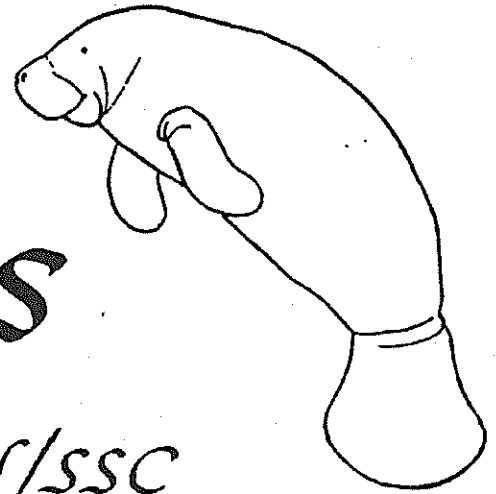


Sirenews



Newsletter of the IUCN/SSC Sirenia Specialist Group

NUMBER 39

APRIL 2003

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- RED TIDE AGAIN STRIKES FLORIDA MANATEES (p. 4)

INTERNATIONAL SIRENIAN WORKSHOP TO BE HELD IN DECEMBER

A workshop to discuss sirenian conservation issues has been proposed to be held in conjunction with the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, North Carolina, USA, 14-19 December 2003. The proposal for this workshop is pending and a final determination will be made after 21 June. We especially encourage participation from sirenian biologists and managers outside the U.S. Invited presentations will cover several aspects of dugong and manatee status and research worldwide. We are soliciting nominations from those interested in giving short presentations at the workshop. If you are interested in presenting or attending, please contact Nicole Adimey as soon as possible.

Registration for the workshop will be awarded on a first-come-first-served basis and will be free to those who sign up beforehand. Another announcement with more specific information on exact time and location of the workshop will be made in the next issue of *Sirenews*. Mark your calendars now!

For additional information please contact Nicole. - **Nicole Adimey** (USFWS) and **Bob Bonde** (USGS). (Nicole Adimey, Fish and Wildlife Manatee Biologist, U.S.)

UNION INTERNATIONALE POUR LA CONSERVATION DE LA NATURE ET DE SES RESSOURCES
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EDITOR'S NOTE

With our next issue, *Sirenews* will complete an astonishing (to me!) 20 years of continuous publication. This is an appropriate time for stocktaking, and the workshop announced above will provide a convenient venue. I ask you, the readers of this newsletter, to consider whether it has been meeting your needs as a source of sirenian-related information in support of your efforts in research and conservation. How can it be improved? How should it be changed? In view of the recent establishment of the SIRENIAN listserv and the Sirenian International website by Caryn Self Sullivan and her collaborators, as well as other on-line resources, is a hard-copy newsletter now redundant? Or is it still relied upon by some, especially workers in developing countries without easy Internet access?

Since I lack the leisure to pursue investigative reporting, *Sirenews* has always relied on your contributions of news and opinion; and for your two decades of support in this fashion, I am extremely grateful. During that time it has been a pleasure to witness the geographic spread of sirenian research and the involvement of new people. Twenty years ago the major sirenian research centers were in Australia, Florida, and Brazil. These centers have remained active, have grown to involve more institutions and agencies, and have been supplemented by (and indeed fostered) newer research and conservation projects in Latin America, Southeast and East Asia, and Africa -- as reflected in the welcome news reports from those areas.

However, in recent years I have also noticed that I am drawing more and more on news services and other published sources, for lack of exclusive first-person reports volunteered by you, the active workers directly involved in the study of sirenians. It is your contributions that have always been the main strength of *Sirenews*, and made it unique. If you have not sent us any news lately, is it because there is too little happening in your neighborhood, or too much happening but with too little time to report it? If *Sirenews* is to be worth your while to read, it must contain timely information from your colleagues -- and vice versa.

