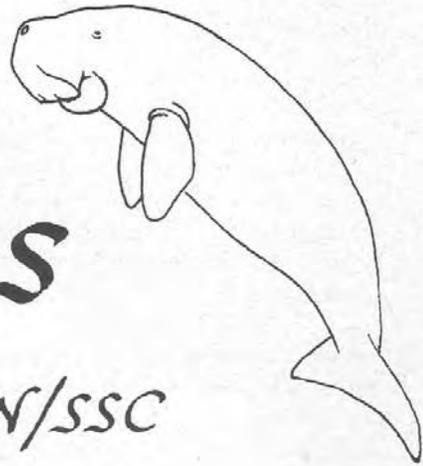


# Sirenews



Newsletter of the IUCN/SSC  
Sirenia Specialist Group

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- IN THIS ISSUE: - DARYL DOMNING STEPS DOWN AS EDITOR  
OF *SIRENEWS* AFTER 21 YEARS OF SERVICE (p. 1)
- STATUS OF SIRENIANS REVIEWED AT IMC9 (p. 4)

## ***Sirenews* – An Evolutionary Perspective**

A little over 20 years ago, in 1984, Daryl Domning had a conversation with Clayton Ray of the Smithsonian, about what to call the new publication Daryl wanted to produce. He envisioned that the publication would be an important conduit for sharing information on the most recent sirenian research and conservation activities from around the world. Daryl does not have a clear recollection of the exact beginnings, but he does remember that a number of conversations emerged out of the IUCN Sirenian Specialist Group (SSG) about the need for sharing information through some type of news bulletin. Daryl, with his incredible productivity and energy, said he would be able to take on the task. Robin Best, who was the SSG chair at the time, had been keen to see something like this happen, particularly after Helene Marsh had produced a dugong newsletter. So Robin enthusiastically gave his blessing to publish under the auspices of the SSG.

The format Daryl used was inspired by the Society of Vertebrate Paleontology News Bulletin which was started in the late 1940s. Daryl wanted something that would be chatty, rather than formal, and would not evolve into a peer-reviewed journal. He wanted a newsletter format that kept people with an interest in sirenians up-to-date on activities,



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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  
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the latest news, publications, and meetings. For a title, the name “*Siren*” had already been taken by IUCN for their seas program. Clayton Ray suggested “*Sirenews*” and it fit well. The first copy in 1984 was published by IUCN. Daryl published subsequent issues himself with contributions from various organizations over the years to cover costs. The US Marine Mammal Commission has been a strong supporter throughout the newsletter’s existence.

*Sirenews*’ Guiding Principles are hinged primarily on getting news from the field whenever and however possible and to provide free communication. Daryl rarely turned away contributions to the newsletter and he strongly encouraged (having been on the receiving end of the phone/letter/e-mail) reports from students and scientists about what they were doing in their own fields of research. That is, what they wanted to let the rest of the world to know or as Daryl summed up the concept “what I did last summer, a chatty organ of communication not to evolve to a peer-reviewed format”. The newsletter has also included various announcements, memorials, and miscellaneous content of interest. Daryl often provided an abstract in the absence of a published paper elsewhere - simply to get information out to the community. The newsletter has always been done in hardcopy form so it could be easily reproduced and mailed at minimal cost. Daryl’s intention from the outset has been to include references to current literature and sirenian news for those that did not have easy access to libraries. He always wanted people without easy access to a computer to have a means of communication that kept them within the informational loop.

Rarely has an article in *Sirenews* elicited much controversy and only occasionally did Daryl receive a letter to the editor, a correction or comments from someone taking issue. Not many “scoops” have occurred either, with the exception of Tony Preen’s documentation of a lack of dugong mortality in the southern Persian Gulf after the first Gulf War. It had been surmised that there might be many dugong deaths, but Tony did not see observed dugong deaths in the south as feared. Daryl was happy to publish the good news. Daryl freely editorialized and contributed to *Sirenews*, particularly if he had not been successful in “persuading” potential article authors to send something in to the newsletter for publication. He let it be known that if you didn’t send along your own article – well, you might just read later what Daryl would report on it...whichever scenario one preferred. That tended to get more response from people in the field.

Daryl began producing *Sirenews* 20 years ago using the word processing program WordStar (for those of us old enough to remember when WordStar was about the only word processing program around). Only two years ago, Daryl stopped using WordStar to produce the newsletter for one reason, “Well it seemed to throw off that new mail-merge program I bought; I think my Wordstar program became corrupted over the years - I probably just wore it out”, he said. Following his personal philosophical approach, he just stuck with what worked.

With Daryl’s approach squarely in mind, Cyndi and I as the new editors of *Sirenews* are very excited to take on this challenge but at the same time, we are quite apprehensive about following in such powerful fluke strokes. Daryl has urged us to solicit editorial

comment from many sources. There is also a strong need to keep abreast of sirenian population issues and encourage more submissions of abstracts and information of interest that may not make it into mainstream publications. Daryl has encouraged us to pursue more “investigative reporting” of emerging issues and topics of common interest. Original news is needed, not just what can be gleaned from the wire services. Most importantly, people are encouraged to submit items of interest to increase the number of direct contributions.

In Daryl’s vision, which we share, *Sirenews* should remain and continue to grow as *the* authoritative source of sirenian news. As Daryl told me, “There’s much going on in the sirenian world that’s not being reported, and the goal of *Sirenews* is to get it out there”. Daryl also reminded us that “content is more important than form”. Keep it simple to keep it flowing.

According to Daryl, electronic media often operates on a shorter news cycle, tends toward a discussion board format, and has certain limitations because of the need for computer access. *Sirenews*, as the voice of the IUCN/SSG, will remain a broadly disseminated permanent hard-copy record that can be kept filed in personal and public libraries around the world, admittedly with its own limitations. But now with the help of Sirenian International and the Society for Marine Mammalogy, *Sirenews* can also be found on the internet, the best of both worlds.

In 2003 at the 2nd International Sirenian Symposium in Greensboro, North Carolina, Daryl was presented with an award from the U.S. Geological Survey and the U.S. Fish and Wildlife Service. The honor was presented in appreciation for Daryl’s outstanding contribution to sirenian conservation over the years.

We aim to maintain and contribute to Daryl’s legacy by keeping as close to his vision as we can. We aim to keep *Sirenews* readers up on the latest news and views. We will do our best to follow Daryl’s suggestions based on over 20 years of experience and dedication to keep *Sirenews* simple, make it easily available, keep it free, keep it informative, promote discussion and, of course, keep nagging you to send in articles and news.

As the first order of business and as a tribute to Daryl, the editors invite you to send in any thoughts, remembrances or interesting tales you wish to share about the two decades of *Sirenews* and its long-time editor. We will be pleased to put them in print for the next edition of *Sirenews*. Oh yes, one final note -- please don’t forget to send in your articles for the next issue -- the deadline is 01 April 2006.

Thank you very much, Daryl, for your invaluable legacy. --**Buddy Powell and Cyndi Taylor, Editors**

## SSG SYMPOSIUM AT THE NINTH INTERNATIONAL MAMMALOGICAL CONGRESS IN SAPPORO, JAPAN

A symposium and workshop to re-assess the status of all sirenian species (manatees and dugongs) and subspecies worldwide was hosted by the Perry Institute of Marine Science and Wildlife Trust through funding from the Marine Mammal Commission. Staff from Wildlife Trust and the Marine Mammal Commission, as part of the IUCN Species Survival Commission (SSC) Sirenia Specialist Group, traveled to Sapporo, Japan in late August to convene the workshop at the Ninth International Mammalogical Congress. Six invited speakers from around the world (Brazil, Ivory Coast, Australia, USA, Belize, Puerto Rico) were assigned the task of assessing the status of a sirenian species or subspecies and presenting that information at the symposium

All living species and subspecies in the Order Sirenia are classified by the World Conservation Union (IUCN) as vulnerable to extinction. A vulnerable taxon is considered to be one that is “not Critically Endangered or Endangered, but is facing a high risk of extinction in the wild in the medium term future” (IUCN 2001). If the status of the various sirenian taxa is not formally reviewed and justified by the Sirenian Specialist Group before 2006, a default listing of “data deficient” will occur in the IUCN Red List of Threatened Species. This category would indicate that there is inadequate data available on which to assess risk of extinction. A data deficient Red List classification would not only misrepresent current knowledge of the sirenians, but could potentially have significant and negative consequences for sirenian conservation if it diminishes conservation or research activity or urgency of action by governments or agencies.

