Sirenews

Newsletter of the IUCN/SSC Sirenia Specialist Group

NUMBER 21 APRIL 1994

IN THIS ISSUE:

EDITORIAL: TEN YEARS OF *SIRENEWS* !

With this issue, *Sirenews* begins its second decade. This is a testimony to the loyalty of its readers, without whose contributions and continuing interest this newsletter would long ago have ceased to exist. It is also tangible evidence of the flourishing state of sirenian research and conservation efforts throughout the world. This growing human attention to the status and needs of manatees and dugongs encourages me to believe that these species will survive the current mass extinction after all. So, my sincerest thanks to all of you who have helped make this publishing project a success, as well as a continuing source of pleasure for its editor.

This anniversary also coincides with several other significant milestones for the sirenian research and conservation community. A workshop on manatee conservation held last month in Jamaica (see report below) inaugurated what we hope will be a new era of activity in the wider Caribbean region; and *Sirenews* stands ready to serve as a medium of communication for the regional network that is to grow out of that meeting. A few days later, the First International Manatee and Dugong Research Conference took place in Gainesville, and was hailed as a great

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

Sirenews (ISSN 1017-3439) appears twice a year
in April and October and is edited by Daryl P. Domning,
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(fax: 202-265-7055). It is supported by the U.S. Marine Mammal Commission.

success by its surprisingly numerous participants. This will be followed in June by the first meeting of the new Manatee Geographic Information System Working Group in Florida - yet another sign of the increasingly sophisticated technology being brought to bear on sirenian problems. It appears that our specialty is on the point of crystallizing on a global scale in a way few would have anticipated ten years ago.

This is therefore an opportune moment for a synthesis of what sirenologists up to this time have achieved; so it is fitting that this month has also seen my sirenian bibliography go to press. Embracing literature from 1507 to 1994, and probably more exhaustive in coverage than the information-retrieval apparatus available for any other group of organisms, it is intended to be a foundation on which future workers can build with greater ease and assurance than ever before. With a sure grip on the data of the past, growing use of the data-processing tools of the present, and the achievement of a critical mass of active workers, sirenology can now look forward to a bright future of discovery.

The moment is also convenient to review, for the benefit of our many new readers, some of the basic facts about *Sirenews* itself. This newsletter is intended as an informal forum for communication within the sirenian research and conservation community, and reaches a select readership of about 200 individuals and organizations worldwide. Since it is not designed as a mass-circulation publication, I have not attempted to advertise its existence to the general public or greatly expand its mailing list, nor do I wish to (more on that in a moment). However, I am happy to send it gratis to anyone with a serious interest and involvement in sirenian affairs.

This constraint on circulation arises partly from *Sirenews'* nature as the official newsletter of the Sirenia Specialist Group (though it is by no means restricted to SSG members), but more practically from the logistics of its publication. This is entirely a one-man operation; your Editor has absolutely no secretarial or other help with its compilation or mailing. He maintains the mailing list; types the newsletter from your submissions, down to the last keystroke; prepares camera-ready copy and delivers it by hand to the printer; addresses, stuffs, and affixes postage to all the envelopes; and hauls them to the post office - all as a part-time job in addition to full-time research, academic, and other duties. Hence his reluctance to see the number of such envelopes grow too large! A corollary of this is that **if you no longer wish to receive *Sirenews*, it would be much appreciated if you would let him know so that printing, postage, and labor expenditures can be held down.**

These constraints on your Editor's time also mean that he cannot regularly contact you to solicit news items, or indulge much in investigative journalism. If you have sirenological news, or a provocative opinion to share, or know of past or future happenings that might be of interest to your colleagues, PLEASE do not wait for an invitation; send it in! Otherwise it may well slip through the cracks. This applies especially to meetings or workshops that should be reported on in these pages; if you're a convener or just a participant, and are unsure whether someone is covering the event for *Sirenews*, contact me - I'll probably be happy to accept your offer to write a report!

