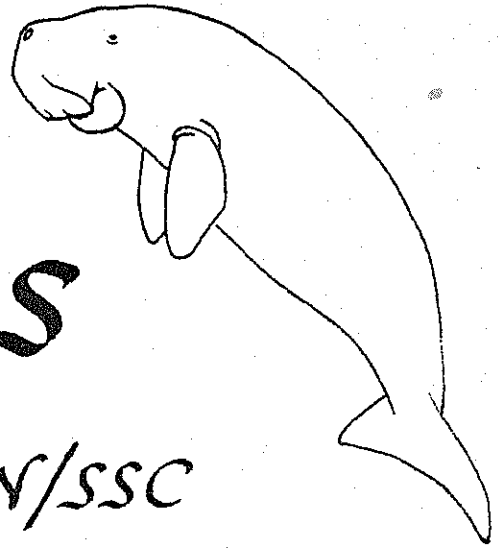


Sirenews



Newsletter of the IUCN/SSC Sirenia Specialist Group

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Death Reported

George Colin Lawder Bertram

11 January 2001, at Graffham, Sussex, England

Dr. Colin Bertram died at Graffham in Sussex, England, on 11th January 2001, 18 months after his wife Dr. Kate Bertram. His life was celebrated in May at a fine memorial service in the Chapel of St. John's College in Cambridge, where he was a Fellow for 55 years (and Tutor for 27 of them). He leaves a family of four sons and thirteen grandchildren.

Colin's sirenian connections began in the early 1960s. Before that he had worked as a polar explorer and seal biologist on the British Grahamland Expedition 1934-37, as



UNION INTERNATIONALE POUR LA CONSERVATION DE LA NATURE ET DE SES RESSOURCES
INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

Commission de la sauvegarde des espèces—Species Survival Commission

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Chief Fisheries Officer in the Middle East during the War, as Director of the Scott Polar Research Institute in Cambridge, and as Director of the Eugenics Society (now the Galton Institute) in London. Kate had studied East African fishes before her absorption into the field of advancing women's education in Cambridge. Sirenians seemed suitably intermediate between seals and fish.

With their offspring growing up enough to be left behind, together they embarked on a series of trips to survey sirenian populations and to highlight their dire conservation situation. Very little was known about manatees or dugongs in those days, for very good reasons. Colin and Kate felt they were mature enough biologists not to mind unduly if they virtually never actually saw a live manatee or dugong. Sure enough, they rarely did. Unperturbed, in the Guianas, Sri Lanka, Australia and Belize they traveled extensively, diligently asking local people about the existence of sirenians there, and collating and disseminating the results. They published over 20 papers, articles and books on all manner of sirenian matters. As a result they played a major role in drawing the world's attention to these previously neglected animals. And in consequence the subject of sirenology appeared and attracted the attention of the researchers who have since been able to gather vastly more information.

Colin was the first Chairman of the IUCN/SSC Sirenia Specialist Group, which was both a cause and a symptom of the growing attention to sirenians. He was delighted with the growth of the subject, and very happy to hand on to others the increasingly detailed tasks of research and correspondence.

As the words of the obituary to Kate in *Sirenews* in April 2000 indicated, the Bertrams did more than any other individuals to usher in the modern era of sirenian biology. That gave Colin huge satisfaction. And as offspring, we are proud to have enabled them to do so merely by growing up. - **Dr. Brian Bertram** (second son) (Special Projects Co-ordinator, Bristol Zoo Gardens, UK)

EDITORIAL: THE DRIVE TO DOWNLIST

The Coastal Conservation Association of Florida (CCA Florida), an organization that promotes recreational fishing, has asked the Florida Fish and Wildlife Conservation Commission (FWCC) to re-evaluate whether the Florida manatee is still endangered. In an Aug. 20 press release, CCA Florida Executive Director Ted Forsgren said, "It doesn't matter whether the management issue is snook, grouper or manatees; we believe that certain scientific information is needed to properly protect and manage a species. First is a biological goal which equates to a healthy sustainable population; and second is a current assessment of the population with respect to that goal."

No argument there: the "biological goal" needs to be a "healthy population", which must remain healthy (be "sustainable") in the future. But who is to judge this, and whose "current assessment" is to be believed? Surely the public has a right to expect that such determinations will be made by the best-qualified people, ones trained in the latest techniques of estimating sizes and conditions of wildlife populations and with the most experience in applying these techniques to Florida manatees.

It so happens that these experts -- professionals from state, federal, and private wildlife agencies, with many decades of experience in manatee research -- have been

brought together in something called the Manatee Population Status Working Group (MPSWG). Since 1998 they have been officially charged with analyzing all the data from all sources, and recommending to the U.S. Fish and Wildlife Service (FWS) what needs to be done for manatees.

Earlier this year, they did that, spelling out in precise mathematical terms what statistical benchmarks would have to be reached before Florida manatees could be "downlisted", that is, reclassified from "endangered" to "threatened". But FWS rejected this advice from its own hand-picked experts, and proposed to lower the bar for downlisting to a point that would be more politically palatable. So much for the "scientific information ... needed to properly protect and manage a species", in CCA Florida's words.

Now CCA Florida wants the state, in the form of the FWCC, to jump onto this downlisting bandwagon. Their petition is based primarily on numbers from annual statewide aerial surveys, which this year counted an all-time high of 3,276 manatees. Starting from a count of only 738 in 1976, they calculate a very rapid rate of increase which they think puts manatees comfortably out of the "endangered" zone.

Unfortunately, manatee math isn't that simple. An increase in *counts* of manatees is not the same as an increase in manatees. Counting techniques have greatly improved in 25 years, and everyone agrees that the early surveys significantly undercounted the animals. The scientists stressed all along that such surveys yield only minimum counts, and continue to insist that aerial counts are only one (and not the most reliable) of the kinds of data that must be used to estimate the survival prospects of manatees. (For a good explanation of the complexities of counting manatees, see the paper by O'Shea, Lefebvre, and Beck [2001] listed under Recent Literature in this issue.)

But ironically, it was *the fishing and boating lobbyists* who, two decades ago, argued most loudly that there were really many more manatees out there than biologists had counted. And when annual statewide aerial counts (begun in 1991) were mandated by Florida's legislature at these lobbyists' insistence, scientists warned that the resulting numbers would be misinterpreted, just as is happening today. *Now those very lobbies have conveniently forgotten their previous claims, and want instead to take at their face value those same flawed old numbers that they once disparaged, in order to inflate the apparent rate at which manatees have been breeding!*

While there is general agreement that manatee numbers have increased over the years thanks to strenuous protection efforts, they are not yet out of the woods. As stockbrokers remind us, past results are no guarantee of future performance. In recent years, as human population and development pressures have increased, manatee population growth seems to have slowed, and it can be expected to stop and reverse as the human pressures continue to climb without meaningful control or foreseeable limit.

A man who jumps from a ten-story building may feel no pain as he passes the third floor, but he is not out of danger. Florida manatees might survive indefinitely if human population and development were frozen at present levels, but there is no sign of that occurring. That future reality is the issue, not just present manatee numbers.

On October 31, the FWCC will appoint a review board to re-examine the manatee data and make a recommendation about downlisting. If good science -- the best available science, as represented by the conclusions of the MPSWG -- is to prevail, this board needs to include bona fide experts in manatees and marine mammal population biology.