The symposium and workshop were organized to develop formal justifications and recommendations regarding updated status of sirenian species worldwide for the IUCN Red List. The morning symposium consisted of presentations on the status of species and subspecies. Speakers included Dr. John Reynolds, head of the U.S. Marine Mammal Commission and co-chair of the Sirenia Specialist Group, who gave a welcome and introduction; Dr. Helene Marsh, James Cook University, on the status of dugongs; Dr. Chip Deutsch, Florida Fish and Wildlife Conservation Commission, on the status of Florida manatees; Dr. Miriam Marmontel, Instituto de Desenvolvimento Sustentável Mamirauá, on the status of Amazonian manatees; Dr. Akoi Kouadio, Wildlife Conservation Society, on the status of West African manatees; and Ms. Caryn Self Sullivan, Texas A&M University and Dr. Tony Mignucci, Caribbean Stranding Network, on the status of Antillean manatees (see Abstracts below). In addition, Mr. Wes Sechrest, Lead Coordinator for the Global Mammal Assessment (GMA) for IUCN, provided an overview of the GMA process and how it complements the Red List Assessment. Speakers have been gathering and assimilating data on the individual species over the past two years. Speakers were given 30 minutes each to address status, threats, and the future of each sirenian group. In addition, numerous sirenian posters on the status of individual populations of sirenians throughout the world were available for viewing during the Congress. Approximately 50 people attended the symposium.

The afternoon workshop consisted of a smaller group of invited participants and focused on the formal species status assessments, with discussions of the robustness of the scientific information available for each taxon. For Florida manatees and dugongs,

the scientific evidence and analyses were comprehensive and adequate to justify a category. For Antillean and West Indian manatees, additional analysis and justification will be obtained over the next couple months to strengthen and validate the suggested category. For Amazonian manatees and West African manatees, the scientific justifications were marginal due to a lack of compiled data. The assessments for these two species will require a great deal of work over the next six months to strengthen, as much as possible, the draft assessment. Draft recommendations for each species and subspecies will be presented to additional members of the Sirenia Specialist Group for approval and incorporation into the Global Mammal Assessment database and presented as formal recommendations to the IUCN Red List of Threatened Species. – **Cynthia Taylor**

### INTERNATIONAL SIRENIAN WORKSHOP

*11 December 2005 at the 16th Biennial Conference on the Biology of Marine Mammals, San Diego, CA*

You are invited to participate in the Third International Sirenian Symposium on Sunday, December 11, 2005 from 8:30AM-12:00 PM, prior to the 16th Biennial Conference on the Biology of Marine Mammals. The goal of the symposium is to foster communication between researchers, managers, and policy makers. Sirenian scientists and resource managers were invited to submit abstracts to speak at the symposium. Deadlines for abstract submission and early registration have passed. Please contact Nicole Adimey (Nicole\_Adimey@fws.gov) for further information.

### LOCAL NEWS

#### AUSTRALIA

*A Lone Dugong on Cocos (Keeling) Islands, Indian Ocean.* - The Cocos (Keeling) Islands (12° 10' S, 96° 52' E) are a territory of Australia and are located in the Indian Ocean approximately 1000 km from Indonesia and over 2000 km from the Australian mainland. They comprise two atolls; the northern atoll contains North Keeling Island (Pulu Keeling National Park) and the southern atoll contains 26 islands arranged in a horseshoe pattern surrounding a shallow lagoon. The Cocos (Keeling) Islands are isolated from the nearest shallow coastal marine habitat (Java, Indonesia) by 1000 km and water depths of between 2000 and 4000 m.

In June 2002 a confirmed sighting of a single male dugong was made on Cocos (Keeling) Islands. This was the first confirmed sighting of a dugong on the atoll even though people have inhabited the islands since 1826. Photos were taken and one photo was published in a book of anecdotal stories (Croll, 2002). The dugong has remained on the atoll since this date and is seen regularly by divers. It was noticeably absent from the atoll for a period of three months, and when it reappeared it was showing a loss of body condition (Dieter and Karen Gerhardt, pers. comm.). This could indicate that the dugong attempted to leave the atoll but did not find suitable habitat.

Unlike a solitary dugong at Vanuatu (Adams, 1998), it has not initiated contact with humans, but returns to a localized area that is regularly used by SCUBA divers.

Anecdotal reports indicate that it generally keeps its distance from divers but has swum with manta rays, dolphins and batfish on several occasions.

Dugongs have the ability to travel large distances (Marsh and Rathbun, 1990, de Iongh et al., 1998, Preen, 2001), but there are few records of dugongs making long-distance movements across deep water. A long-distance movement such as this example to Cocos (Keeling) Islands could indicate how previous colonization events may have occurred. This was suggested for similar movements of dugongs to the Seychelles (Marsh et al., 2001). The Cocos (Keeling) Islands have extensive seagrass beds which support a large population of green and hawksbill turtles, and so this dugong will have an adequate food supply. However, how it will cope without a mate will be interesting to observe in the future. Further behavioral observations and any extended absences should be recorded.

### References

Adam, S. 1998. Dugong-human interactions. *Sirenews* 30: 13-16.

Croll, G. 2002. *Cocos Capers*. Greg Croll. 200 pp.

De Iongh, H. H., Langeveld, P., and Van der Wal, M. 1998. Movement and home ranges of dugongs around the Lease Islands, East Indonesia. *Marine Ecology* 19(3): 179-193.

Marsh, H., and Rathbun, G. B. 1990. Development and application of conventional and satellite radio tracking techniques for studying dugong movements and habitat use. *Australian Wildlife Research* 17(1): 83-100.

Marsh, H., Penrose, H., Eros, C. and Hugues, J. 2001. *Dugong Status Reports and Action Plans for Countries and Territories in its Range*. UNEP, Kenya.

Preen, A. 2001. *Dugongs, Boats, Dolphins and Turtles in the Townsville-Cardwell Region and recommendations for a Boat Traffic Management Plan for the Hinchinbrook Dugong Protection Area*. GBRMPA, Townsville.

- **Whiting, Scott D.** (Biomarine International, P.O. Box 376u, Charles Darwin University, NT 0815, Australia; tel.: +61 8 89327607; fax: +61 8 89327607; e-mail: <[s\\_whiting@biomarine.com](mailto:s_whiting@biomarine.com)>; Web page: <[www.biomarine.com](http://www.biomarine.com)>), **Robert Thorn**, and **Wendy Murray** (Parks Australia North, P.O. Box 1043, West Island, Cocos (Keeling) Islands, Western Australia 6799)

### BRAZIL

***Bacterial Survey in Captive Amazonian Manatees Indicates the Presence of Campylobacter sp., a Potentially Harmful Pathogen.*** - Bacterial infections can be related to 30-50% of mortality in aquatic mammals and in most cases the infection agent is not identified. A bacterial survey study was conducted in July 2004 in the pools of the Laboratório de Mamíferos Aquáticos, Instituto Nacional de Pesquisas da Amazônia (INPA), where 30 Amazonian manatees are kept under veterinary supervision.

Ninety-eight samples were collected from all the Amazonian manatees whenever the opportunity permitted. Swabs from the nostrils, mouth, genital opening, anus, eyes, wounds, and, in one case, from an abscess were collected during the cleaning of the pools. Some manatees behaved very passively during the swab collection, while others were very sensitive to the touch of the swab, despite their having lived in captivity for many years. In these cases we did not insist and decided to collect from another manatee.

A total of 22 samples (22.45%), corresponding to 17 manatees (56.7%), were positive for *Campylobacter* sp. We observed that 28.12% of the collected samples from the nostrils were positive; 27.6% from the mouth; 13.3% from the genital opening; 6.25% from the anus; and 50% from wounds; while samples from the eye and from one abscess were negative. Based on this, we inferred a significant prevalence of *Campylobacter* in the nostrils, mouth and wounds, which indicates possible sites for easy colonization for these bacteria. Contaminated vegetation collected from the waters surrounding Manaus and used for feeding the captive manatees is the most probable source of these bacteria.

We consider these results to be of high significance, since such a survey was never conducted before, and as a contribution to the biology and ecology of Amazonian manatees. This could help to minimize potential threats to the species as well as increase the knowledge and perceived importance of *Campylobacter* in these aquatic mammals and their environment.

We thank the keepers and interns of the Laboratório de Mamíferos Aquáticos/INPA for helping during collection of swabs. This study was funded by the Escola Nacional de Saúde Pública/FIOCRUZ. - **Ana Luzia Lauria-Filgueiras\***, **Sheila S. Duque\***, **Priscila Oliveira\***, **Grazielle S. Mendes\***, **Wagner Esteves**, **Vera da Silva<sup>o</sup>**, **Fernando C.W. Rosas<sup>o</sup>**, **J. Anselmo d’Affonseca Neto<sup>o</sup>**, and **Salvatore Siciliano<sup>#</sup>** (\*Setor de *Campylobacter*, Laboratório de Zoonoses Bacterianas, Dep. Bacteriologia, IOC, FIOCRUZ, RJ, Brazil; <sup>o</sup>Laboratório de Mamíferos Aquáticos, INPA, Manaus, AM, Brazil; <sup>#</sup>Grupo de Estudos de Mamíferos Marinhos da Região dos Lagos, Laboratório de Ecologia, Dep. Endemias Samuel Pessoa, Escola Nacional de Saúde Pública, FIOCRUZ, RJ, Brazil)

***First Female Amazonian Manatee Born in Captivity.*** - On 2 April 2005, the first female Amazonian manatee (*Trichechus inunguis*) was born at the Center for the Preservation and Research on Aquatic Mammals (CPPMA), located near the hydroelectric power plant of Balbina, 200 km from Manaus, Amazonas.