In all cases, please try to adhere to the copy deadlines stated at the end of each issue. They never change - April 1 and October 1 of every year - and I do try to stick to them. If your piece arrives after the newsletter gets put to bed (and some have), it's six months to the next issue and your news may be pretty stale by then! If your submission is a long one (more than a page), please consider submitting it on MS-DOS diskette - preferably 5-1/4" in WordStar or ASCII format.

To quote a reminder from our very first issue: *Sirenews* is "an informal forum, not to be considered citable, formally-published literature; it will not be 'peer-reviewed', and contributions to it should not be quoted without the written permission of the author. Certainly the opinions expressed will be those of the writers and not necessarily those of IUCN or other organizations. Therefore, I hope that contributors will feel free to offer informal speculations and ideas as well as news in the interest of rapid communication." For some time the *Zoological Record* has been indexing items from this newsletter, and I have noticed some people citing information from *Sirenews* in their publications. This is NOT a practice to be recommended, however; and articles from *Sirenews* will not be listed in my forthcoming sirenian bibliogra-

phy. As is also true of theses, abstracts, in-house reports, and all other forms of "gray literature", if it's important enough to cite, it's important enough to publish through the normal, peer-reviewed outlets. Quality scholarship demands no less, and we need to set a good example for our students.

One further note to our subscribers, in response to many inquiries: back issues of *Sirenews* are in most cases not available. To avoid tying up money in inventory, print runs are kept to a size commensurate with the current mailing list. I have a very few copies of some of the more recent issues, which I am happy to distribute as long as they last, with priority going to requests from libraries. However, complete runs of back issues cannot be had, nor are there any plans to reprint them, nor am I in a position to duplicate them to order for individuals; so I'm afraid you'll have to borrow copies and xerox them yourselves.

This little newsletter's second decade will take us into the next century. Centuries to come will look back on our era as the time of crisis, when the long-term survival of sirenians and countless other species was decided one way or the other. If they make it past the next hundred years of human population growth, they can probably survive anything, even asteroid impacts. As news of your efforts keeps coming in, I look forward to seeing how the story unfolds. - **DPD**

REPORT OF CARIBBEAN MANATEE WORKSHOP

On 1-4 March 1994 the Regional Workshop on the Conservation of the West Indian Manatee was convened in Kingston, Jamaica by the Natural Resources Conservation Authority (NRCA) of the Government of Jamaica and UNEP's Regional Coordinating Unit (RCU) of the Caribbean Environment Programme, with partial financial support from the Government of the United States of America.

The objectives of the meeting were to review and exchange information on the status of the West Indian manatee, *Trichechus manatus*; review and provide inputs to the draft regional management plan for the West Indian manatee; and formulate a specific plan of action of priority conservation activities to be implemented during the 1994-95 biennium. Twenty-one experts from the region, as well as ten observers representing non-governmental organizations and academic institutions, participated in the meeting. Regional experts present included, among others, Dr. John Reynolds, Chairman of the U.S. Marine Mammal Commission; Dr. Daryl Domning, sirenian specialist; Dr. Daniel Odell, Research Biologist at Sea World; Dr. Thomas Carr of the Caribbean Conservation Corporation; Dr. Miriam Marmontel, manatee researcher from Brazil; and Mr. Benjamin Morales, manatee researcher from Mexico. Other experts representing ten of the nineteen manatee-range countries of the region also participated in the meeting.

The meeting successfully reviewed the draft regional management plan and provided technical inputs to assist with its finalization. The draft plan contains general information on the biology and distribution of the species in the region, as well as specific information on its status in each of the nineteen manatee-range countries. However, the main component of the draft plan is a general framework for manatee conservation in the Wider Caribbean, which includes recommended priority, as well as long-term regional activities. The draft plan also recommends specific in-country activities to be implemented at the national level.