I earnestly solicit your thoughts on these issues, at any time up to and including the December workshop, where I hope a formal discussion of this topic can be included on the agenda. The publication of *Sirenews* is an extremely time-consuming task. I want to make sure that my energies are being applied in the most productive direction, and (if this newsletter is to continue) that it genuinely serves the needs of the sirenian research and conservation community. - **DPD**

LOCAL NEWS

AUSTRALIA

Hand-Raised Dugong Recaptured. - The male dugong calf hand-raised from a neonate (*Sirenews* No. 31, April 1999 and No. 33, April 2000), and released into Moreton Bay in Queensland on March 12, 2002 (*Sirenews* No. 37, April 2002), was recaptured in poor condition on November 9, 2002 and returned to Sea World (Australia) after 8 months in the wild. At 145.5 kg, "the pig" - whose identity was unequivocally confirmed only after capture - had lost 52.0 kg (26.3%) of his release body weight, and had been severely beaten up by another, presumably male, dugong.

He was recaptured in shallow water in Days Gutter, along the southwestern aspect of Moreton Island. This location was approximately 5 km from his release site (as the crow flies), but a journey of at least 10-15 km (as the pig swims) depending on whether he hugged the contours of the sandbanks and/or took shortcuts through connecting gutters. It was also within 2 km of where his PTT/VHF tag and tether harness had washed up, decorated with shark teeth marks, on the southern-most tip of the island on the third day after release.

The pig's recuperation is proving to be a continuously challenging process. He proceeded to lose another 8.5 kg off his already frighteningly lean physique in the first four days after return to Sea World. After erratic gains and losses, his weight was down to 136.0 kg by the end of the fifth week - a staggering 61.5 kg (31.1%) lighter than his weight at release. When one considers the relatively greater contribution of the heavy sirenian skeleton to total body

weight compared to that in terrestrial mammals, this probably represents an even more alarming percentage of his soft tissue mass.

Since mid-December, however, the pig has demonstrated a gradual improvement in health and body condition. The combination of abundant salad vegetables, supplementary milk paste, various medications, worming, restoration of intestinal bacteria, a heated pool, and lots of TLC have seen his weight creep upwards, albeit somewhat erratically, to a maximum of 156.0 kg in late February 2003.

While understandably disappointed by his failure to thrive in the wild, we consider ourselves extremely fortunate to have been able to recapture him in spite of the premature detachment of his tracking device. Positive aspects of his attempted release include his surviving for 8 months (through winter), avoiding predation and boat strike, and apparently mastering the vagaries of tides and currents (Days Gutter is an area of relatively heavy boat traffic and strong currents).

Any decisions about his long-term future will continue to be made in consultation with the other key stakeholders in this ongoing 4-year rescue and rehabilitation process, viz., the Queensland Parks and Wildlife Service and the Great Barrier Reef Marine Park Authority. - **Wendy Blanshard** (Records/Special Projects Officer, Sea World, P.O. Box 190, Surfers Paradise, Queensland 4217, Australia (tel.: +61-7-5588-2222; fax: +61-7-5588-2266; e-mail: <wendyb@seaworld.com.au>)

FLORIDA

Red Tide Blooms Killing Manatees. - Southwest Florida is experiencing the second-largest red tide-related manatee die-off ever recorded. Since Feb. 27, 16 dead manatees have been confirmed victims of red tide, and 44 more deaths were probably caused by red tide, said Tom Pitchford, director of the state's Marine Mammal Pathobiology Laboratory in St. Petersburg. Five live manatees suffering from red tide poisoning have been rescued. Four are at Lowry Park Zoo in Tampa; one is at Sea World in Orlando.

Pitchford and his team perform necropsies on virtually every manatee carcass found in the state. "We suspect red tide in these animals because of circumstantial and gross findings," Pitchford said. "The circumstantial is that they all came from red tide bloom areas. The gross findings are consistent with red tide poisoning: swollen, congested kidneys, froth in the airways of the lungs, blood that doesn't coagulate when you cut into the animal, hemorrhaging in the eyes, bloody froth in the nose. As we get tissues tested, we'll move them from suspect to confirmed."

The largest red tide manatee die-off ever recorded was in 1996, when 149 died between March 5 and April 27 in Southwest Florida. After the 1996 die-off, scientists developed tests to determine whether a dead manatee had been killed by red tide toxin — before that event, no such test was available.