Her mother, named Aira, a 10-year-old manatee, arrived at CPPMA 12 months after having been rescued from a fish tank where she was kept inadequately. Her keepers intended to exhibit her in small communities in the interior of the Amazon.

Aira had a deep harpoon wound on her back, but was in good nutritional condition. Her pregnancy was constantly monitored and several ultrasound exams were carried out.

At a local school, a contest to choose a name for the young Amazonian manatee, with the intention of increasing interaction between children and nature conservancy, has come to an end. The winner, Manoel Xavier, age 11, suggested the name Morena (Brunette), with the reason being an homage to the inhabitants of the riverside community: Morenas that have as much difficulty in trying to survive as the manatees. - **Stella Maris** (e-mail: <cppma@netium.com.br>)

***Eight West Indian Manatee Deaths in Maranhão.*** – An alarming development has the IBAMA Manatee Project worried. In just the first semester of this year, the Centro Mamíferos Aquáticos/IBAMA in Maranhão recorded eight deaths of West Indian manatees in the state, of which seven were caused by accidental entanglement in fishing nets.

“Despite all our efforts on behalf of the manatee, these fatal accidents are still happening due to the size of the coastal zone and the difficulty of access to many areas”, said the Center’s director, Josarnaldo Ramos.

The director explained that environmental education and social work are constantly being developed for the traditional populations to make them aware of the importance of preserving the critically endangered manatee. As part of this effort, a campaign entitled “Don’t Kill Manatees!” was implemented on the Maranhão coast in 2004. This campaign seeks mainly to inform fishermen and populations of coastal communities of the need to preserve the manatee and prevent manatee deaths, forming a network of volunteer collaborators of the Manatee Project along the coast.

In agreement with the national coordinator of the Manatee Project and chief of CMA/IBAMA, Régis Lima, these accidental deaths have been registered by the Project since 1993, and from then till now the Project has succeeded in developing prompt and timely responses in the state.

Lima also explained that “it has not yet been possible to build up the Executive Unit of CMA/IBAMA in Maranhão into conformity with the real needs of the work that should be done in this immense littoral, which has one of the largest manatee populations on the coast of Brazil, because the Center in Maranhão has only one Environmental Analyst on its staff.”

The Manatee Project is carried out by the IBAMA Center for Aquatic Mammals in collaboration with the Aquatic Mammals Foundation and with official support from the national oil company Petrobrás.

Maranhão has the second-longest coastline in Brazil. With 640 km of beaches, it is surpassed in this respect only by Bahia. In 1992 an expedition, named Igarakuê, visited 74 localities between the municipality of Carutapera and the delta of the Parnaíba River, to verify the distribution and conservation status of the West Indian manatee in the region. Within this state alone, Igarakuê established the presence of about 100 manatees, out of an estimated 500 of this species on the entire coast of Brazil.

After this, in 2001, an executive unit of CMA/IBAMA was installed in the state. In the following year, monitoring of manatees in the wild was begun. In the course of these sightings, several groups of animals were observed interacting among themselves. There were groups of approximately 12 in Baía de Tubarão, 5 in Baía de São José, and 6 in Baía de São Marcos, the three areas of greatest manatee occurrence on the Maranhão coast.

Among the deaths noted this year, only one was a stranded newborn calf, which was beached at Baía de São José do Ribamar. The carcass was taken for necropsy to the laboratory of the Veterinary Hospital of the State University of Maranhão.

As with most strandings, this one was a reflection of the degradation of mangroves, which are an ideal nursery for manatees because they are places with calm waters, abundant food, and availability of fresh water. Josarnaldo Ramos noted that “Here in Maranhão, in the places where manatees are present, mangroves are still intact”,

and pointed out that this was the only recorded case of a dead manatee stranded in the state. - **Luís Boaventura** (IBAMA) [Translated by DPD]

***Amazonian Manatee Symposium held in Manaus.*** - On October 17-18 2005, the Department of Fauna and Fisheries (DIFAP) of the Brazilian Environmental Agency (IBAMA) organized a symposium about the Amazonian manatee in the city of Manaus, in the heart of the Brazilian Amazon. During the symposium, eleven different Brazilian research groups working with the Amazonian manatee met to discuss the current conservation status of the species, share experiences, and establish a plan of action for long-term conservation goals. Among the different activities initiated, one working group was established to create a protocol for rescue of orphaned and wounded manatees and transportation to rehabilitation centers. Another working group was established to develop a protocol for reintroduction of captive-raised animals to the wild. There are currently 72 Amazonian manatees kept in captivity at different research centers in Brazil: 34 at Instituto Nacional de Pesquisas da Amazônia (INPA) in Manaus; 32 at Centro de Pesquisas e Proteção de Mamíferos Aquáticos (CPPMA) in Balbina; 5 at Conselho Nacional de Seringueiros-CNS (CNS) in Santarém; 1 at Museu Goeldi (MPEG) in Belém and 1 at Bosque Rodrigues Alves in Belém. Of these, about 60% are calves and sub-adults. With very few exceptions, the captive manatees in Brazil were either rescued as calves and rehabilitated in captivity, or else were born in captivity. In the last eight years a total of seven manatee births have been recorded, 5 at INPA and 2 at CPPMA and a future program for reintroduction to the wild is in progress. – **Vera da Silva** (INPA; email: [tucuxi@inpa.gov.br](mailto:tucuxi@inpa.gov.br))

## JAPAN

***Japanese and U.S. Governments Agree to a New Military Base Plan in the Habitat of the Okinawa Dugong.*** - In Japan, the dugong (*Dugong dugon*) is observed only at Okinawa Island, the northernmost limit of its range. The year-round habitat for the dugong is limited to the east coast of the Island. There are large coral reef and seagrass beds offshore of Henoko, Nago City, which is the center of distribution and the most important habitat for the dugong. The local population of dugong is confined to a very small area and is isolated from other populations, and their numbers are estimated to be less than fifty, making Okinawa's dugong critically endangered.

The first relocation plan of Futenma Airstation (used by the United States Marine Corps) to the shallow waters off Henoko (1500m×700m) was rejected by citizen's voting in Nago City in 1997. The next plan, which was enlarged to the military/civilian airport (2500m×730m) on the coral reef off Henoko in 2002, became impossible due to local residents and conservation groups organizing a blockade. As a result, last month the Japanese and U.S. governments have considered new options and agreed to a scaled-down runway plan (1800m×700m) on the coast of the USMC Camp Schwab in Henoko and Oura.

This new plan is smaller than the former plan, but the conditions for the coral reefs, seagrass beds, and dugong will worsen due to landfills in the shallow water, loud noises

from the military exercise airplanes/helicopters, and pollution from the military establishments.

The IUCN submitted recommendations to the governments of Japan and the U.S. in 2000 and 2004, which included the establishment of protected areas and a conservation plan for the dugong in Okinawa. UNEP has recommended in its 2002 dugong conservation report that the Japanese government should take conservation actions. We continue to be seriously concerned and dismayed that these recommendations have not been carried out.

We strongly urge the Japanese and U.S. governments to cancel the current construction plan of the military airbase in Henoko and Oura, and to designate protected areas and develop a conservation action plan for the dugong in Okinawa. **-Shin-ichi Hanawa** (WWF Japan; e-mail : hanawa@wwf.or.jp)

## FLORIDA

*Not Many Know This About Snooty the Manatee's Birth.* - The recent birthday celebration for our famous manatee, Snooty, marked his 57th year of life, and 56 of those have been spent right here in Manatee County. [ED. NOTE: Snooty is the longest-lived manatee in captivity anywhere in the world.] Each year, we hear that he was born at the Miami Aquarium, but how many of us knew that the aquarium was inside a ship? Carol Audette, curator of the Parker Manatee Aquarium at Bishop Planetarium and South Florida Museum, seems to be the only person with this knowledge, which is natural, based on her 21 years with this gentle mammal.

According to a recent article by Alice L. Luckhardt in *Florida Monthly Magazine*, the *Prins Valdemar*, a steel-hulled, square-rigged Danish barkentine with four masts, was sailed to Miami in 1925 with plans to convert her into a 100-room hotel and world-class restaurant. Plans went awry when the large ship sank, blocking the harbor and all incoming ship traffic, causing some developers to pull out of the city at the height of its land boom. After four weeks of frustration, the ship was righted and the harbor cleared. The steel and wood masts had been cut away and water pumped out. She went on to survive the 1926 hurricane with 125-130 mph winds that devastated nearly every building in Miami.

Now moored at Southeast First Street, the *Prins* was mostly forgotten until her owners, Richard Walters, Cliff Storm, and George Reiser, formed plans to convert her into a tourist attraction. After a permanent bulkhead was constructed around the ship, the interior was fitted with large tanks to hold fish and mammals. The city of Miami loaned tanks from the Miami Beach Aquarium, then closed, and a grand opening was held 1 May 1928.

Our Snooty, first called Little Snoots and later Baby Snoots, was born there 21 July 1948, and made his first appearance in Bradenton in conjunction with the DeSoto Celebration of 1949. The aquarium owners were beginning to experience lease and permitting problems with the city of Miami, opening the way for the young manatee to remain in Bradenton. Walters spent many months seeking homes for his remaining creatures, some 2,500 of them. Eventually, the few remaining were released into Biscayne Bay and the facility was closed.