The meeting agreed on the following priority activities as part of the draft plan: environmental education and public awareness; assessment of manatee status and distribution in those countries which have not done so; increased protection for manatees and their habitat and reduction of human-related mortality through adoption of international treaties and enforcement of national legislation; preparation of national recovery plans by national recovery teams; establishment of a regional cooperation and information network for manatee conservation with the assistance of a regional network coordinator. Many of these recommended activities follow the model of the successful sea turtle conservation effort of WIDECAST, which has been implemented in the region for the last ten years in cooperation with UNEP.

The meeting also recommended that the draft plan include, as an additional appendix, sample formats for data-gathering relevant to manatee conservation in order to ensure uniformity in the type of data collected in the region.

Prior to the finalization and approval at the intergovernmental level of the draft management plan, it will be circulated among the manatee-range countries not represented at the meeting to ensure that the information is accurate and relevant.

In keeping with these recommended priority activities, the meeting identified three main activities to be implemented during 1994-95: 1) the production and wide dissemination in English, Spanish, French, and Dutch of educational materials (pamphlets, posters, and videos) using as much as possible existing materials from relevant organizations and programs; 2) support of an ongoing manatee conservation effort between Mexico and Belize to assist with the development of the relevant recovery plans and school-system educational activities; and 3) development of national recovery plans and national recovery teams for those manatee-range countries that have already begun relevant manatee conservation activities.

Additionally, the meeting recommended that, in keeping with the WIDECAST model and pending intergovernmental approval of the draft management plan, an interim regional manatee coordinator and an interim informal manatee advisory group assist the Secretariat with the preparation of the national recovery plans and implementation of the other recommended activities as appropriate. [ED. NOTE: Dr. Miriam Marmontel was unanimously recommended for the role of interim regional manatee coordinator.]

Additional recommendations requested the States of the Wider Caribbean to accede to or ratify the SPAW Protocol, as well as the CITES, Ramsar, CMS, and Biodiversity Conventions, as these relate to the conservation of endangered species. It was also recommended that the Secretariat establish closer cooperation with the Secretariats of the treaties mentioned above, as well as with relevant programs of the Marine Mammal Action Plan.

For further information, contact: UNEP Caribbean Environment Programme, Regional Coordinating Unit, 14-20 Port Royal Street, Kingston, Jamaica; telephone: (809) 922-9267 to 9; fax: (809) 922-9292; Telex: 3672 UNEPCARJA; Email: UNIENET:UNX040 & ECONET:UNEPRCUJA. - **Alessandra Vanzella Khouri** (Programme Officer, UNEP-CAR/RCU)

MANATEE CONFERENCE EXPRESSES CONCERN ABOUT HABITAT LOSS IN COASTAL ZONE

The First International Manatee and Dugong Research Conference, held in Gainesville, Florida, on March 11-13, 1994, brought together over 200 scientists from 17 countries who are involved in conservation and research projects on manatees and dugongs. This diverse group of experts presented new information on sirenian evolution and genetics, monitoring of sirenian distribution and trends in abundance, manatee immunology, anatomy and behavior, manatee hearing and response to approaching boats, management challenges, and the impact of coastal zone degradation on sirenians throughout their range. In many of the 65 countries where sirenians still occur, gillnetting, deforestation, and poor agricultural practices have contributed to declining quality and diversity in coastal marine systems. Seagrass losses have been documented on both coasts of Florida and in Australia, and there is growing concern in countries such as Mexico and Belize that nearshore plant and animal communities will disappear as human populations and coastal development expand. The potential for conflicting objectives in freshwater aquatic plant management was also highlighted. Aquatic plant managers and manatee biologists must work together to ensure that plant control does not have detrimental effects on manatees.

The conference, sponsored chiefly by the University of Florida's College of Veterinary Medicine, was immediately followed (on 14-18 March) by a workshop on manatee and dugong research methods for participants from developing countries. This Sirenian Research Workshop was sponsored by the National Biological Survey's Sirenia Project. Its purpose was

to train biologists, primarily from the Caribbean region, in methods of sirenian research, such as aerial surveys, capture techniques, food habits analysis, and radiotelemetry. This training was conmpleted at the Florida Department of Environmental Protection's Marine Research Institute in St. Petersburg, and at Sea World in Orlando. Twenty-three biologists from 12 countries participated in the workshop.