Otherwise, manatees could be declared un-endangered by fiat, stripping them of the protections Floridians have supported for decades. - DPD

DISINFORMATION CAMPAIGN IN FULL SWING IN FLORIDA

An organization called "The Silver Think Tank" has a website <manateestudy.com> devoted to spreading the often-debunked myth that manatees are not native to Florida, along with an assortment of other canards that would be amusing if so many people were not inclined to believe them. Some of the choicer quotes to be found there (the site is still under construction, so expect more to come) include the following (emphases in original):

"The presence of manatee in large numbers in the Indian River Lagoon threatens the existence of over 132 native threatened and endangered species, including seagrass.

"The manatee is a tropical creature found throughout the Caribbean. Approximately 40 years ago a campaign to increase the population by expanding the manatee's range was initiated. ...

"Manatee defecate continuously in the seagrass fields... Manatee excrement is not consumed by fish or other animals and lies on the bottom or in the seagrass decomposing. While decomposing, a chemical process known as eutrophication occurs... The nutrient pollutant load of manatee feces is very rich in phosphates and nitrates, which often facilitates algae blooms, which will ultimately result in a fish kill.

"Manatees defecate 330,000 pounds of feces into Florida's waterways every day." [This figure is calculated on the basis of] "... 3,300 manatees, each defecating approximately 100 pounds of feces each day. This adds up to 330,000 pounds of feces injected into the nurseries and breeding grounds of Florida's aquatic wildlife each and every day. That is like dumping 7 tractor trailer loads of terrible pollution into Florida's most sensitive waterways each and every day, the cumulative effect will be dramatic, especially when the population of the manatee doubles again within 6 years....

"Manatees destroy native fish nurseries and facilitate fish kills that dramatically reduce food supplies for both the Wood Stork & Bald Eagle chicks....

"Florida's native ecosystems will collapse under the stress of the invasive West Indian Manatee. Unlike the grass around your house that you cut each week, seagrass takes between 1 to 5 years to regenerate...."

"The Florida Keys represents the natural Northern extent of the range for the West Indian Manatee.

"The manatee is a tropical mammal, and naturally found throughout the Caribbean. Even as recent [sic] as 20 years ago, it was very rare to see a manatee in Northern waters like the Indian River lagoon....

"Some organizations estimate the population of manatees in Florida is currently over 5,000.

"The Florida Fish & Wildlife Conservation Commission attempts to count the population of manatee in Florida every Winter. However, a count of the population represents only the manatees that the people doing the counting happened to see. In addition, the count does not include baby manatees. The mother and baby manatee are counted as one...."

[The website's authors estimate a Florida manatee population of 14,904 by 2010, based on a 8.3% mortality rate and starting with the 2001 census figure of 3,276. Bruce Ackerman of the Florida Marine Research Institute comments as follows: "Note that the population model on the Silver Think Tank site, if you examine the math, says that NO manatees at all die each year and all females have calves every 2.5 years, NO MATTER WHAT AGE THE FEMALE IS (no lower age of sexual maturity). It seems to show about a 18%/year rate of increase, and I guess that is about what you would get!!!"]

"The West Indian Manatee is an invasive species to most of Florida's waterways, and the invasion is funded by tax payer dollars.

"There are over 50 endangered species that are native to Florida's waterways, and that deserve our protection from invasive creatures like the manatee.

"Like a Cancer that destroys Florida's aquatic habitats, the continued expansion and invasion of the manatee must be stopped before it is too late....

"The Manatee bureaucracy has become big business, with a future that promises to dwarf today's budgets. Teams of professional manatee extremists work full time to expand their power and influence....

"Manatee/Money Fever has a grip on the Florida Fish and Wildlife Conservation Commission and the manatee extremist organizations. The result is a regulatory commission that has lost touch with the desires of the citizens that they are suppose [sic] to serve, replaced by greed, power, and extreme unrealistic decision making.

"The Florida Fish and Wildlife Conservation Commission facilitates extortion and collusion with manatee extremists.

"A good example of how the extortion and collusion can be found is in the dock construction and repair permitting. If a home owner desires to either repair an existing dock, or build a new dock, a \$546 donation for each boat slip is requested to be paid to the [National Fish and Wildlife Foundation]. From each donation, \$500 will go directly to the manatee extremists. However, without the land owner making this donation, it is unlikely that the permit for the dock will ever be issued. At present, there are thousands of docks in Florida in disrepair because the land owners have refused to donate money to the manatee extremists....

"Naturally, it can be assumed that the value of water front property will reduce [sic] because the new manatee rules will make this real estate less desirable to potential buyers. However, the greatest cost of the manatee invasion will be the loss of many thousands of jobs across Florida, then eventually the entire Southeastern United States, from Mexico to Virginia. As people gradually stop boating, family owned businesses that caterer [sic] to the marine industry will collapse into bankruptcy. Even large marine businesses will be heavily stressed by the smaller market place....

"Know This: Manatee extremists want to stop all boating in the State of Florida, and the Florida Fish and Wildlife Commission is infiltrated by manatee extremists...."

"It is most probable that the Florida Fish and Wildlife Commission, with the help of other manatee extremists, will release false information to the media about the content of the [23 May 2001 public] meeting...."

* * *

That's probably enough manatee misinformation for one day. But if you really want to see the "manatee extremists" properly told off, there is also a Kill the Manatee web site <<http://www.killmanatees.f2s.com/>>:

"Welcome to Kill the Manatees. This web page is made to make people aware that manatees are more valued than taxpaying Americans. You can do you [sic] part to preventing the manatee lovers from taking over the waterways by gettin [sic] involved in the extermination of manatees. Get involved, make your voice heard by telling the manatee lovers you are not going to take it. They have ruined all the good fishing and boating spots with manatee zones that do noting [sic] but frustrate the average boater. Why should the average pleasure boater have to suffer for a stupid slow animal that is not even native to America???"

"Manatee is a very tasty animal to eat (havent actually tasted them) Below are ways of cooking manatees:" [sic, sic, sic]

Now, really: Who are the "extremists"? Who is "releasing false information"? -

DPD

SIRENIA SPECIALIST GROUP GETS NEW CO-CHAIRS

Drs. John Reynolds and James Powell were recently appointed as co-chairs of the IUCN Sirenia Specialist Group. Dr. Reynolds is Chairman of the U.S. Marine Mammal Commission and is currently the Manatee Research Program Manager at Mote Marine Laboratory in Sarasota, Florida. Dr. Powell has worked on manatees in Florida, West Africa and the Caribbean. He is presently Director for Aquatic Programs of the Wildlife Trust, a non-profit international research and conservation organization. They hope to work closely with recent co-chairs Drs. Helene Marsh and Miriam Marmontel and the many sirenian researchers and managers around the world to facilitate communication, dissemination of information on dugongs and manatees and the development of conservation actions in order to help ensure the continued survival and recovery of sirenian populations. The recent completion of the draft "Dugong Status Reports and Action Plans for Countries and Territories in its Range" by Marsh et al. [see announcement below] is an important development and provides an excellent basis for dugong conservation throughout their range. Drs. Reynolds and Powell can be contacted at <Reynolds@mote.org> and <Powell@wildlifetrust.org>.

STATUS OF DUGONG ACTION PLAN

A 158-page document entitled "The Dugong (*Dugong dugon*): Status Reports and Action Plans for Countries and Territories in its Range" has been compiled by Helene Marsh, Helen Penrose, Carole Eros and Joanna Hugues.

The report contains (1) an introduction which summarizes present knowledge of the conservation biology of dugongs, and (2) a report on the status of dugongs and suggestions for their conservation based on information provided by experts in 37 countries and territories.