Last year, red tide killed 35 manatees; before 1996, the largest suspected red tide manatee die-off was in 1982, when 39 died over 11 weeks in Lee County. Because no test was available, scientists based that

conclusion on circumstantial and gross evidence.

"We've essentially had an event every year since 1996," Pitchford said. "We undoubtedly had them before, but they probably went unrecognized because of the small numbers involved and the lack of a test."

Scientists chalked the 1996 die-off up to a confluence of events. As area water started warming up, manatees that had spent the winter in warm-water areas, such as the Florida Power & Light power plant on the Orange River, began moving toward the coast. At that time, a huge bloom of the organism that causes red tide, *Karenia brevis*, developed at the mouth of the Caloosahatchee River. Many manatees swimming through the bloom were poisoned and died — virtually all of the carcasses were recovered in Lee County.

This year's event is a little different. Red tide has been in Southwest Florida waters for several months, but not in the same high concentrations as 1996. Also unlike 1996, manatees already had dispersed through the area — carcasses have been recovered from Sarasota to Marco Island — 29 from Lee County.

Some manatees have survived the algae's toxin, which becomes airborne and causes respiratory irritation in humans as well. Once away from the toxin produced by red tide, the manatees usually recover, scientists said.

"Certainly we don't know all there is to know about manatees and the effects of red tide," Pitchford said. "One thing is painfully clear: When red tide is in manatee habitat, manatees are going to die." - Kevin Lollar (from *The News-Press* [Fort Myers, FL], April 17, 2003; supplemented from Associated Press State & Local Wire)

Status of Florida Manatee Downlisting Proposal. - The Florida Fish and Wildlife Conservation Commission has decided to re-visit the manatee's listing status at its May 28-30 meeting in Kissimmee, Florida. (See <<http://floridaconservation.org/whatsnew/03/postcomm-apr03-st.html>>.)

Staff at FWC's Florida Marine Research Institute prepared a biological status review of the Florida manatee based on the state of Florida's listing criteria. A preliminary report was peer-reviewed and the report finalized last December. The report is available on-line at <http://www.floridamarine.org/features/view_article.asp?id=19173>.

Based on the state's listing criteria,* staff recommended that the manatee be down-listed at the state level from endangered to threatened. The Commission heard the report at its January 2003 meeting in Ft. Myers and decided to postpone making a decision on the manatee's status in Florida. If the commissioners decide to downlist the Florida manatee, a state management plan will have to be developed prior to implementation of a change in status. The state of Florida maintains an imperiled species list separate from the federal endangered species list and a change at the state level does not change the federal list. - **Elsa M. Haubold**, Ph.D., Research Administrator II, Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, 100 8th Ave. SE, St. Petersburg, Florida 33701 (tel.: 727-896-8626 x1902; e-mail: <Elsa.Haubold@fwc.state.fl.us>; <<http://www.floridamarine.org>>).

*[ED. NOTE: For a critique of the State of Florida's listing criteria, see *Sirenews* No. 38.]

O.J. Simpson Pays Fine. - O.J. Simpson has paid a US\$130 fine for speeding through a manatee zone in a powerboat. Patricia Jones, Simpson's attorney, paid the fine on Nov. 22. The former football star didn't come to the courthouse. Simpson, 55, had been ticketed July 4 for creating a wake in a manatee zone while driving a 30-foot powerboat near downtown Miami (see *Sirenews* 38).

Judge Ana Maria Pando had earlier issued a bench warrant for Simpson after he and his attorney both missed a court hearing. The warrant meant Simpson could have been arrested if stopped by police. The warrant was withdrawn hours later after Simpson's primary attorney, Yale Galanter, explained he didn't attend because of a scheduling mix-up.

Simpson was acquitted of murder charges in the 1994 slayings of his ex-wife and her friend. A civil jury later held Simpson liable for the killings and ordered him to pay the victims' survivors US\$33.5 million. He hasn't worked since. Any money he makes could be seized to satisfy that judgment, which remains largely unpaid. He continues to maintain his innocence in the killings. - (Source: Associated Press Online, Nov. 23, 2002)

Fate is Against Us. - A Florida psychic has bad news for manatee lovers. Self-described "spiritual consultant" Tracy Crespo, 37, of Fort Myers, Florida, made the following prediction to reporter Denise Scott:

Q: Will docks or manatees disappear?