On the last day of the workshop, the participants divided into groups to assess the applicability of the various techniques used to study sirenians. The chart on the following pages presents the results of this assessment as summarized by Helene Marsh.

The conference and workshop emphasized the need for coordinating our efforts to study and protect manatees across international boundaries, and laid the foundation for transferring knowledge and technology developed for the Florida manatee to sirenian researchers worldwide. The importance of sirenians as flagship species for the coastal marine environment was widely recognized.

For a copy of the conference proceedings (= book of abstracts), send US$5.00 to: Office of Conferences and Institutes, Institute of Food and Agricultural Sciences, University of Florida, P.O. Box 110750, Gainesville, FL 32611-0750. - **Lynn Lefebvre and Roger Reep**

MANATEE GIS WORKING GROUP MEETING

The first meeting of the Manatee GIS Working Group will take place June 29, 1994, at the University of South Florida, St. Petersburg. The purpose of the Working Group is to encourage communication among organizations interested in cooperating on the Manatee Geographic Information System (MGIS) by presenting a forum where individuals can gain access to expertise, examine computer hardware needs, and discuss data-sharing issues. The specific goal of the upcoming meeting is to produce a Marine Mammal GIS Users Reference Guide, which will be a set of guidelines that cooperators can follow to effectively interact with the MGIS. Ultimately, the Working Group will serve as a forum for discussing database management issues, examining analysis techniques, and evaluating resource-use options impacting manatees.

The groundwork for the upcoming Working Group meeting was laid by the GIS Coordinating Team. This team has met semi-annually for two years and includes representatives from the Marine Mammal Commission and Federal, State, and County government agencies.

If you are interested in participating in the Manatee GIS Working Group, please RSVP by the end of April, if possible, so that we can send out an information packet and make the necessary arrangements. We want to emphasize that the MGIS Working Group belongs to the participants and is open to governmental and non-governmental organizations alike. Participants are expected to contribute to the development of the MGIS and follow the guidelines that the group establishes. Success of the Working Group will depend on the user community's commitment to make it function effectively.

Please contact:

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The tentative agenda for the meeting is given on p. 8 below.

Summary Evaluation of Relative Merits of Techniques used to Study Sirenians and Their Habitats. Gainesville. March 14 to 16 1994. Participants: Acuna, Asanza, Beck, Cockcroft, Deutsch, Dominguez, Dutton, Goldberg, Jimenez, Khan, Lefebvre, Leotaud, Marmontel, Marsh, Montoya, Olivera, Pinto de Lima, Powell, Quintana-Rizzo, Reid, Smith, Soavinski, Velasco, Young

TECHNIQUE	SATELLITE TRACKING	VHF TRACKING	AERIAL SURVEY	CARCASS ANALYSIS	HABITAT EVALUATION	INTERVIEW SURVEY
Information obtainable	• locations • movements • habitat use • activity	• locations • movements • habitat use • activity • behaviour of tagged animals	• distribution • relative abundance • 'absolute' abundance • population trends • habitat use • extent of potential habitat • similar information for other marine mammals, sea turtles, sea birds	*Decomposed carcasses:* • measurements • skeleton • stomach contents • reproductive status • photographs *Moderately fresh carcasses:* above plus • organ samples • skin for DNA • organ samples for microscopic and gross anatomy • contaminants • parasites *Fresh carcasses:* above plus • pathology • virology • bacteriology • blood for genetics	*Qualitative* • rapid ecological assessment - species of SAV[1] present • identification of critical areas • basis for zoning *Quantitative* • physical geography of area • physiochemical parameters of water and bénthos • bathymetry SAV diversity, biomass, productivity • temporal trends	• Sources and levels of mortality • hunting methods • awareness of legislation and other conservation initiatives • distribution • relative abundance • qualitative assessment of temporal trends • biology and ecology especially at local scale e.g. food, breeding season, movements
Type of technical expertise required	• knowledge of animal radio -tracking • access to well equipped workshop • experience in marine mammal capture • knowledge of ARGOS system	• basic knowledge of animal radio -tracking • access to well-equipped workshop • experience in marine mammal capture	• statistical skills • cartographic skills • good pilot • crew not susceptible to air-sickness	• basic knowledge of anatomy and priorities for carcass salvage	*Essential* • ability to recognise species of SAV • knowledge of aquatic ecology *Desirable* • GIS expertise • access to aquatic chemists, coastal engineers and social scientists	• good interpersonal skills • knowledge of local language or access to interpreter • knowledge of questionnaire design and interview techniques