The report is being produced with financial support from the World Conservation Union (IUCN) through a grant from the Peter Scott Foundation, the United Nations Environmental Programme Division of Early Warning and Assessment (UNEP-DEWA), UNEP-World Conservation and Monitoring Centre (WCMC) Cambridge, the Cooperative Research Centre (CRC) for the Great Barrier Reef World Heritage Area, the Pew Foundation and the School of Tropical Environment Studies and Geography (TESAG), James Cook University, Australia. It is accessible on the internet at: <<http://www.tesag.jcu.edu.au/dugong>> (authorization: actionplan; password: dugong). Hard copies will be published by UNEP later this year. If you would like to order a copy please contact <Helen.Penrose@jcu.edu.au> as soon as possible. Some pro-bono copies will be available; others will be sold for an as-yet-to-be determined price.

Helen Penrose is preparing a distribution plan for the volume. Please e-mail names of scientists and policy makers in your country who should be included on the distribution. - **Helen Penrose**

SIRENIAN CONSERVATION WORKSHOP

A workshop entitled "International Sirenian Conservation" will be held in conjunction with the Society for Marine Mammalogy's 14th Annual Biennial Conference on the Biology of Marine Mammals. The workshop is scheduled for Wednesday, November 28, 2001, from 1:30 to 4:30 PM at the Simon Fraser University downtown campus, room 2270. The workshop will be on a first come first served basis, with no registration fees. The workshop will address current management and research issues, with specific emphasis on international efforts. Topics may include human threats, conservation, program descriptions, status, and rescue/rehab. We are now accepting speakers/presenters for the workshop. Those interested in attending or presenting should contact Nicole Adimey by October 15, 2001. - **Nicole Adimey** (Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, 6620 Southpoint Drive, South #310, Jacksonville, Florida 32216-0958; phone: 1-904-232-2580, ext. 123; fax: 1-904-232-2404; e-mail: <nicole_adimey@fws.gov>)

MARINE MAMMAL HEALTH WORKSHOP

A marine mammal conference will be held in Gainesville, Florida in April 2002, the focus of which will be marine mammal health. Manatees are anticipated to be a major topic. For further information, visit the following website: <<http://www.vetmed.ufl.edu/flmmhc>>.

AFRICAN MANATEE TO BE PROPOSED FOR LISTING IN CMS APPENDIX II

The Scientific Council of the Convention on Migratory Species of Wild Animals (CMS or Bonn Convention) agreed at a meeting in Edinburgh in April 2001 that the African manatee (*Trichechus senegalensis*) is of unfavorable conservation status and should be listed on the Convention's Appendix II (species and populations of unfavorable

conservation status that would benefit from international cooperation in research and conservation action). It was recommended that a formal listing proposal be submitted to the next Conference of the Parties in 2002 in Bonn, and the representative of Ghana agreed to carry the proposal forward with his government.

A summary of the conservation status of the species and a draft listing proposal are given below. - **Bill Perrin**

Conservation Status of the West African Manatee

W. F. Perrin

Background. - At the Ninth Meeting of the Convention on Migratory Species of Wild Animals (CMS or Bonn Convention) in 1999, it was noted that the West African manatee (*Trichechus senegalensis*) was the most threatened of all manatee species and it was proposed that it be considered as a species for action (UNEP/CMS/ScC.9/Doc.10, p. 9). It was agreed that the status of the species would be reviewed at an upcoming workshop on small cetaceans of West Africa. The workshop took place in Conakry, Guinea in May, 2000 (Anon., 2000a). A brief review was presented by CMS participants, and comments and new information were solicited. New information was available for only one country, Ivory Coast. Following is a summary of the review and discussions at the meeting and additional information since gathered from the recent literature and personal communications.

Distribution and Status by Nation. - The West African manatee occurs in the middle and lower reaches of rivers from the Senegal to the Quanza in Angola (Powell, 1996; Dodman, 1999). It also occurs in adjacent seasonal wetlands, shallow marine waters and around some coastal islands. In addition, there are, or were, isolated populations in the upper parts of some rivers: the Niger, the Benue, the Congo, the Ubangi, and the Chari. The ranges extends over at least 20 nations, although it may now be close to extinct in some of them.

Mauretania. - The species occurs in the Senegal River and its tributaries (Powell, 1996); this river forms the border between Mauretania and Senegal. It is an infrequent inhabitant of the Diawlang Reserve, a wetland reserve of interconnecting streams, lakes and ponds.

Senegal. - In Senegal, the manatee is close to extinction (Navaza and Burnham, 1998). In most areas of the country, it has not been seen for many years. There are a few remaining in the Casamance River in the estuary and up to Kolda, and there have been some reported sightings in the delta of the Sine Saloum River near Kaolack, but the species is considered to be severely depleted and threatened. In the Casamance River where they still occur, they are respected and not molested, so there is some hope they can be saved there.

The Gambia. - In the Gambia, numbers are thought to have declined, but as of 1993 the manatee was still numerous in the River Gambia. They have been fully protected for many years but in the 1980s were still hunted extensively.

Guinea Bissau. - Guinea-Bissau at one time was considered to be one of the last sanctuaries of the manatee, because of the relatively undisturbed state of its mangroves, wetlands and river systems (Schumann, 1995; Powell, 1996). The species also occurs throughout the Bijagos Archipelago. Information on the status of the manatee is scarce.

In 1997, the government signed an agreement with IUCN to develop a National Plan for Conservation of the West African Manatee in Guinea-Bissau, and some training and survey work started, but the work stopped when the war started in 1998 (Almeida e Silva, 1998). The present status of that effort is unknown. The major source of mortality before the war was accidental capture in fishing nets; they were not extensively hunted. Most recently, manatees have been advertised for export on the Internet, and two were exported to the Toba Aquarium in Japan (Asano and Sakamoto, 1997; Kataoka et al., 2000; Anon., 2000b).

Guinea. - Little information is available on the manatee in Guinea. The country has extensive suitable habitat, and the species is known to occur in the area (Powell, 1996), but no systematic studies have been carried out (Barnett and Prangley, 1997).

Sierra Leone. - In Sierra Leone the manatee is also declining (Reeves et al., 1988; Powell, 1996). It is protected but widely hunted and marketed, because it is good to eat and because it is thought to be a pest by rice growers and fishermen among the Mende People. The manatee in the late 1980s was still widely distributed in the country, but the catches at that time were thought to be unsustainable. The animals are trapped, netted and harpooned. There is some concern about the effect of modern fishing gear on the manatee, because it is easily tangled in monofilament gillnets.

Liberia. - Manatees occur throughout the major rivers of Liberia, including in the proposed national park of Cestos-Sankwer, and in the Piso Lake region (Powell, 1996). No information is available on status.

Ivory Coast. - In the Cote d'Ivoire, the manatee by the mid-1980s had been reduced by hunting to 5 or 6 small isolated populations, with an estimated total number of less than 750 animals. Hunting is illegal, but it still continued in the late 1980s, with traps, harpoons, hook lines, baited hooks and nets (Roth and Waitkuwait, 1986; Nicole et al., 1994; Powell, 1996). A program of research and education began in 1986, sponsored by the Wildlife Conservation Society. The population is tentatively estimated at 750-800 (Akoi Kouadio, pers. comm., 2000). Illegal hunting is still a problem, as is habitat destruction by barrages. However, some success has been enjoyed in educating potential hunters and in enforcing the hunting ban in some areas, with the aid of Wildlife Conservation International (Akoi, 2000; Anon, undated). A conservation plan is in development (Akoi, 2000).

Ghana. - Recent surveys by the Institute of Aquatic Biology confirmed the continued existence of manatees in Volta Lake and Digya National Park; additional surveys are planned (Powell, 1996). Hunting continues.

Togo. - Manatees may still exist in Togo Lake (Powell, 1996). No information is available on status.