A: Boat owners are going to win over manatees. Money generally rules. And with evolution, our animals are

changing. In about five years, manatees will be extinct. Destiny wants them extinct. I'm not blaming the boat owners. - (Source: *The News-Press* [Fort Myers, FL], Dec. 31, 2002)

SINGAPORE

Manatee Born in Singapore Zoo. - The *Singapore News* has reported that a 9 kg female manatee was born, unassisted, in the Singapore Zoo on Tuesday, 11 March 2003. The Zoo is inviting visitors to suggest names for its newest arrival.

The Singapore Zoo started with three adult manatees (*T. m. manatus*) from Germany. Besides this latest newborn, its current collection also includes a baby male manatee.

WEST AFRICA

New Manatee Research and Conservation Program. - We are pleased to inform you that a long-term research and conservation program on the West African manatee will be undertaken in October 2003 (planned for a minimum of 3 years). This program,

part of a new-born French and international NGO (devoted to education, research and conservation), will focus on 3 main objectives :

1. Study of the West African manatee's distribution and repartition in the Niger Inner Delta (Mali) and adjacent countries (Senegal, Burkina Faso, Benin). - Intensive aerial and boat surveys, radio-tracking, etc.
2. Study of the manatee's biology - 3 years of field observations planned.
3. Population genetics studies (species comparisons, genetic variability, population viability, etc.).

More details will be published and issued in October 2003 (NGO website, official research program, contact addresses, etc.). In the meantime, we welcome contacts with other biologists, sirenologists and research/conservation organizations. Contact **Frederic G. Speyser** at our temporary e-mail address:

<t.senegalensis@netcourrier.com>.

ABSTRACTS

The following abstracts are of presentations at the 10th Reunion de Trabajo de Especialistas en Mamíferos Acuáticos de America del Sur - RT and 4^o Congresso SOLAMAQ, Valdivia, Chile, 14-19 October 2002.

Anatomical and Histological Characteristics of Female Reproductive Tract of *Trichechus inunguis* (Natterer, 1883) (Mammalia: Sirenia).

Fernanda Rosa Rodrigues & Vera Maria Ferreira da Silva
Instituto Nacional de Pesquisas da Amazônia (INPA); Laboratório de Mamíferos Aquáticos - LMA; Av. André Araújo, 2936; Petrópolis; Manaus-AM; Brasil.

The Amazonian manatee (*Trichechus inunguis*), like other representatives of the Order Sirenia, is uniparous with possesses slow reproduction, considering the interval between birth and long gestation interval. Another aggravating factor to its population growth is that hunting of the species continues, although prohibited by law. The reproductive tract's macroscopic and histological study, especially of the ovaries, supplies important information about the life history and on the female's reproductive state. In this study, anatomical and

histological descriptions of the female reproductive tract and mammary glands were made for the first time for *T. inunguis*. Three specimens were utilized, and the collected material was fixed in buffered formalin at 10%. After the biometry and anatomic description, tissue samples of the female reproductive apparatus were removed and prepared for histological sections. Histochemistry and immunohistochemistry techniques were used. The results revealed that the external genitalia, mainly the clitoris and the *labia majora*, present numerous nervous ganglions and tactile sensitive corpuscles in the dermis, important for sexual stimulation. The vaginal epithelium is columnar, mucus-secreting, varying from simple to pseudostratified. In mammals in general, the epithelium is stratified squamous non-glandular keratinised. This keratinization is related to the degree of friction to which the epithelium is subjected. The hymen has two vaginal openings, tied by a short segment, and it separates the vagina from the vestibule. These openings, possibly, become a single opening during sexual intercourse. The shortage of elastic fibers corroborates this hypothesis, reducing the possibility of complacency of the hymen. In one of the specimens in this study, whose endometrial glands didn't present maximum development, no placental scars were observed in the uterus. In this same individual the presence of hemorrhagic body and Graafian follicles in the right ovary, besides corpora albicantia, was recorded, suggesting that *T. inunguis* goes through infertile cycles, in order to reach sexual maturity, before the first gestation. Macroscopically, the cicatricial body counts were difficult because of their small diameter. It is not possible to differentiate the cicatricial bodies resulting from the follicles' rupture (corpora albicantia) from those of non-ruptured follicles. It was histologically observed, through the technique of Picrosirius - modified for confocal, that the cicatricial bodies can be differentiated among corpora albicantia and those resulting from non-ruptured follicles by the variation of the organization and density of the collagen fibers of these structures. The presence of *corpora albicantia* in the right and left ovaries of one of the specimens in this study suggests bilateral function of the ovaries in *T. inunguis*. [Master's Thesis in Aquatic Biology and Interior Fisheries, University of Amazonas/INPA, Manaus, Brazil, 2002. 114 pp.]