For a time the *Prins* served as a civic center, but was soon declared unsafe and demolished. Some of its remains were discovered when a causeway was under construction in 1964, but the rest is buried beneath the American Airlines Arena, built in 1998. But Snooty had found a real home in Manatee County, first in a much-too-small pool at the South Florida Museum's original home at the end of the Memorial Pier. When the first permanent museum building was built years later, Snooty's pool, somewhat larger, was declared adequate.

Now, however, he cavorts, much as a senior citizen manatee might cavort, in a lavish facility known as the Parker Manatee Aquarium. He is, from time to time, accompanied by younger manatees brought to the local facility to recuperate from wounds received in the wild. - **Bubbles Greer** (Source: *Sarasota Herald-Tribune* [Florida], 3 August 2005)

## LOUISIANA

***Manatees Appear to Approve of the Improved Quality of the Water in Lake Pontchartrain.*** - Prior to Hurricane Katrina on 29 August 2005, manatees were becoming steadily more numerous in Lake Pontchartrain, on the north side of New Orleans (see *Sirenews* No. 41). Sightings of the docile mammals grazing in the once-polluted 634-square-mile lake and branching bayous remain uncommon, but in the past decade, as the lake has become cleaner, more of the endangered animals have been sighted each summer.

"Rarely do you hear about more than four or five in Lake Pontchartrain," said Jim Valade, manatee recovery leader for the U.S. Fish and Wildlife Service. But that is changing. In late July, 20 to 30 manatees were sighted in the lake from the air, authorities said. The Lake Pontchartrain Basin Foundation estimates that 100 or more manatees could be in the lake, but others have questioned that estimate. These days, "they're finding Lake Pontchartrain to their liking," Valade said. "It says an awful lot about the quality of Lake Pontchartrain."

Valade said he is "99 percent" certain the manatees are from Florida, part of the population in the Crystal River area on the west coast of the state, north of Tampa. There's a "remote possibility" some are from Mexico, he said. "Some range farther than others, exploring, looking for new opportunities for food," he said. The mammals are expected to return home when the first cool front passes through in September or October.

The sea cows graze on lake grasses and look for fresh water to drink along the shoreline and connecting streams and bayous. The plants manatees eat, including *Ruppia* and *Vallisneria*, have been returning since shell dredging in the lake was stopped in 1993, said Martin O'Connell, an assistant professor of environmental sciences at the University of New Orleans. At high tide, the mammals may feed on grasses along the shoreline, O'Connell said. "We'll have a better idea by the end of the summer about the size of the manatee population in the lake," which may be higher, he said.

During a flight over the lake on 21 July, Carlton Dufrechou, executive director of the Lake Pontchartrain Basin Foundation, said he counted about 30 manatees. He said he's reluctant to share information about the manatees' increasing presence but understands that without information, the public cannot help protect them.

In late July, two dead manatees washed ashore near Shelter No. 2 about 1 ½ miles from Pontchartrain Beach, Dufrechou said. The bodies were disposed of before authorities had an opportunity to determine the cause of death, he said. Steps have been taken so it's unlikely other manatee carcasses will be destroyed before they're examined, Dufrechou said. According to U.S. Fish and Wildlife records, manatees began reappearing in Lake Pontchartrain in May 1995. The current population in U.S. waters -- the largest in the world -- is more than 3,000. But human contact has a damaging effect. Most deaths are directly related to human contact or encroachment.

Besides collisions with recreational boats, commercial boats are a concern as well, with the shrimping season scheduled to start in a couple of weeks, Dufrechou said. Nets could trap the manatees because they lack hatches to allow the large animals to escape. If the manatees are treated well, they'll come back, Dufrechou said. "Watch them. Appreciate them. Don't disturb them," he said.

The "unprecedented" number of manatees creates "an intriguing possibility," Valade said. One or more of the female manatees, which have a gestation period of 13 months, could be pregnant and give birth in Lake Pontchartrain, he said. If that happens, the calves likely will be imprinted on the area and return to the waters of their birth.

Since the devastation of the New Orleans area by Hurricane Katrina, no reports of dead or injured manatees have reached *Sirenews*; but the pumping of grossly polluted water from the flooded city, now underway, will certainly prove to be a setback to Lake Pontchartrain's water quality.

Anyone who sees a manatee in Lake Pontchartrain is asked to report the sighting to the foundation at (504) 836-2215. Leslie Williams can be reached at <[lwilliams@timespicayune.com](mailto:lwilliams@timespicayune.com)> or (504) 826-3358. - (Adapted from an article by Leslie Williams in the New Orleans *Times-Picayune*, 6 August 2005)

## UNITED ARAB EMIRATES

***Bird-Filled Wetlands to be Site of US\$3.3 Billion Luxury Housing Development.*** - The Khor al-Beidah lagoon in Umm Al-Quwain, United Arab Emirates, is a pristine tidal flat teeming with wildlife, including endangered birds, sea turtles and manatee-like dugong that swim among its tangles of mangroves. But a bevy of dredges and construction gangs are about to begin transforming a 1,500-acre (600-hectare) parcel into an 8.2 dirham (US\$3.3 billion) luxury conglomeration of homes, shops, marinas and beach resorts aimed at foreign buyers and tourists. The crown jewels of the development are private villas to be built on artificial islands with gated access - and views over one of the few remaining mangrove archipelagos left in the Persian Gulf.

Developers say the waterfront complex, called Umm Al-Quwain Marina, will skirt the mangroves and leave most of the 20 square miles (50 square kilometers) of wetland untouched. "Our aim is to create a community of special neighborhoods bordering an open stretch of water with views of the marina against a backdrop of the gulf," says Mohammed Ali Alabbar, chairman of Emaar, the Middle East's largest developer.

Environmentalists are aghast. They fear construction and people, cars and boats will drive off Khor al-Beidah's internationally famous wildlife, including birds that migrate from Siberia to Africa and the rare Socotra cormorant that nests almost exclusively on the Arabian Peninsula. "We've seen it happen everywhere else. When you

start to dredge and build marinas, that's the end of it," says Colin Richardson, a 30-year resident of Dubai and author of the periodic Emirates Bird Report and a guidebook to local species.

The leaders of Umm Al-Quwain, however, are eager to bring big projects to their emirate, which is the least-developed of the seven states in the United Arab Emirates. It has little of the energy wealth of Abu Dhabi, the largest of the emirates, and few of the tourists of Dubai, one of the world's fastest-growing cities and tourist destinations. The 35,000 people of Umm Al-Quwain, most of whom live in the small coastal city of the same name, make their livings from fishing, growing dates, building traditional sailing dhows and, lately, working at a container port.

Development is coming fast, though.

The deal for the lagoon complex was signed 23 July, and a few days later developers announced Umm Al-Quwain's desert interior would be the site for a new city that could eventually house as many as 500,000 people. The initial phase was valued at 8.2 billion Emirates dirham (US\$3.3 billion). The once empty Emirates coast is awash in construction that has buried coral reefs, mangrove swamps and other wildlife zones. The tidal lagoon here is one of the last such areas in the country, especially since the partial bulldozing of a mangrove swamp on the east coast.

Richardson says a half-million birds stop at Khor al-Beidah every year. "The birds don't have very much left," he says. "It's a very important site. It has the highest density of winter migrants anywhere in eastern Arabia." The lagoon is a shallow tidal flat where turquoise sea and orange sand form swirling arabesques, bordered by grassy desert dunes. The protected waters are laden with small fish and crabs that lure the birds that nest in adjacent mangroves and on a sandy barrier island.

Bird enthusiasts are running out of sites in the Emirates. Richardson says hundreds of people visit Khor al-Beidah every year for the wildlife. He and other activists long urged the government to protect the lagoon, arguing it is more valuable as an ecotourism destination than as home to another luxury housing complex.

BirdLife International, an advocacy group, has designated Khor al-Beidah an "important bird area" for hosting of 85 species, including the country's largest wintering flock of crab plovers, one of the world's rarest shorebirds. The wetlands also are stopping place for the Emirates' only flock of Great Knots, birds that migrate from nesting grounds on the Siberian tundra. Developing the lagoon also could threaten endangered sea turtles and dugongs, a manatee-like sea mammal, Richardson says.

The marina project is meant to resemble canal-side neighborhoods of Fort Lauderdale, Florida, with residents able to walk to their boats and quickly cruise to open sea, says Mark Amirault, Emaar's senior director of development. As is common at similar luxury developments in Dubai, the homes will be targeted for sale to buyers from all over the world, especially Britain and elsewhere in Europe, as well as India, Pakistan and Arab countries. Emaar, established in 1997, is responsible for many of the projects that have turned Dubai into the Middle East's growth hub, including Burj Dubai, planned to be the world's tallest building when it opens in 2008. "What you're seeing in this region is on par with development in North America 100 years ago," says Robert Booth, Emaar's executive director. - **Jim Krane**, Associated Press Writer (Source: Associated Press Worldstream, 3 August 2005)

WASHINGTON, D.C.