Benin. - In Benin, the manatee had been thought to be extinct. However, this is apparently not the case (Powell, 1996), and a new research and conservation project on the species is underway to establish its current distribution and numbers as well as gather data on its ecology and behavior (Risch, 2000).

Nigeria. - The manatee is found throughout Nigeria but is depleted, due to overhunting (Powell, 1996). It is hunted for its oil. There is no effective enforcement of protection laws. The most recent concern is about pollution of the Niger Delta by oil development.

Cameroon. - In Cameroon, based on a survey sponsored by WWF-USA and the Wildlife Conservation Society in 1989 (Grigione, 1996), manatees may still be numerous in some areas. Illegal hunting has been very limited, due mainly to local attitudes toward the species rather than legal protection, but poaching from across the border in Nigeria is a severe problem. Habitat destruction by dams is also a problem.

Equatorial Guinea. - There is no recent information on manatees; they likely occur in the lower reaches of the Mitémélé River on the mainland (Powell, 1996).

Gabon. - Gabon may have one of the highest densities of manatees remaining in Africa (Powell, 1996). Reports of opportunistic sightings are common. Bycatch occurs in gillnets.

Congo. - A preliminary survey in 1994 found manatees in lakes, rivers and lagoons of Congo (Powell, 1996).

Republic of Congo (former Zaire). - Manatees were once common in the extreme lower reaches of the Congo River below Binda (Powell, 1996). A local name for the species exists in the upper reaches of the Congo, so it may occur there as well. Status is unknown.

Angola. - Manatees have been reported from the entire coast, but little information is available on abundance or status (Powell, 1996).

Mali. - Manatees are found throughout the entire Niger River system of Mali (Powell, 1996) but may have been reduced by hunting. Hunting continues but may be decreasing, as meat now only rarely appears in the markets; it is not clear whether this is due to legal protection, less demand for the meat, or greatly decreased abundance.

Niger. - The species has been recorded from the Niger River below Niger in Nigeria and above Niger in Mali, so it can be assumed that it occurs in the Niger River in Niger as well, but there is no information on its distribution or status (Powell, 1996). It may also occur in the Niger portion of the Chad basin.

Chad. - Manatees were once abundant in the Chad basin but had become rare by 1924 (Powell, 1996). In a survey in 1995, they were found to be less abundant than formerly but not uncommon in Lére and Tréne Lakes in the Mayo-Kebbi region. Hunting continues on the rivers and lakes, despite enforcement efforts. The animals are sought mainly for their oil, which is shipped with dried meat to Cameroon.

Burkina Faso. - Manatees inhabit all of the nations that surround Burkina Faso (Mali, Ivory Coast, Ghana, Togo, Benin and Niger). They are present in Volta Lake above the dam (see Ghana above). However, I could find no mention of its occurrence in the upper tributaries of the Volta (White Volta, Red Volta and Black Volta) or in the Mekrou River, which forms the boundary between Burkina Faso and Togo/Benin and drains the wetlands of the Parc National de l'Arly. Pending directed surveys, its occurrence there must be considered possible.

Overall Status. - The West African manatee is listed by IUCN as Vulnerable, based on a 20% decline in numbers over a period of 10 years. It is listed on Appendix II of CITES. It is protected by national law in every country in which it occurs, albeit ineffectively in most areas.

In response to requests from West African conservationists, Wetlands International convened a regional meeting in 1998 with representation by 20 countries (Dodman, 1999). It was agreed that action must be taken to prevent the animal from

disappearing from African waters, and a program of research and education is now under development, including an as-yet unfunded proposal for a preliminary across-region survey (Dodman, pers. comm., June, 2000).

In summary, the species is much reduced and still declining, due to both hunting and habitat destruction. It exists in many scattered and likely isolated populations. There is much work to be done to prevent extinction of many or all of these populations.

Migration. - A major question for CMS is "Does the manatee migrate across national boundaries?"

The answer seems to be yes. There are no published studies on this, but James Powell, who has studied the manatees in several countries in West Africa, has established that they migrate seasonally in response to changes in water levels or salinity differences between wet and dry seasons. They move between Mali and Niger and between Niger and Nigeria in the Niger River. They also move between Senegal and the Gambia in the upper Gambia River, cross the Senegal River between Senegal and Mali, and move between seasonal wetlands in Mauretania and Senegal. It was reported at the Conakry workshop that manatees move between the waters of Ivory Coast, Ghana and Liberia (Akoi, 2000). Manatees may move across boundaries in other areas, and they may move along the coast between nations.

Conclusion. - At this point, it appears that the manatee does meet the major criteria for inclusion in Appendix II of CMS. It is certainly of unfavorable conservation status. It is migratory in the sense of the Convention. And it could benefit from regional cooperation in research and conservation action. Thirteen of the 20 range states are CMS Parties or signatories. A draft proposal to add the species to Appendix II is attached (Annex 1).

ANNEX 1

DRAFT PROPOSAL FOR INCLUSION OF SPECIES ON THE APPENDICES OF THE CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS (20 February 2001)

- A. **PROPOSAL:** Inclusion of the West African manatee *Trichechus senegalensis* on Appendix II.
- B. **PROPONENT:** (a West African Party suggested).
- C. **SUPPORTING STATEMENT:**
 - 1. **Taxon** [...]
 - 2. **Biological data**
 - 2.1. **Distribution** - Restricted to the coastal waters and adjacent rivers and lakes of West Africa from southern Mauretania to Angola and east to Mali, Niger and Chad (Powell, 1996). May have disappeared from parts of its original range. Some populations are isolated.
 - 2.2. **Population** - There are no credible published population estimates (Powell, 1996). The species is reported to be reduced, and it is believed that several local populations have been extirpated. (However, anecdotal records continue to be reported from throughout what is believed to be the original range). The species is thought to satisfy an IUCN criterion for Vulnerable status (at least a 20%

decline in 10 years). The population decline has been attributed largely to hunting and incidental capture in fishing nets.

2.3 Habitat - Inhabits coastal areas, estuarine lagoons, large rivers that range from brackish to fresh water, freshwater lakes and the extreme upper reaches of rivers above cataracts (Powell, 1996). Major rivers inhabited include (N to S) the Senegal, Saloum, Gambia, Casamance, Cahacheu, Rio Mansoa, Rio Geba, Rio Grande de Bulba, Rio Tombali, Rio Cacine, Kogon, Kondoure, Sierra Leone, Great Scarcies, Little Scarcies, Sherbro, Malem, Waanje, Sewa, Missunado, Cavally, St. Paul, Morro, St. John, Bandama, Niouniourou, Sassandra, Comoe, Bia, Tano, Volta, Mono, Oueme, Niger, Mekrou, Benue, Cross, Pie, Katsena Ala, Deb, Okigb, Issa, Bani, Akwayafe, Rio del Rey, Ngosso, Andokat, Mene, Munaya, Wouri, Sanaga, Faro, Chari, Bamaingui, Bahr-Kieta, Logoné, Mitémélé, Gabon, Ogoué, Lovanzi, Kouliou, Congo, Loge, Dande, Bengo, and Cuanza; the manatee also inhabits the lakes in these river systems. The basic requirements are sheltered water with access to food and fresh water. Optimal coastal habitats are "a) coastal lagoons with abundant growth of mangrove or herbaceous growth; b) estuarine areas of larger rivers with abundant mangrove (*Rhizophora racemosa*) in the lower reaches and lined with grasses, particularly *Vossia* and *Echinochloa* further upriver; c) shallow (<3 m depth) and protected coastal areas with fringing mangroves or marine macrophytes, particularly *Ruppia*, *Halodule* or *Cymodocea*" (Powell, 1996). Where river levels fluctuate seasonally, preferred areas are those with access to deep pools or connecting lakes for dry-season refuge and with seasonal flooding into swamps or forests with abundant grasses and sedges, particularly *Vossia*, *Echinochloa* and *Phragmites*. In the Bijagos Archipelago (Guinea Bissau), marine areas frequented have freshwater seeps and pools. May be limited to waters of 18°C or higher.