Phylogeography of *Trichechus inunguis* (Natterer, 1883) (Mammalia: Sirenia) in Brazilian Amazon.

Andréa Martins Cantanhede¹; Vera Maria Ferreira da Silva¹ & José A. Alves-Gomes²

1-Laboratório de Mamíferos Aquáticos – LMA; Instituto Nacional de Pesquisas da Amazônia (INPA); Av. André Araújo, 2936; Petrópolis; Manaus-AM; Brasil.

2-Laboratório Temático de Biologia Molecular; Instituto Nacional de Pesquisas da Amazônia (INPA); Av. André Araújo, 2936; Petrópolis; Manaus-AM; Brasil.

The Amazonian manatee is endemic to the Amazon River basin, occurring from Marajó Island (Brazil) up to the heads of that river in Colombia, Peru and Ecuador. Historically, this species has suffered from extensive hunting, resulting in reduced population. The goal of this study was to estimate the genetic variability of this species, verifying whether or not there was any association between the geographic distribution and the genetic variation using the mitochondrial control region. Sixty-eight individuals from six areas of the Amazon basin (Rios Negro, Japurá, Solimões, Madeira, and Amazon in the State of Amazonas, and from Pará) were sampled. A total of 364 base pairs were sequenced and 37 haplotypes were found. The haplotype diversity was relatively high ($h = 0.909$), despite the low nucleotide diversity Pi (JC) = 0.00836. This can be explained by the large number of singletons (31) in the sample. The k values (average number of nucleotide differences per sequence pair) and D_{xy} values (average number of substitutions per site) discriminate haplotypes from the Pará area, which are more variable compared to the other areas. The AMOVA shows that 93.86% of the genetic variability is explained by haplotype variation within the areas, and that the gene flow estimate is high (migrants per generation, M , varies from 3 to 13.133). The absence of geographic segregation demonstrated by the phylogenetic analyses has strong implications for the species' conservation in the wild. The Amazonian manatee population seems to be panmictic; therefore, guidelines for future reintroduction programs of captive manatees will not be limited by the origin area of the animal to be released. [Master's Thesis in Aquatic Biology and Interior Fisheries, University of Amazonas/INPA, Manaus, Brazil, 2002. 82 pp.]

The Apparent Period of Pregnancy in Amazonian Manatee (*Trichechus inunguis*) Females Kept in Captivity, Based on Plasmatic Levels of Progesterone.

Claudia Carvalho do Nascimento¹, Cláudio Alvarenga de Oliveira¹, Vera Maria Ferreira da Silva², Érika Cristiane Gutierrez Felipe¹, José Anselmo d'Affonseca Neto.

