rothauscher/dugong/dugong.htm>**>

Dugong necropsy manual (available for downloading): <**http://www.gbrmpa.gov.au/corp_site/info_services/publications/research_publications/rp64/index.html**>

Florida Fish and Wildlife Conservation Commission, Bureau of Protected Species Management: <**<http://www.floridaconservation.org/psm/>**>

Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute (Florida manatee mortality data): <**<http://www.floridamarine.org/manatees/>**>

Friends of the Manatee Association, Manaus & Balbina, Brazil: <**http://www.amigosdopeixe-boi.org.br/english/Ing_index2.htm**> [Includes a bibliography of INPA aquatic mammal project publications and abstracts]

Fundación Salvemos al Manatí de Costa Rica: <**www.fundacionmanati.org**>

Great Barrier Reef dugongs: <**http://www.gbrmpa.gov.au/corp_site/info_services/publications/dugong/index.html**>

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Jacksonville University (Florida) Manatee Research Center Online: <**www.ju.edu/juconnect/research/marco**>

Manatee neuroanatomy: <**<http://www.neurophys.wisc.edu/Manatee/>**>

"Manatee Watchers" Internet discussion list: <**<http://www.listbot.com/archive/MANATEE>**>

News clippings on Florida manatees: <**<http://www.n-jcenter.com/menus/enmanate.htm>**>

Philippines Dugong Research and Conservation Project: <**<http://www.wwf-phil.com.ph>**>

Save the Manatee Club: <**<http://www.savethemanatee.org>**>

Sea World of Florida: <**<http://www.seaworld.org>**>

SEMARNAP, Secretaria de Medio Ambiente, Recursos Naturales y Pesca, Mexico: <**<http://www.semarnap.gob.mx/naturaleza/especies/manati/descrip.htm>**>

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Sirenian International, Inc.: <<http://www.sirenian.org/>> [Includes a bibliography of sirenian literature, and an archive of *Sirenews* issues.]

Smithsonian Institution sirenian bibliography: <<http://www.si.edu/resource/faq/nmnh/sirenia.htm>> [This is a relatively short bibliography, compiled by Joy Gold, that provides a very good introduction to both the technical and the popular literature.]

Steller's sea cow: <<http://home.t-online.de/home/rothauscher/steller/steller.htm>>; also the website [in Finnish] of Dr. Ari Lampinen, University of Jyvaskyla, Finland: <<http://www.jyu.fi/~ala/ilmasto/steller.htm>>

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