2.4. Migration - Seasonal movements in response to changes in water level affecting availability of food and/or water salinity have been reported for several areas: between the Senegal River and Lake de Guier, between Niouzomou Lagoon and the Niouniourou River, and up and down the Gambia, Waanje, and Shewa Rivers (Powell, 1996). Shorter-term movements of up to 20km have also been reported. Seasonal migrations have been observed between Mali and Niger and between Niger and Nigeria in the Niger River, between Senegal and the Gambia in the upper Gambia River, across the Senegal River between Senegal and Mali, and between seasonal wetlands in Mauretania and Senegal (unpublished data, pers. comm. from James Powell, 2000). It has also been reported that manatees move between the waters of Ivory Coast, Ghana and Liberia (Akoi, 2000). Manatees may move across boundaries in other areas, and they may move along the coast between nations.

3. **Threat data**

3.1 Direct threats to the populations - Continuing uncontrolled and likely unsustainable hunting must be considered the major threat to the populations. Despite legal protection, the manatee is still hunted throughout its range for meat, leather and oil, by harpoon, trap, net, and snagline (Powell, 1996; Reeves et al., 1988; Roth and Waitkuwait, 1986; Akoi, 1992). In Mali, Senegal and Chad, the oil is used for medicinal and cosmetic purposes (Powell, 1996). In some areas,

hunting is highly traditional and ritualized, and the meat is consumed locally. In other regions, hunting is more opportunistic and meat is traded among areas and tribes. In some nations, progress has been made in discouraging hunting, but the real protection thus conferred has been marginal and hunting is still thought to be continuing at unsustainable levels. Meat has become scarce in some markets, but it is not known with certainty whether this is due to increased protection or decreased abundance (the latter seems more likely). The few historical data that exist indicate decrease in catch rates. For example, at one point in the 1930s as many as 12 manatees a day were caught in a 100-mile stretch of the Gambia River, whereas only two per year were estimated taken in the same area in the period 1978-83 (Powell, 1996). Awareness of the protected status of the manatee is widespread in all areas surveyed, but there is little perceived fear of arrest and punishment (Powell, 1996); enforcement is rare and fines or sentences for the most part have been negligible.

Manatees are viewed as pests in some agricultural and fishing areas, e.g. in Sierra Leone (Reeves et al., 1988). They consume rice and other crops in the field and eat small fish caught in gillnets. This can result in the animals being culled. Data on the size or impact of the culls are not available.

Manatees are known to die incidentally in shark nets, e.g., in Senegal (Cadenat, 1957) and Sierra Leone (Reeves et al., 1988), trawls, set nets and weirs (Powell, 1996). They are sometimes also killed in turbines or control gates of dams; on one occasion six manatee carcasses were seen at one time below the Kainji Dam in Nigeria (Powell, 1996). There are no estimates of incidental kill rates in either fisheries or at dams.

3.2. Habitat destruction - The coastal wetlands that are a major habitat for the manatee have already been heavily damaged and are further severely threatened. Woodcutting, especially of the red mangrove (*Rhizophora racemosa*), for firewood and furniture construction is resulting in the extermination of mangrove stands in the Ivory Coast (Nicole et al., 1994). Mangrove clearance and erosion due to forest clearance upstream are resulting in increased sedimentation that silts up lagoons and estuaries. Reduced water flow due to construction of dams reduces availability of estuarine freshwater and increases overall salinity that affects growth of vegetation. Similar destructive pressures operate on coastal wetlands throughout West Africa. Inland, construction of dams affects the amount and quality of riverine and lacustrine manatee habitats, but these effects have not been evaluated. It has been suggested that the manatee could serve well as a flagship species in the conservation of West African wetlands (Dodman, 1999).

3.3. Indirect threats - Coastal wetlands throughout West Africa are ecologically burdened with burgeoning human population and development. For example, in the Ivory Coast coastal wetlands make up only about 1% of the country but are home to 25% of its population (Nicole et al., 1994). Both population increase and development lead to increased effluents, which concentrate in rivers and estuaries. This pollution burden is largely unknown in its effects on manatee health and habitat but can be assumed to be detrimental.

- 3.4. Threats connected especially with migrations - Increases in salinity or reduced water flow due to manipulation or development of water resources can cause manatees to strand or vacate an area, with unknown demographic results (Powell, 1996).
- 3.5. National and international utilization - The manatee is fully protected in all of the nations in which it occurs. Despite this, it is hunted and utilized in all of the range states. Manatees move in international trade. An aquarium in Japan acquired two manatees for exhibit from Guinea-Bissau in 1996 (Asano and Sakamoto, 1997), and manatees were offered for sale internationally on the Internet from Guinea-Bissau in 2000 (Anon., 2000). Manatee meat and oil is reported to move illegally in trade between Chad and Cameroon (Powell, 1996).
4. **Protection needs and status**
- 4.1. National protection status - The West African manatee is protected by the national laws of all the countries in which it occurs. However, it continues to be killed and utilized illegally throughout its range.
- 4.2. International - The species is classified as Vulnerable by IUCN (on the basis of a 20% decline over 10 years) and is listed on Appendix II of CITES.
- 4.3. Additional protection needs - Progress has been made in reducing kills in some areas, but there is a strong need for increased community-based education and resource management programs to increase awareness of the conservation problem and find ways to stop or reduce unsustainable hunting (Powell, 1996; Dodman, 1999).

In a recent review (Powell, 1996), eight areas critical for manatee conservation were identified, on the basis of "the degree of threat to manatees in that particular area, the existence of what is likely a sizeable manatee population or a site where institutional arrangements would facilitate the implementation of a manatee conservation program in an area known to contain an important manatee population":

- (1) Lake Volta, Ghana
- (2) N'Dogo Lagoon, Gabon
- (3) Fresco, Nioumozou, Tadio Lagoons Complex, Ivory Coast
- (4) Bijagos Archipelago, Guinea-Bissau
- (5) Casamance River, Saloum Delta National Park, Djoudi National Park and Lake de Guier, Senegal
- (6) Lake Léré and Lake Tréné, Chad
- (7) Inland Delta and Lake Débo, Mali
- (8) Lake Ossa and Sanaga River, Cameroon

In order to increase understanding of the population biology of the manatee and develop systems for its protection and sustainable utilization, research is needed on reproductive biology, migratory habits, and mortality levels due to hunting, culling and stranding (Powell, 1996).

5. **Range states**
Mauretania, Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Equatorial Guinea, Congo, Republic of Congo (Zaire), Angola, Mali, Niger, Chad and possibly Burkina Faso.
6. **Comments from range states**

7. Additional remarks

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LOCAL NEWS

BAHAMAS

Manatee Birth in the Bahamas.

- Gina, a resident manatee at Great Harbour Cay, Berry Islands, Bahamas, gave birth on 3 September 2001. Veterinarian Dr. Peter Adams, a volunteer with the USGS/Sirenia Project, observed and photographed Gina alone in the marina canal late on 2 September. She appeared pregnant as she was distended at the urogenital aperture. In the morning of 3 September, she was seen in the marina with a small calf. Dr. Adams reported that the two are remaining close together. The calf appears to be of normal size. She is actively swimming and dives are for 1 to 2 minutes. The calf appeared to be nursing on several occasions. Residents of Great Harbour Cay will continue to monitor the movement and behavior of the cow and calf. Captain Percy Darville at the marina is the best contact for updated information.