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The Amazonian manatee is the only sirenian which lives in the Amazon river basin. Few studies about reproductive physiology of this species have been made. The aim of our work is to evaluate the concentrations of plasmatic progesterone of two females in captivity at the Laboratório de Mamíferos Aquáticos – Instituto Nacional de Pesquisas da Amazônia (LMA-INPA), with the purpose of estimating the pregnancy length of the species. So far, three pregnancies have been registered in captivity (two from Boo, 27 years in captivity and one from Tukano, 18 years in captivity). Blood samples from these females were taken at irregular periods, between June 1998 and March 2002. Amounts of 1,5 ml were frozen at -80° in microtubes for analyses. The hormone quantification was made by solid phase radioimmunoassay at the Laboratório de Dosagens Hormonais – Faculdade de Medicina Veterinária e Zootecnia - Universidade de São Paulo (LDH-FMVZ-USP). Plasmatic progesterone concentrations were undetectable before pregnancy (0,02ng/ml). In the first month of pregnancy we found an increase of 6,7 ng/ml for Boo and 9,99 ng/ml for Tukano, followed by an increase in the second month of 10,37 ng/ml and 13,58 ng/ml for Boo and Tukano, respectively. After this increase, amounts of progesterone lessened until the time of parturition. Concentrations of plasmatic progesterone remained high for an average of 334 days and were not detectable after parturition. This period (11 months) was inferred as pregnancy length. This length differs from the Florida manatee (*Trichechus manatus latirostris*), which is approximately 12 to 14 months. This is the first estimation of the pregnancy period of the Amazon manatee based on plasmatic levels of progesterone.

The following abstract is of a doctoral dissertation submitted to the Centro de Investigación Científica y de Educación Superior de Ensenada, CICESE, Ensenada, BC, México, Dec. 2002.

Habitat factors that determine the distribution of Antillean manatees (*Trichechus manatus manatus*) in the northern portion of Bahia de Chetumal, México. (187 pp.)

León David Olivera-Gómez.

The West Indian manatee (*Trichechus manatus*, Mammalia: Sirenia) and the Antillean subspecies (*Trichechus m. manatus*) are considered endangered by the Mexican and many international environmental laws, for three main reasons: its reduced population size (a result of the intensive hunting of this species since the arrival of Europeans to the New World), the poor knowledge about many regional populations because of their low densities and the difficulty of studying manatees in cryptic habitats, and the human impact and modification of the rivers, estuaries and coastal zone, where these mammals live. A large part of the studies about this species referred to their general conservation and to the distribution of some of their populations. In these studies, researchers indicated the need of studying the principal characteristics of the habitat of the manatee. Those studies had recognized some elements of the habitat, but few had explored quantitatively the relationship of these characteristics with the use by the manatees at a medium spatial scale. In this research, I accomplished a field study to test the correlations between functional characteristics of the habitat and the use by the manatee of small spatial units, of 0.02 km², within Bahia de Chetumal, located on the Caribbean coast of Mexico. This bay is a state natural protected area and a sanctuary for the manatee since September 1996.

The habitat characteristics evaluated were: distance to sources of freshwater, submerged vegetation coverage, depth, slope of the bottom, shelter from wind and surf, salinity and water temperature. I counted the manatees and sampled the habitat characteristics concurrently, between November of 1998 and April of 2000. I registered the location and the number of manatees through 17 aerial surveys with a light aircraft, in four sampling periods along a series of fixed transects on the northern coasts of the bays.

Throughout these transects I established the study units. I built surface maps with the data of the habitat characteristics, and from these maps I assigned the corresponding values to each unit. I calculated the frequency of occurrence of manatees inside each unit, and finally, I calculated the Spearman's correlation coefficients between each habitat variable and the occurrence of manatees and between each pair of habitat variables. I accomplished the same analysis for the data of the east and west coasts separately. Furthermore, to observe the multivariate relationships among habitat characteristics and manatee data, I carried out three types of analysis: Poisson regression, logistics regression and discriminate functions analysis. With the exception of the shelter from the wind and surf, all the analyzed variables presented a significant correlation with the frequency of occurrence of manatees. The global correlation was influenced by the data of the west coast, since the manatee occurrence on the east coast presented correlation only with the distance to freshwater sources. In the multivariate approaches, the distance to the sources of freshwater and the depth were the variables that contributed more to the models of regression and classification. In this study, I confirmed the association of the habitat variables proposed to explain the differential use of sites by the manatees at a small spatial scale. My data emphasize the influence of the distance to freshwater sources on habitat models.

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(NOTE: Not all of these sites have been visited recently by your Editor, and some may no longer be active, or their addresses may have changed.)

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>

IBAMA manatee project, Brazil: <www.projetopeixe-boi.com.br>

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>>

Sirenews (texts of current and recent issues): <<http://pegasus.cc.ucf.edu/~smm/>>; <<http://www.sirenian.org/>> (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 *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>>

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

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