***Status of Sirenian Bibliography Project.*** – The database portions of Domning's *Bibliography and Index of the Sirenia and Desmostylia*, published in 1996 in hard-copy form, have been migrated from a DOS-based database manager to a Windows-compatible one (Citation 8.2™). However, I have been advised by a consultant to migrate it further, to FileMaker Pro™, before publishing it to the Web. Attempts to do this last year were unsuccessful, and at the moment the project has been dead in the water for over a year, due in part to heavy and more urgent demands on my time (which have also precluded updating the database with the last couple of years' worth of literature).

If this research tool is ever going to be available in interactive form on the Internet, I am going to need the prompt assistance of someone well versed in database software and design of a user interface – preferably someone who can work with me in person here in Washington. A great deal of that person's time would probably not be needed. Some funds for reimbursement are available. If you are or know of such a source of technical support, please contact me! - **Daryl Domning** (Dept. of Anatomy, Howard University, Washington, D.C. 20059; tel. 1-202-806-6026; <[ddomning@howard.edu](mailto:ddomning@howard.edu)>)

WEST AFRICA

***New West African Manatee Conservation Project.*** - Wetlands International (Dakar) is launching a sub-regional project focused on West African manatee conservation. This project is part of the Regional Program for the Protection of Coastal and Marine Resources (PRCM). This conservation project, part of the species and habitat conservation component, will be carried out by Wetlands International West Africa Programme in cooperation with the PRCM partners: IUCN, WWF, and FIBA. The intervention area is part of the PRCM area, from north Senegal to Guinea, but will be extended to other countries in West Africa. This project, which is to continue for three years, will be implemented in 2006.

The objectives of this West African Manatee Conservation Project are:

- To carry out baseline surveys of the West African manatee along the West African seaboard, complemented with a literature study;
- To develop a regional network for the conservation management of the West African manatee;
- To promote the manatee as a flagship species for wetlands, by virtue of the high level of interest it generates, and for its importance in local customs and culture;
- To develop an action plan for the West African manatee along the West African seaboard, using results of surveys and a regional workshop;
- To raise awareness of the West African manatee and wetlands along the West African seaboard on national and international levels;
- To develop a proposal for a second phase of the project.

In this first phase, Wetlands International needs to collect information (researches, conservation projects, baseline surveys ...), but also experiences in manatee conservation issues. This information will be useful to build up a base of scientific knowledge on the West African manatee. Wetlands International needs also contacts (international, national, regional level) to develop a network, involved in West African manatee

conservation. This network will help us to set up appropriate conservation measures in the selected areas.

A flyer concerning the project's objectives and the expected results is available at Wetlands, Dakar. If you desire further information, and if you would like to cooperate in this Regional Project, please contact the Project Manager: **Mame Dagou DIOP** (Wetlands International West Africa, BP 8060 Dakar – Yoff, Senegal (tel: +221 8206478; fax: +221 8206479; e-mail: <[dagouwet@sentoo.sn](mailto:dagouwet@sentoo.sn)> / <[wetlands@sentoo.sn](mailto:wetlands@sentoo.sn)>; website: <[www.wetlands.org](http://www.wetlands.org)>)

***Joint Action for Protecting the West African Manatee.*** - The West African manatee (*Trichechus senegalensis*) is the most threatened of all manatee species, and the least studied. They are found in coastal marine and estuarine habitats, and in fresh water river systems along the west coast of Africa from the Senegal River south to the Kwanza River in Angola, including areas in Mauritania, Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, [Ghana](#), Togo, Benin, Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, D.R. of the Congo, Angola, Chad, Niger, Mali and Burkina Faso.

The Regional Seas Programme ([www.unep.org/regionalseas](http://www.unep.org/regionalseas)) of the United Nations Environment Programme (UNEP-RSP), the Convention for Cooperation in Protection and Development of the Marine and Coastal Environment (Abidjan Convention; 1984) and the Secretariat of the Convention of Migratory Species (CMS) with the support of the Government of Monaco are now joining forces to develop a comprehensive Conservation Strategy for the West African Manatee throughout its entire range.

This initiative follows the UNEP and WWF joint effort in 2004 on the development of a Conservation Strategy for the Dugong in the Western Indian Ocean region, developed within the framework of the Eastern African Regional Seas program (Nairobi Convention) [see: *Eastern African Marine Ecoregion, 2004. Towards a Western Indian Ocean Dugong Conservation Strategy: The status of Dugongs in the Western Indian Ocean region and priority conservation actions.* (WWF, UNEP)].

There is no international or regional mechanism for sirenian conservation, and populations are incoherently covered by national and local laws and customs. The West African Manatee is protected by national law in most countries in which it occurs, although this is often ineffective. Currently, there is no comprehensive conservation plan for the West African manatee.

The Abidjan Convention provides the framework for the protection and conservation of the marine and coastal resources and environments in the West and Central African region. This activity is supported by decision 7/5:3 of the Contracting Parties requesting the Secretariat of the Abidjan Convention to establish new partnerships and networks, e.g. for the conservation of migratory species of wild animals (including small cetaceans and sirenians) and to combat invasive alien species in the marine and coastal environment.

The West African manatee is included in Appendix II of CMS. Within the legislative mandate of CMS, Recommendation 7.3 on Regional Coordination for Sirenians of Central and West Africa (adopted by the Conference of Parties at its Seventh Meeting in Bonn, 18-24 September 2002), encourages all parties in the distribution

range to consider the establishment of a MoU on these species and the implementation of collaborative actions, notably through action plans. Such plans would consider the particular characteristics of inland and marine waters.

Recommendation 7.3 further encourages the participation of all stakeholders, including government agencies responsible for the conservation and management of sirenians, as well as relevant non-governmental organizations and the international scientific community. The Recommendation builds upon the result of a workshop in Conakry, Guinea (8-12 May 2000), and it addresses the main concerns expressed by the land-locked countries during this workshop.

The Abidjan Convention Secretariat will work collaboratively with the World Wildlife Fund for Nature (WWF) in Senegal and Wetlands International (WI) in the preparation of this Regional Status Report and Conservation Strategy. This project will complement the Regional West African Manatee Conservation project of WI, which is part of the Regional Programme for the Protection of Coastal and Marine Resources (PRCM) of the IUCN, FIBA, WWF and WI.

**Steps to a strategy.** National status reports will be compiled into a comprehensive Regional Status Report, which will be used to develop a Conservation Strategy which will include identification of threats and recommendations for protection, including a description of the roles of the different stakeholders involved in the protection of the West African Manatee – UNEP, Abidjan Convention, national authorities, CMS, WWF, IUCN, WI, WCS and other relevant parties.

A Stakeholders Meeting will be organized to discuss the draft Regional Status report and the Conservation Strategy. After endorsement by the stakeholders and final review by all relevant parties, the Regional Status Report and Conservation Strategy will be printed and published into an official publication.

The project will work closely with the national Focal Points of the Abidjan Convention and the CMS Focal Points and for range states which are not a Party to any of the conventions (Sierra Leone, Equatorial Guinea, Angola) the contact point will be identified in the National Authority holding main responsibility in Manatee conservation.

The project is expected to start towards the end of 2005. - **Hanneke Van Lavieren** (Programme Officer, UNEP Regional Seas Programme, P.O. Box 30552, Room T-235, Nairobi, Kenya; tel.: (254) 20 624052; fax: (254) 20 624 618; mobile: ++ (254) (0)735-267 939; e-mail: <[Hanneke.VanLavieren@unep.org](mailto:Hanneke.VanLavieren@unep.org)>)

## BOOK REVIEW

E. P. Green and F. T. Short (eds.). 2003. *World Atlas of Seagrasses*. Prepared by the UNEP World Conservation Monitoring Centre. University of California Press, Berkeley: xii + 298.

Comprising only a dozen genera and 50+ species, marine angiosperms form a minuscule fraction of the world's flora, and are unimpressive to behold. Hence they get little respect – despite constituting one of Earth's most productive and economically important biotopes, and one increasingly imperiled by human activities. This book seeks to change that, by clarifying where seagrasses live, what they do for us, and what we are doing to them.

This handsome, well-produced volume grew out of international workshops in 1998 and 2001, and includes contributions from 58 authors in 25 countries. A synthesis of the distribution and status of seagrasses and their habitats, it describes their ecology, summarizes studies to date, and focuses on threatened areas and on problems of conservation and management.

The contents comprise a global overview of the present state of knowledge; 24 regional chapters (with references in endnotes to each chapter); and an index. Appendices and sidebars include estimates of area of seagrass beds; species lists for almost 180 countries and territories; a list of protected areas; case studies on areas and habitats of concern; and numerous colored maps showing species distribution and diversity. Other illustrations comprise small green-and-white photographs, maps, and graphs throughout, plus six color plates. One of the latter portrays fruits and flowers, but the poor photos barely persuade that these are flowering plants. Seagrass inflorescences are admittedly not much to look at, but I wish that at least the pink-and-white blossoms of *Thalassia hemprichii* had been included to do them more justice.