We believe this is Gina's first birth and the first manatee birth recently documented for the Bahamas. Using photo-identification analysis, we know that Gina is an eight- or nine-year-old Florida manatee. She was a calf when photographed with her mother in the winter of 1993 in the Homosassa River, on the west coast of Florida. She was last seen at Homosassa during the winter of 1994. For the majority of 1999, she was routinely seen at the Atlantic Undersea Testing and Evaluation Center (AUTEK) in Andros, Bahamas. Gina has been at Great Harbour Cay since 1 January 2000. Since late spring 2000, she has frequently been seen accompanied by an adult male manatee. He was last seen at Great Harbour

several weeks ago. We believe these are the only manatees using the Berry Islands. We will continue to coordinate with Great Harbour personnel. I plan to travel to Great Harbour later this month. Please feel free to contact me for additional information. - **Jim Reid** (Sirenia Project, U.S. Geological Survey, 412 NE 16th Ave., Room 250, Gainesville, FL 32601; phone: 1-352-372-2571; fax: 1-352-374-8080; website: <<http://www.fcsc.usgs.gov/Manatees/manatees.html>>; e-mail: <reid@nersp.nerdc.ufl.edu>)

BRAZIL

New Association to Protect Aquatic Mammals in the Amazon. - The Aquatic Mammal Lab at the National Institute for Amazonian Research (INPA) and the Center for the Protection and Preservation of Aquatic Mammals (CPPMA) at Balbina, Amazonas State, Brazil, announce the formation of the "Associação Amigos do Peixe-Boi" or "The Friends of the Manatee Association". The joint effort of these two centers has created this association to promote activities for the protection, conservation, research and management of aquatic Amazonian mammals. This organization, with its multifaceted goals, will work to support and coordinate research, environmental education and environmental protection programs in the Amazon. It will organize and participate in cultural and scientific meetings. In addition, it will promote the integration and exchange of ideas between national and international conservation and environmental institutions in an effort to help them improve their Amazonian aquatic

mammal conservation and management programs. - Renata S. Sousa-Lima (<pboi@inpa.gov.br>)

INPA's Amazing Amazonian Manatee Mom! - On February 19, 2001, Boo, a 27-year-old captive female, who herself had been an orphan, gave birth to a stillborn female. Although the stillbirth of her calf saddened her caretakers, just knowing that she conceived felt like progress. And then to the joy of the center, Boo immediately adopted an orphaned male, Tapajos, who had arrived at the facility just three days earlier. And, this adoption came just in time. Tapajos was having problems feeding up to this point. He is now doing very well and has an adopted sister named Manaos. And, the most amazing thing: Manaos is also being nursed by Boo! Go BOO!

Research is making progress too. The results of research on individual vocal signatures in sirenians have been described for the first time for Amazonian manatees in Brazil. This work, by Renata S. Sousa-Lima, will soon be published in the journal *Animal Behavior*. You can look for more information about her results in upcoming newsletters. - Renata S. Sousa-Lima (<pboi@inpa.gov.br>)

CHAD

New African Manatee Website. - Jonathan Salkind has been studying the manatees of the Lake Chad region, and many of his findings are posted on his website: <<http://members.aol.com/needbii/manatee-index.html>>.

FLORIDA

Manatee in Deep Water. - As this issue of *Sirenews* was going to press, word was received that a manatee is accompanying an oil barge laying pipe in 3000 feet of water in the northern Gulf of Mexico. The crew was worried that the manatee was following them and might get caught in the propellers. They were also concerned that sharks were harassing the animal. The location was reportedly 130 miles ESE of Venice, Louisiana, in oil exploration Block 85 over the Mississippi canyon. This would make the position due south of the Florida Panhandle and well over 100 miles offshore -- an area where manatees have never been known to occur. A rescue operation was being contemplated.

GUATEMALA

Guatemala Forms National Manatee Working Group. - Guatemala's small population of manatees, like many Caribbean manatees, is threatened by illegal hunting, motor boats, fishing gear, habitat destruction and pollution. Now, several non-government organizations have started programs to protect manatees. They have formed a National Manatee Working Group that will propose mechanisms for manatee conservation in the country.

The group is already working hard on an educational campaign and distributing brochures, pamphlets and posters about conservation. This educational project is supported by the RARE center and will be an intensive pride campaign that will work in concert with campaigns from Honduras and southern Belize. They have worked with government agencies to institute fines to

decrease poaching and the selling of manatee meat. Currently, these fines are very low and not a deterrent to these illegal activities.

The group has also identified areas of high manatee concentration that may be appropriate for tourism. They have started a tour guide training program using guidelines established by the Coastal Zone Management Authority in Belize. Research projects on distribution and monitoring protocols are also underway. With all of this hard work, manatees in Belize are better protected. - **Flor de Valle**

- a. Body weight (kg)
- b. Total length (cm)
- c. Head to tail flukes length (cm)
- d. Head to umbilical length (cm)
- e. Head to genital slit length (cm)
- f. Head to anal slit length (cm)
- g. Chin girth (cm)
- h. Cervical girth (cm)
- i. Pectoral girth (cm)
- j. Abdominal girth (cm)
- k. Tail girth (cm)
- l. Tail width (cm)

For the first fourteen months, the daily diet was 18-20 kg of *Syringodium isoetifolium*. The amount was based on the dugong's *ad libitum* consumption. But we decided to reduce the diet to 15-16 kg per day, considering the repetitive digestive problems the dugong suffered. Reducing the seagrass consumption, though not totally preventing the digestive tract disorders (bloat, colon tympani, constipation), could decrease the incidence of these problems. The dugong was fed four times daily to resemble its feeding behavior in the wild (long grazing period). Preventive

INDONESIA

News Update on Captive Dugong in Indonesia. - As we said in last year's report, a male dugong was found on the Bojonegara coast in October 1999. SiDul, the dugong, was lethargic and suffered from an abdominal wall rupture, so it was not feasible to release him into the wild right away. The dugong was then transferred to the SeaWorld Indonesia facility in Jakarta, several months after he was found.

Below are some body measurements that have been taken during his captivity:

	March 2000	June 2001
a. Body weight (kg)	73	98
b. Total length (cm)	163	170
c. Head to tail flukes length (cm)	150	152
d. Head to umbilical length (cm)	76	83
e. Head to genital slit length (cm)	92	95
f. Head to anal slit length (cm)	116	120
g. Chin girth (cm)	Missed	63
h. Cervical girth (cm)	77	91
i. Pectoral girth (cm)	94	100
j. Abdominal girth (cm)	114	119
k. Tail girth (cm)	35	37
l. Tail width (cm)	Missed	51

medicine was undertaken in the form of routine administration of oral vitamins and periodic antihelminthic treatment.

Rather than using his tail, the dugong uses his flippers to swim. Though this could happen because of the holding tank setting, it's more likely that this is due to the defect on his lower abdominal wall. When observed from either the dorsal or the caudal side, the body wall looks asymmetric due to the lesion. - **Linda Tjhin** (Associate veterinarian/curatorial staff, SeaWorld Indonesia, Jl. Lodan Timur No.7, Ancol,

Jakarta 14430, Indonesia; e-mail
<tjhai_hui@hotmail.com>)

SEYCHELLES

Dugongs Sighted at Aldabra. -

According to Dr. Vic Cockcroft, the last individual dugong in the Seychelles was seen around 1908. In the Comoro Islands dugongs apparently still occur, but in small numbers. Maurice Loustau-Lalanne, Chairman of the Seychelles Islands Foundation, now reports that dugongs have been seen and photographed at Aldabra Atoll, halfway between the Comoros and the other Seychelles Islands, in the open Indian Ocean. One dugong was photographed near the eastern entrance of Bras Monsieur Clairemont.

This is the fourth time (since August 2001) that a dugong has been sighted in that same area by the Foundation's staff. Most of the sightings have been of one dugong, but on the third occasion two dugongs were spotted in the same area. The dates of the sightings were 2 and 3 August and 1 and 12 October 2001. The dugongs were found in shallow lagoonal waters near the mangroves of Bras Monsieur Clairemont. They are believed to be adults of around 2.5-3 m long.

Although there have been previous sightings of dugongs around Aldabra, multiple sightings in such a short period of time are unheard of. It is believed by some local experts that they may have migrated to the atoll during the northwest monsoons.

Dr. Ian Swingland, Founder of the Durrell Institute of Conservation and Ecology in the UK, reported that during the mid-1970's a Royal Society research team sighted dugongs on several occasions in calm waters in the western

end of the lagoon during the dry season. The sightings were documented in David Stoddart's *Biogeography and Ecology of the Seychelles Islands* (1984). A local expert on the ecology of Aldabra, Antonio Constance (also known as Mazarin), remarked that he had also spotted dugongs on occasion long before the Royal Society's activities on Aldabra.

In response to this important sighting, the Seychelles Islands Foundation feels it is crucial to initiate a research project to study the dugong at Aldabra. The Foundation is currently seeking a donor for this project locally and internationally.

Aldabra is a huge atoll in the middle of nowhere, comprising 35,000 ha (land, 18,800 ha; mangrove, 2,000 ha; sea, 14,200 ha). It is almost uninhabited, and is home to 150,000 giant land tortoises, among other species.

The photo of the dugong can be seen at <<http://home.t-online.de/home/rothauscher/dugong/dugong.htm>>. The Seychelles Islands Foundation (SIF) manages and protects the World Heritage Sites of Aldabra and Vallée de Mai. Maurice Loustau-Lalanne's address is <sif@seychelles.net>. - Gisela and Hans Rothauscher <<http://rothauscher.bei.t-online.de/>>; Angela Valente also contributed to this report.

TEXAS

Manatee Sighted in Corpus Christi Bay. - On 23 September 2001, Albert Oswalt of the Texas State Aquarium spotted a West Indian Manatee in the inlet between the Texas State Aquarium and the Lexington Museum right around dark. He said the animal appeared less than 3 feet from him. It was approximately 6 feet long

and dark gray in color. This is the third and probably most reliable sighting of this rare animal in Corpus Christi bay. - **Carl Beaver** (Center for Coastal Studies, Texas A&M University, -Corpus Christi, 6300 Ocean Dr. NRC 3200, Corpus Christi, TX 78412)

[ED. NOTE: As of Oct. 17, a dead manatee had been reported stranded at Port Aransas, Texas -- possibly the same one reported above.]

VIRGINIA

Chessie the Manatee on a Comeback Tour after 5-Year Hiatus. - After a five-year disappearance, Chessie, perhaps the most famous and best-traveled manatee along the U.S. Atlantic Coast, has been sighted again in coastal Virginia.

After first being radio-tagged and tracked by the manatee researchers with the U.S. Geological Survey (USGS) in 1994, Chessie gained media fame in the summer of 1995 by swimming past the mid-Atlantic states, through New York City and even by the Statue of Liberty, all the way to Rhode Island, farther than any manatee had been known to venture. After returning to Florida for the winter, he again wandered north again as far as Virginia, where he was last seen in 1996.

In early September 2001, Chessie was photographed in Great Bridge, Va., at the Great Bridge Locks. Two engineers, Joel Scussel and Rob Poyner, were working at the Great Bridge Locks when they noticed a manatee in the lock basin. Because manatees are only occasionally seen this far north, they notified Sue Barco, a marine mammal scientist at the Virginia Marine Science Museum, who brought her research team to the locks. While the manatee patiently cooled its flippers in the lock basin

waiting for the gates to open, Barco, Poyner, and Scussel watched the manatee and photographed his distinctive scar pattern. Afterward, they opened the gates, and the manatee continued his trip south.

The photographs were sent to USGS manatee researchers, who used the manatee photo-identification catalog to match scar patterns and to excitedly confirm the traveler's identity as Chessie.

Barco said that it was clear from the animal's behavior that it had been through these or similar lock systems before. "But we didn't think it was Chessie because of the new scars on his tail and back. But after getting the confirmation that it was Chessie, we are very happy to know he is doing well."

Chessie first gained fame in the fall of 1994 when he was sighted in the Maryland waters of Chesapeake Bay, considered far outside the normal winter range of manatees. The adult male manatee was captured by the National Aquarium and U.S. Fish and Wildlife Service and returned by U.S. Coast Guard plane to Florida. Chessie was released near Kennedy Space Center, wearing a satellite-monitored radio tag.

USGS manatee biologist Jim Reid kept track of Chessie as he moved into southeastern Florida, and then in the spring of 1995, as he moved northward. By mid-July 1995, Chessie was again in Chesapeake Bay. Because the bay waters were warm, the manatee was not captured. Reid continued to track Chessie by radio, through waters of New Jersey and Connecticut, past the Statue of Liberty, and through Long Island Sound as far as Point Judith, Rhode Island, in mid-August, 1995.

Finding the New England waters too cold, the manatee turned south again.

A week later, Chessie's radio tag broke free in New Haven, Conn., but public sightings enabled the researchers to track Chessie's whereabouts as he continued his journey south. In late September, Chessie passed through the Great Bridge Locks - the same place he was spotted several weeks ago - and then was seen in Florida waters near Jacksonville in mid-November.

Chessie wisely stayed in warmer Florida waters that winter, where he was sighted near Ft. Lauderdale in February 1996, and where researchers again attached a radio transmitter to the belt that he still wore. Once again, scientists tracked his movements until his transmitter was lost near Beaufort, North Carolina. Chessie was last seen in August, 1996, swimming south past Portsmouth, Virginia.

Since then, several sighting reports of manatees north of the Carolinas have been forwarded to USGS manatee researchers, but none of these sightings could be confirmed as Chessie. This time, though, researchers were able to positively identify Chessie.

Since Chessie's noteworthy trips, more public sightings of manatees have occurred in northeastern states. USGS manatee scientists believe that Chessie's annual migration from Florida to the Chesapeake Bay may have been

common for manatees in previous centuries. The repeated sightings of a "sea monster" in the Chesapeake Bay, nicknamed "Chessie", date back throughout this century and possibly include manatee sightings that were not properly identified. Chessie was named after this purported sea monster. [ED. NOTE: Actually, Chessie was originally named after the Chester River in Chesapeake Bay, where he was initially sighted, and/or after the Bay itself.]

Cooperation among members of the Marine Mammal Sighting Networks, oceanaria, government agencies and the public on Chessie's migration has, said Reid, raised the public's awareness of this unique endangered marine mammal. "Manatees," said Reid, "are long-lived and typically repeat established movement patterns. It's likely that sightings of Chessie or other manatees will occur again in these northern areas."

For future sightings, the public should contact local wildlife authorities, who will get in touch with the USGS manatee team.. - (Source: USGS Press Release, 25 Sept. 2001; <http://www.usgs.gov/public/press/public_affairs/press_releases/pr1496m.html>)

For archived Chessie Manatee stories, visit: <<http://www.sirenian.org/chessie.html>>.

ABSTRACTS

The following abstract is of a poster presented at the annual meeting of the American Society of Mammalogists in Missoula, Montana, 16-20 June 2001.