“Atlas” here is meant literally. Emphasis is on where seagrasses live and how they are faring, not taxonomy, morphology, or autecology, for which see works such as den Hartog (1970) and Phillips and Meñez (1988). Still, for the non-botanist like myself, interested mainly in how seagrasses interface with other organisms, the distribution maps and well-referenced accounts of ecology will make this a most useful resource.

It now remains to supplement these compendia with a careful phylogenetic analysis of this polyphyletic group, using both morphological and molecular data. Combined with the seagrasses’ scanty fossil record, and reevaluation of their biogeography using these updated distribution maps, this will start us toward the reconstruction of their 100-million-year evolutionary history that this book (p. 10) acknowledges as needed.

#### Literature Cited

den Hartog, C. 1970. *The Seagrasses of the World*. North Holland Publishing, Amsterdam.

Phillips, R.C., and E.G. Meñez. 1988. Seagrasses. *Smithsonian Contributions to the Marine Sciences* 34.

- **Daryl P. Domning** [reprinted from *Quarterly Review of Biology* 80(2): 256, June 2005.]

### ABSTRACTS

The following abstracts are of papers and posters presented at the Ninth International Mammalogical Congress, Sapporo, Japan, 31 July – 05 August 2005:

#### **Status of Sirenians – An Introduction**

J.E. Reynolds, III

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All five living species and subspecies of sirenians face a precarious future. The survival of some local populations or stocks is especially tenuous in the face of small numbers of individuals, geographic isolation, and significant anthropogenic threats. Despite some regional differences regarding specific factors, the suite of threats facing sirenians is rather similar among the various groups, suggesting that common solutions or mitigation options may also exist. Presentations at this symposium will focus on the following topics, as available, for each sirenian species or subspecies: distribution, population size and demography, life history attributes, mortality factors, current and future threats to survival, and potential options for improved conservation. The goal of the symposium is to use the most current scientific information to develop and justify revised, formal assessments of the status of manatees and dugongs worldwide.

### **The Global Status of the Dugong**

Helene Marsh

School of Tropical Environment Studies and Geography, James Cook University

The dugong has a large range spanning at least 37 countries and territories and includes tropical and sub-tropical waters from East Africa to Vanuatu between about 26° north and south of the Equator. A review of the status of the dugong throughout its range was conducted in 2002 with the assistance of more than 100 experts. The major threats were identified as fishing impacts especially gill and mesh nets (36 countries), habitat loss and degradation (at least 33 countries), hunting and poaching (at least 32 countries) and vessel impacts (at least 13 countries). The review concluded that the dugong was at very high risk of extinction in East Africa, India and Sri Lanka, Japan and Palau. The dugong's prospects are uncertain but of concern in the Arabian Gulf, South-East Asia, East and south East Asia and the Pacific Islands, the urban coast of Queensland and close to major Australian Indigenous communities, especially in Torres Strait. The dugong is probably secure in the Red Sea and Western Australia. The habitat loss resulting from the 2004 tsunami must have exacerbated the situation in India and Sri Lanka and parts of South East Asia. On balance, this evidence supports the current listing as vulnerable to extinction at a global scale based on reports of actual or potential levels of exploitation and the decline in area of occupancy (Criterion Va1c,d).

### **The West African Manatee (*Trichechus senegalensis*): Status and Conservation**

A. Kouadio <sup>1</sup>, J.A. Powell <sup>2</sup>, and J.E. Reynolds III <sup>3</sup>

<sup>1</sup>Wildlife Conservation Society (WCS), Coastal Biodiversity Conservation Project, 04 Bp 1240 Abidjan 04, Ivory Coast (e-mail: [akoi-k@hotmail.com](mailto:akoi-k@hotmail.com)); <sup>2</sup>Wildlife Trust, Aquatic Conservation Program, 1601 3<sup>rd</sup> Street S. Suite F, St. Petersburg, Florida 34240 USA; <sup>3</sup>U.S. Marine Mammal Commission and Mote Marine Laboratory, 1600 Ken Thompson Parkway, Sarasota, Florida, 34236 USA

The West African manatee (*Trichechus senegalensis*) occurs along the Atlantic coast of Africa from the Senegal River to the Cuanza River of Angola. It has been recorded some 2,000 km inland; from the Niger River from Koulikoro to Gao; in Lake Debo in Mali; and in Lakes Léré and Tréné in Chad. The species exists in trans-boundary wetlands and appears to move freely between countries. The wide distribution of *T. senegalensis* contrasts with the minimal information about the species' biology, distribution, and status. The on-going West African manatee conservation project in Côte d'Ivoire, supported by the Wildlife Conservation Society since 1986, represents the only noticeable and lasting initiative in the whole continent; even there, assessments are based to a large extent on literature reviews and personal communication. In many countries throughout its range, the species is legally protected, but enforcement of such legislation has generally not been effective and the numbers appear to be declining in many areas, due principally to subsistence hunting, incidental entanglement in fishing nets and modification of habitat, as by dam construction and irrigation projects. The West African manatee is listed as vulnerable to extinction (Category V) in the *IUCN Red List*, and it is listed in Annex II of the Convention on the International Trade in Endangered Species of wild flora and fauna (CITES). Recently, several countries have expressed their need for technical support to develop a manatee conservation program. Although some countries fear that there may no longer be viable manatee populations in their countries, others wish to protect their remaining manatees; such efforts are hampered by lack of knowledge of where they occur. As the species clearly suffers diverse threats across its range, there is a strong need for the development of a conservation action plan, better enforcement, and a precautionary listing.

### **The Amazonian Manatee (*Trichechus inunguis*): Distribution and Status**

Miriam Marmontel

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*Trichechus inunguis* is endemic to the Amazon region. Its historical distribution remains unchanged although in reduced numbers. It is found in Brazil, Colombia, Guyana, Ecuador, Peru and Venezuela. Sympatry with the West Indian manatee may occur along a portion of the Brazilian coast. Historically abundant, populations were depleted due to commercial hunting in past decades. Animals are still hunted throughout the range for subsistence and some local trade. Habitat destruction and degradation follow in importance of threat. Animals are more vulnerable when aggregated in restricted areas during the dry season. Young animals may be accidentally captured in fishing gear. Calves are caught to bait the mothers. Commerce of orphaned offspring is growing and reaching the capacity of holding facilities. Captive births have occurred in Brazil. Reintroduction attempts in Brazil and Colombia have had partial success. Enforcement of the legal protection in most countries is often inadequate and/or logistically hampered. Due to the expanse of the basin, the turbidity of the waters and the species' cryptic habits, no reliable population estimates exist. Captive studies have been carried out in Brazil since the 1980's but studies on wild populations have been rare. The first long-term study of wild Amazonian manatees was begun in 1993 around Mamiraua (Brazil) using radio telemetry. Tracking has identified migratory routes between areas of floodplain and terra firma. Future work will include sonar-based assessments and GIS modeling-based distribution. The species is listed as vulnerable to extinction in the IUCN Red List, and in Appendix I of CITES. Brazil produced an action plan for aquatic mammals, including Amazonian manatees, but Colombia is the only country so far to produce a national action plan specific to manatees. There is a strong need for a collaborative regional strategy to protect the species.

### **Population Status of the Florida Manatee (*Trichechus manatus latirostris*): Application to IUCN Red List Status**

C. J. Deutsch<sup>1</sup> and M. C. Runge<sup>2</sup>

<sup>1</sup>Florida Fish and Wildlife Conservation Commission (FWC), Fish and Wildlife Research Institute, Gainesville, Florida, USA (e-mail: [Chip.Deutsch@MyFWC.com](mailto:Chip.Deutsch@MyFWC.com)); <sup>2</sup>U. S. Geological Survey, Patuxent Wildlife Research Center, Laurel, Maryland, USA

The Florida manatee inhabits coastal waters, estuaries and rivers of the southeastern United States but is found year-round only in Florida. The highest count obtained during range-wide surveys was 3300 manatees in 2001; this is presumed to be a minimum count, but the fraction detected is unknown. The subspecies is comprised of four subpopulations that differ in size, demographic rates, habitats, and major threats. Population growth rates were estimated by Runge and colleagues (2004) using a stage-based model that integrated mark-recapture estimates of survival and reproduction based on individual photo-identification. From 1990-1999 the two smaller subpopulations (15% of highest count) have shown robust growth, while the Atlantic subpopulation (44%) may have remained stable, and the Southwest subpopulation (41%) may have declined. Human-related mortality, primarily from watercraft collisions, accounted for at least 48% of adult deaths since 1986 and is a significant factor inhibiting population growth. To address IUCN listing criteria relating to the probability of future population decline or extinction, the FWC conducted a population viability analysis. The PVA simulated plausible scenarios that incorporated future threats, including expected declines in carrying capacity through loss of warm-water refugia, potential increases in mortality associated with projected human population growth, and natural catastrophic mortality events (e.g., red tide). In several scenarios there was a reasonable probability of substantial population decline (>20% or >50%) over time (the next two or three generations, respectively), suggesting that this subspecies meets the IUCN Red List criteria for "endangered." Despite concerns about recent stagnant growth, continued human-caused mortality, and emerging threats, we acknowledge positive strides towards recovery. The population has apparently grown since its federal listing >30 years ago, and management actions have resulted in expanded boat speed zones in manatee habitats, no-entry zones at important warm-water sites, and improved habitat (water quality and seagrass) in some estuaries.

### **Conservation Status of the Antillean Manatee (*Trichechus manatus manatus*) in the Wider Caribbean**

Caryn Self-Sullivan<sup>1,2</sup> and Antonio A. Mignucci-Giannoni<sup>3</sup>

<sup>1</sup>Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843-2258; <sup>2</sup>Sirenian International, 200 Stonewall Drive, Fredericksburg, VA 22401-2110, email: [caryn@sirenian.org](mailto:caryn@sirenian.org); <sup>3</sup>Caribbean Stranding Network, PO Box 361715 San Juan, Puerto Rico 00936-1715, email: [mignucci@caribe.net](mailto:mignucci@caribe.net)

The Antillean manatee (*Trichechus manatus manatus*) occurs in riverine and coastal systems throughout the Wider Caribbean region, where it is recognized as a priority species of regional concern and is protected by national and international laws. One of two West Indian (*T. m.*) subspecies, the status of Antillean manatees was assessed as “vulnerable” by the IUCN Species Survival Commission’s Sirenia Specialist Group (SSC/SSG) in 1996 (VU A2d ver.2.3). To update this assessment, we compiled data gathered through an extensive literature review and personal communication with over 50 scientists representing expertise on manatees in 39 countries from the Caribbean Sea, Central America, and South America. Our assessment excluded the Florida manatee (*T. m. latirostris*) population in North America. Although these two sub-species have been recognized since 1934, recent mtDNA research suggests three distinct *T. m.* groupings and possible re-evaluation of the taxonomy. West Indian manatee populations occur in at least 19 of the 39 countries assessed, with rare sightings in additional countries. However, suitable habitat and manatee distribution are discontinuous within its range. Major threats to survival continue to include habitat degradation and loss, hunting, accidental mortality, pollution, and human disturbance. Status at the population level varies from vulnerable, to endangered, to extinct, with population numbers estimated to range on the order of 10<sup>1</sup> to 10<sup>3</sup>; the largest population (outside of Florida) is reported from Belize, for which some estimates range as high as 1000 or more individuals. In most of the countries with extant populations, some effort has been made to protect manatees through governmental and/or non-governmental organizations. In a few countries, including Mexico, Belize, Puerto Rico, and Brazil, efforts have been extensive and include species management and recovery plans, site specific and country-wide surveys, remote sensing projects, health assessments, habitat protection, educational outreach programs, stranding networks, and rehabilitation facilities.

#### **Status and Threats to the Dugong of Okinawa, in Japan**

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In Japan at present, Dugong (*Dugong dugon*) is observed only at Okinawa Island which is the northernmost limit of the distribution. A local population of Dugong is confined to a very small area of distribution, isolated from other populations, very few in number, and very much in danger of extinction. Okinawa's Dugong is one of the critically endangered species and a natural monument in Japan. One of the serious problems is a plan to construct a joint US Marine Corps and Japanese public airport to replace Futenma air station of USMC. The basic plan is to landfill a coral reef and seagrass area about 1 kilometer offshore of Henoko, Nago City and construct a 2,500 meter long, 730 meter wide airport on top of the landfill. The construction site is located in the central portion of the Dugong's habitat in Okinawa Island. It would not only bisect the habitat, but would also destroy seagrass beds that function as important feeding grounds, coral reefs that serve as resting sites, and canals between both sites for the Dugong. Japanese Government is continuing the drilling survey in the habitat of Dugong without EIA, and the EIA of the airport is going on without alternatives in spite of the IUCN recommendations (Amman 2000, Bangkok 2004). United States Government insists that the responsibility of the airport construction belongs to Japanese Government. Another serious problem is incidental bycatch. Corpses of Dugong that appear to have been caught in fishing nets occasionally stranded ashore. In the 1980s there were five corpses, nine in the 1990s and three in 2000. Red soil runoff from the land is also damaging the seagrass beds and the coral reef environment. Therefore appropriate and urgent prevention measures are required for the survival of Okinawa's Dugong. We are continuing conservation activities such as public awareness, signature campaign, lobbying for the Diet and the government, symposium with scientists, and others based on the action plan made by NGOs for the conservation of Dugong in Okinawa.

#### **Status and Conservation of the Manatee (*Trichechus manatus*) in Mexico**

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The knowledge of the manatee population in Mexico is still young and fragmented. The species is locally considered endangered and federally protected by Mexican laws since 1921 against any consumptive use. The manatee inhabits the southern coasts of the Gulf of Mexico and the Yucatan Peninsula. Manatees use primary riverine and estuarine ecosystems in the Gulf of Mexico, and marine and estuarine ecosystems in the Caribbean Sea. In the last decade, ecological research has been made mainly in Quintana Roo, Tabasco and Veracruz States. Only in the Yucatan Peninsula are there data available about manatee distribution, abundance, and population trends. The abundance in the north area of the Yucatan Peninsula is very low but increases in Quintana Roo State where there are around 150 to 200 manatees. In the same region, local movements of manatees radio tagged have been monitored since 1994 and genetic studies were started in 1997. A health assessment project is still going too. There are no data of the same quality for the other states. Habitat degradation and destruction likely is the most significant threats. This is a result of inappropriate coastal, urban and tourism development, wetlands destruction for cattle-rising and agriculture, oil and gas exploitation industry, dam construction, and fishery and port industries. On the other hand, poaching is still present in some rural areas of Veracruz, Tabasco and Campeche States as a traditional use of the species by hunters and fishermen. The Mexican Government created a Manatee Advisory Committee in 1997, composed of experts, academics, private organizations, volunteers and environmental authorities to coordinate the protection and recovery of the species. This committee also coordinates the conservation initiatives in accord with the National Recovery Plan released in 2001. Currently, there are 23 manatees in captivity, which are maintained in aquariums, private and public parks and other local facilities. Many of the manatees are held in semi-captive facilities for reintroduction. In December 2004 the first manatee was born in captivity in Mexico at the Veracruz Aquarium. Among the local conservation priorities are: reinforcement of federal laws to protect the manatee and its habitats, diminishing of the manatee mortality caused by hunting, gillnets and ship strikes, updating a management plan for the treatment and release of manatees from captivity, and research on the manatee distribution and abundance in many unevaluated areas in the country.

### **Grazing of Dugong (*Dugong dugon*) and Seagrass Recovery in Okinawa, Japan**

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Dugong (*Dugong dugon*) is a marine mammal that feeds on seagrass in shallow water. Relationship between dugong and seagrass was studied mainly in Australia, however, few studies have been done in Japan. Dugong is one of the most endangered species in Japan and it is found only around Okinawa Island. Seven species of seagrass (*Cymodocea rotundata*, *C. serrulata*, *Halodule pinifolia*, *H. uninervis*, *Syringodium isoetifolium*, *Halophila ovalis*, *Thalassia hemprichii*) are fed by dugong (Aketa, 2003) out of 10 identified seagrass species around Okinawa Island. Seagrass biomass that dugong intakes, grazing efficiency, and seagrass recovery after grazing were measured in this study. Kayo area, northeastern part of Okinawa island, was selected as a study site. All 7 species fed by dugong were found in this seagrass bed. Study plots were established in 3 seagrass meadows dominated by *T. hemprichii*, *C. rotundata*, and *H. uninervis* respectively. In order to estimate grazing biomass, seagrass leaves, rhizomes and roots were excavated by 15cm x 15cm quadrats (n=5) within dugong feeding trenches every month from January to June 2005. The seagrass biomass dugong trench in each plot (n=5) was also measured. For comparison of the seagrass recovery, experimental trenches that imitated dugong trenches (3m x 20 cm, leaves, rhizomes and roots completely excavated) were established in *T. hemprichii* dominant seagrass meadow. The recovered seagrass in the experimental trenches was also weighed every month. Biomass of the seagrass was 158.3±45.7g.d.w./m<sup>2</sup>, 206.6±51.4g.d.w./m<sup>2</sup>, 54.6±18.3g.d.w./m<sup>2</sup>, and dugong grazed 11.1%, 29.0%, 42.7% of total biomass, and 19.6%, 64.8%, 63.2% of above-ground biomass in seagrass meadows dominated by *T. hemprichii*, *C. rotundata*, and *H. uninervis* respectively. Recovery of seagrass in dugong trenches was rapid, while that in experimental trenches was very slow. Only *H. ovalis* showed prompt recovery in experimental trenches.