Effectiveness of Manatee Speed Zones at Eight Sites in Florida (S.L. Shapiro and J.A. Powell). - Boat-related casualties are the leading cause of manatee injury and mortality in Florida. To address state and federal statutory objectives, managers have created watercraft speed zone restrictions on waterways that have high manatee and human use. Previous studies concentrated intensive sampling efforts at specific locations. This

research provides a snapshot of statewide vessel traffic and boater compliance data, information about differences in user-groups, and a springboard for future statewide boater compliance research.

We collected boat traffic and boater compliance data for nine days (4 weekend days and 5 weekdays) at three manatee slow speed zones and one idle zone in Florida (compliance assessment). We also collected the same data for three days at four other sites, to evaluate the effects of law enforcement on boater behavior (enforcement effects study). These studies totaled 48 field days. We designated vessel speeds as idle, slow, plow, plane or cruise. Compliance was characterized as compliant (obeying the speed limit), technically noncompliant (one category faster than the speed limit), and blatantly noncompliant (two or more categories faster than the speed limit).

The site-specific assessment revealed that vessel traffic behaved similarly at most sites. However, vessel sizes varied significantly between locations ($\chi^2=230$, $p<0.001$). Compliance in the slow zones was fairly consistent (55-57%). The idle zone was less compliant, but traffic traveled slower, with >80% of vessels moving at slow or idle speed. Smaller watercraft traveled faster and broke the law more frequently ($\chi^2=230$, $p=0.001$). These vessels (<26 feet) were also the most numerous. Personal watercraft (Jetskis®, etc.) were consistently the least compliant vessel type. Because vessel size and type were highly dependent ($\chi^2=5480$, $p<0.001$), it was difficult to tease apart their effects on compliance. Different vessel types associated with each location may explain the differences in compliance among the four sites.

During the enforcement study, compliance increased significantly with the presence of law enforcement, with a concurrent decrease in technical and blatant noncompliance ($\chi^2=129$, $p<0.001$). The strong dependence of compliance on law enforcement negated any effects of either vessel type or size on compliance.

Based on these results, a few management options include: increasing the number of law enforcement officers; focusing outreach and law enforcement efforts on the weekends, at boat ramps and areas most accessible to smaller watercraft; and designating critical manatee areas as idle speed zones.

The following abstracts are of papers and posters scheduled to be presented at the annual meeting of the Society of Vertebrate Paleontology in Bozeman, Montana, 3-6 October 2001.

Sea Cows, Seagrasses, and Stable Isotopes (M.T. Clementz and P.L. Koch). - In modern ecosystems, sirenians (i.e., manatees and dugongs) are the dominant large-bodied consumers of seagrasses in coastal communities. This association has been presumed to extend into the past, and occurrences of sirenian remains in deposits have been interpreted as evidence of the presence of seagrasses in ancient marine ecosystems. However, is this association true for all extinct sirenian taxa? Modern manatees are known to consume a variety of vegetation types besides seagrass, including freshwater vegetation and algae, and historical records indicate that the diet of the recently extinct Steller's sea cow was predominantly kelp and marine algae. These observations suggest that the diets of early sirenians could have been highly variable and seagrasses may not have been a major component of their diet, especially those species that were still capable of terrestrial locomotion.

To determine the diets of early sirenians, we analyzed the carbon isotope composition of the enamel of modern and early sirenians. The carbon isotope value of an animal's tooth enamel reflects the carbon isotope value of its diet. Since seagrasses typically have a much higher carbon isotope value than other types of aquatic vegetation, modern sirenians that foraged exclusively on seagrasses yielded higher enamel carbon isotope values than those that consumed other types of vegetation, which proved that we could use carbon isotope values of enamel to identify seagrass consumption. Next, we obtained samples from Eocene species of sirenians located in France, Florida, and Egypt and analyzed the enamel from each specimen. All specimens yielded higher carbon isotope values than co-occurring terrestrial and marine taxa with values ranging from -2.0‰ to $+2.0\text{‰}$. Geographically, carbon isotope values were higher in France and Florida than in Egypt, which may have been related to differences in productivity within these regions at this time. The high carbon isotope values of Eocene sirenians clearly indicate that seagrass was a major component of early sirenian diets and that diversification of diet did not occur until later in sirenian evolution.

Skeletal Morphology of Basal Sirenia: A "Condylarth"-Like Quadrupedal Seacow from the Eocene of Jamaica (D.P. Domning, B.L. Beatty, R.W. Portell, S.K. Donovan, S. Mitchell, R.D.E. MacPhee, and C. Flemming). - Abundant bones from the early middle Eocene Seven Rivers site, western Jamaica, represent a new genus and species, the oldest and most primitive sirenian adequately known postcranially. Only the jugal, some teeth, atlas, most of the caudal vertebrae, xiphisternum, fibula, and most of the manus and pes are unrepresented in the collection. A composite skeleton (2.1 m long) is long and low-slung, as hypothesized for *Moeritherium*.

The animal is clearly sirenian based on its large rostrum, enlarged and retracted nares, premaxilla-frontal contact, long and deep mandibular symphysis with longitudinally-aligned incisor rows, and pachyosteosclerosis. It belongs to the basal family Prorastomidae based on its primitively undeflected rostrum and unexposed mandibular dental capsule. However, it is more derived than *Prorastomus* in that the periotic is not fused to the alisphenoid and the ventral border of the mandible is downturned anteriorly. Surprisingly, its sternum is derived (broad, flat, and probably tripartite) in contrast to the primitive multisternebrate condition seen in the otherwise more advanced *Protosiren*.

Other characters include: 7 cervical, 20 thoracic, 4 lumbar, and 4 sacral vertebrae; large horizontal flanges on tips of neural spines; unfused but rigidly articulated sacrals; no enlarged caudal transverse processes; dense, swollen ribs; broad scapular blade; unreduced pelvis; third trochanter on femur; large patella; prominent cnemial crest, twisted shaft, and tilted ankle joint on tibia. Skeletal details are "condylarth"-like.

This is the first sirenian discovered that could support its body on land, but it probably both fed and rested in the water. It swam like an otter or the early whale *Ambulocetus*, by simultaneous pelvic paddling with spinal undulation; the tail still had only a limited role in propulsion.

[The name of this new genus and species is *Pezosiren portelli* Domning, 2001; see paper in *Nature* by Domning under Recent Literature below.]

Earliest Tethyan Seacow from the Lutetian Eocene of Pakistan. (I.S. Zalmout, M. Haq, and P.D. Gingerich). - Tethyan Eocene deposits in eastern Baluchistan Province (Pakistan) have yielded a primitive sirenian fossil from the top of the Habib Rahi Formation, early Lutetian (early middle Eocene). Substantial association of cervical and thoracic vertebrae and ribs show it to be *Protosiren*, because of the unique keyhole-shaped cross-section of the neural canal of the thoracic vertebrae, lack of pachyostosis, and the lack of well-formed joint surfaces on the ribs. The new find represents the earliest sirenian occurrence in the Old World Tethys; moreover it is smaller than the three known species *Protosiren fraasi* and *P. smithae* of Egypt, and *P. sattaensis* from Pakistan.

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

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Columbus (Ohio) Zoo manatee exhibit, live camera: <<http://www.discovery.com/cams/manatee/manatee.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.state.fl.us/fwc/psm/>>

Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute (Florida manatee mortality data): <<http://www.fmri.usf.edu>>

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

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"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>>

Sirennews (texts of current and recent issues): <<http://pegasus.cc.ucf.edu/~smm/>>; <<http://www.sirenian.org>> (for archive of many 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.online.de/home/Rothauscher/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/neeii/manatee-index.html>>

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