### **Seasonal Fluctuations in Seagrass Epiphyte Abundance Recorded in the Stable Isotope Composition of Manatee Whiskers**

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Seagrass epiphytes are major contributors to overall productivity within seagrass communities. Extremely high epiphyte loads, however, can have detrimental impacts on community health and serve as ecological indicators of eutrophication or environmental stress within ecosystems. Anthropogenic factors (i.e., nutrient dumping, freshwater fluxes, dredging) can spark these algal blooms and monitoring epiphyte growth could provide a measure of human impact on coastal communities. Yet, direct measurement of epiphyte abundance is time-consuming and difficult to conduct over large study areas. Here we explore the use of incremental stable isotope signals ( $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$ ) preserved in manatee whiskers as a record of seasonal epiphyte abundance in seagrass communities. The Indian River Lagoon (IRL) was chosen as a study site because manatees are abundant in this region, seagrass meadows are extensive, and prior research has documented seasonal oscillations in epiphyte abundance. Seagrass and epiphyte samples were collected every three months for a period of one year at multiple sites within the IRL. Seagrass samples were consistently  $^{13}\text{C}$ -enriched and  $^{15}\text{N}$ -depleted relative to associated epiphytes and isotopic differences were typically  $>5\%$  for both elements. Multiple perioral whiskers were collected from 5 manatees that had died within the IRL. Whiskers were subsampled in  $\sim 0.5$  mm increments for  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  analysis and averaged 4 cm in length, yielding  $\sim 60$  samples per whisker. Values exhibited cyclical trends for both carbon and nitrogen with ranges of  $>2\%$  within a single whisker. Peak  $\delta^{15}\text{N}$  values typically coincided with a drop in  $\delta^{13}\text{C}$  values that matched the winter-spring season of abundant epiphyte growth in the IRL. These results suggest that epiphyte productivity may be a more important food source for IRL manatees than previously thought and that stable isotope values in manatee tissues may provide a novel record of the ecological health of coastal communities.

## RECENT LITERATURE

- Anonymous. 2005. Dugong conservation in Tanzania. *Mar. Pollut. Bull.* 50(5): 492.
- Andre, J., E. Gyuris, and I.R. Lawler. 2005. Comparison of the diets of sympatric dugongs and green turtles on the Orman Reefs, Torres Strait, Australia. *Wildlife Research* 32: 53-62.
- Astibia, H., A. Payros, X. Pereda Superbiola, J. Elorza, A. Berreteaga, N. Etxebarria, A. Badiola, and J. Tosquella. 2005. Sedimentology and taphonomy of sirenian remains from the Middle Eocene of the Pamplona Basin (Navarre, western Pyrenees). *Facies* 50(3-4): 463-475.
- Badrudeen, M., P. Nammalwar, and K. Dorairaj. 2004. Status of sea-cow *Dugong dugon* (Müller) along the southeast coast of India. *Jour. Bombay Nat. Hist. Soc.* 101(3): 381-387.
- Brant, J.G., and C. Jones. 2005. Annotated checklist of marine mammals of Texas. *Occas. Papers, Mus. Texas Tech Univ.* No. 244: 1-4.
- Domning, D.P. 2005. Fossil Sirenia of the West Atlantic and Caribbean region. VII. Pleistocene *Trichechus manatus* Linnaeus, 1758. *Jour. Vertebrate Paleontology* 25(3). [Describes a new subspecies of *Trichechus manatus* from the Late Pleistocene of the southeastern USA.]

- Fitzgerald, E.M.G. 2005. Holocene record of the dugong (*Dugong dugon*) from Victoria, southeast Australia. *Mar. Mamm. Sci.* 21(2): 355-361.
- Flewelling, L.J., J.P. Naar, J.P. Abbott, D.G. Baden, N.B. Barros, G.D. Bossart, M.-Y.D. Bottein, D.G. Hammond, E.M. Haubold, C.A. Heil, M.S. Henry, H.M. Jacocks, T.A. Leighfield, R.H. Pierce, T.D. Pitchford, S.A. Rommel, P.S. Scott, K.A. Steidinger, E.W. Truby, F.M. Van Dolah, and J.H. Landsberg. 2005. Red tides and marine mammal mortalities. *Nature* 435(7043): 755-756.
- Furusawa, H. 2005. Evolution of the North Pacific Sirenia (Hydrodamalinae) and their paleoenvironment. *Fossils* (Palaeontological Soc. Japan) No. 77: 29-33.
- Hauxwell, J., T.K. Frazer, and C.W. Osenberg. 2004. Grazing by manatees excludes both new and established wild celery transplants: implications for restoration in Kings Bay. *Jour. Aquat. Plant Management* 42: 49-53.
- Hines, E.M., K. Adulyanukosol, and D.A. Duffus. 2005. Dugong (*Dugong dugon*) abundance along the Andaman coast of Thailand. *Mar. Mamm. Sci.* 21(3): 536-549.
- Inuzuka, N. 2000. Preliminary report on the evolution of aquatic adaptation in desmostylians (Mammalia, Tethytheria). *Oryctos* 3: 71-77.
- Jiménez Pérez, I. 2003. *Los manatíes del Río San Juan y los Canales de Tortuguero: ecología y conservación*. Managua, Araucaria: 1-87.
- Jiménez Pérez, I. 2005. Development of predictive models to explain the distribution of the West Indian manatee *Trichechus manatus* in tropical watercourses. *Biol. Conserv.* 125: 491-503.
- Kendall, S., and D.L. Orozco. 2003. El árbol de los manatíes: caza, concertación y conservación en la amazonia colombiana. In: C. Campos-Rozo and A. Ulloa (eds.), *Fauna socializada: tendencias en el manejo participativo de la fauna en América Latina*. Bogotá, Fundación Natura, MacArthur Foundation, and Instituto Colombiano de Antropología e Historia: 215-237.
- Lanyon, J.M., T. Johns, and H.L. Sneath. 2005. Year-round presence of dugongs in Pumicestone Passage, south-east Queensland, examined in relation to water temperature and seagrass distribution. *Wildlife Research* 32(4): 361-368.
- Linares, O.J., and B. Rivas A. 2004. Mamíferos del sistema deltaico (delta del Orinoco-Golfo de Paria), Venezuela. *Memoria de la Fundación La Salle de Ciencias Naturales* 2004 ("2003"), 159-160: 27-104.
- Parente, C.L., J.E. Vergara-Parente, and R.P. Lima. 2004. Strandings of Antillean manatees, *Trichechus manatus manatus*, in northeastern Brazil. *Latin Amer. Jour. Aq. Mamms.* 3(1): 69-75.

Raloff, J. 2005. Toxic surfs: homing in on an alga's threat – and therapeutic promise. *Science News* 168(4): 56-58.

Siciliano, S., and S. M. S. Franco. 2005. *Catalogo da Coleção de Mamíferos Aquáticos do Museu Nacional* (Rio de Janeiro). [Includes data on manatee specimens. PDF available from Salvatore Siciliano, <sal@ensp.fiocruz.br>.]

Smith, K., and R. Mezich. 2004. Managing natural aquatic plant communities in Manatee Springs: the effects of manatee grazing, nutrient pollution and flooding. *Aquatics* 26(2): 12-20.

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Belize Coastal Zone Management Authority & Institute's Manatee Research Program: <[http://www.coastalzonebelize.org/pr\\_manatee.html](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](http://www.colszoo.org/animalareas/shores/manatee_coast/index.html)>

Dugongs: <<http://www.hans-rothauscher.de/dugong/dugong.htm>>

Dugong necropsy manual (available for downloading): <[http://www.gbrmpa.gov.au/corp\\_site/info\\_services/publications/research\\_publications/rp64/index.html](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](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](http://www.fundacionmanati.org)>

Great Barrier Reef dugongs: <[http://www.gbrmpa.gov.au/corp\\_site/info\\_services/publications/dugong/index.html](http://www.gbrmpa.gov.au/corp_site/info_services/publications/dugong/index.html)>

IBAMA manatee project, Brazil: <[www.projetopeixe-boi.com.br](http://www.projetopeixe-boi.com.br)>

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

*Sirennews* (texts of current and recent issues): <<http://www.marinemammalogy.org/snews.htm>>; <<http://www.sirenian.org/sirennews.html>> (for archive of most older issues)

Sirenia Project, U.S. Geological Survey: <<http://www.fcsc.usgs.gov/sirenia>> or <<http://www.nfrcg.gov/sirenia>>

Sirenian International, Inc.: <<http://www.sirenian.org/>> [Includes a bibliography of sirenian literature, and an archive of *Sirennews* 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://www.hans-rothauscher.de/steller/steller.htm>>. This site also includes a searchable database of museum collections worldwide that contain bones of *Hydrodamalis gigas*: <<http://www.hans-rothauscher.de/steller/museums.htm>>. See also the website [in Finnish] of Dr. Ari Lampinen, Univ. of Jyväskylä, Finland: <<http://www.jyu.fi/~ala/ilmasto/steller.htm>>

*Trichechus senegalensis* skull: <[http://digimorph.org/specimens/Trichechus\\_senegalensis/](http://digimorph.org/specimens/Trichechus_senegalensis/)>. [CT imagery of an African manatee skull and mandible, viewable as individual thin slices, 3-D rotational movies, and slice movies. Excellent detail!]

West African manatee in Chad (Jonathan H. Salkind): <<http://members.aol.com/neeii/manatee-index.html>>

Xavier University manatee web site (Midwest Manatee Research Program; Chuck Grossman): <[www.xu.edu/manateerearch](http://www.xu.edu/manateerearch)>

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