Equipment required	• capture and handling gear • transmitter attachments • transmitters • receivers • antennas • tracking platforms - boats, vehicles • computer and modem	• capture and handling gear • transmitter attachments • transmitters • receivers • antennas • tracking platforms - boats, vehicles, aircraft, fixed stations	*Essential* • high wing light aircraft • crew of at least 3 plus pilot • maps • data sheets • polaroid sunglasses *Desirable* • tape recorder • intercom • binoculars • GPS • radar altimeter • stop watch • computer	necropsy kit with • collecting containers • preservatives • surgical gear • proformas • specimen labels	*Essential* • diving gear for ground-truthing *Desirable* • satellite imagery • sonar for bathymetry • climatic data • aerial photography	• vehicle, boat • tape recorder • camera • writing materials • maps • photographs of animals • interpreter
Cost of equipment	transmitters ++++ other gear +++	transmitters + other gear +++	air time ++++	basic gear + transport ++	++ to ++++ depending on degree of quantification	travel ++
Cost of labour	++	++++	field + lab +++	collection + analysis ++++	++ to ++++ depending on extent and level of resolution	+
Application	• high budget • large area • large number of observations	• medium budget • small area • detailed observations of individuals required • less suitable in salt than in freshwater	*Most applicable* • large areas • clear water • information required at large spatial scale • animals dispersed *Least applicable* • dark water • overhanging vegetation	• easily accessed areas where anthropogenic mortality is high	*Most applicable* • situations where most information already exists • information required at local scale *Least applicable* • little known area • very large scale integration of information desired	• reconnaissance • identify 'hot spots' to focus efforts • initial education • assess conservation interest • assess impact of project

[1] submerged aquatic vegetation

The Manatee GIS Working Group: First Meeting
Tentative Agenda
St. Petersburg, FL, June 29, 1994
University of South Florida, St. Petersburg, Activities Center
Corner of 2nd St. South and 6th Ave. South

Expected Participants
- State agencies
- Non-governmental organizations: Save the Manatee Club, business community, County representatives
- Federal agencies
- Conservation organizations
- Universities
- Contractors developing data for Manatee GIS participants

Opening remarks (9:00 AM, R. Flamm)

Historical overview (9:10 AM, J. Reynolds)

Roles of participating agencies in developing Manatee GIS (9:30 AM)
- Marine Mammal Commision (J. Reynolds)
- Department of Environmental Protection-Research (B. Weigle)
- Department of Environmental Protection-OPSM (P. Rose or K. Frohlich)
- National Biological Survey, Sirenia Project (L. Lefebvre)
- County government (Dade or Brevard counties)
- U.S. Fish and Wildlife Service (B. Turner or J. Kraus)

Break (10:45 AM)

Manatees and their ecosystem: data requirements (11:15 AM, R. Flamm)

Manatee data themes (11:30)
- Mortality (S. Wright)
- Aerial Survey (L. Ward)
- Telemetry (B. Weigle)
- Boating Studies (K. Frohlich)
- Other: seagrass, bathymetry (C. Friel)

Lunch (1:00 PM - 2:15 PM)

Data exchange (2:15 PM, C. Friel)
- Data standardization, documentation, and ethics issues
- Manatee GIS reference guide: an approach to resolving the above

Future vision (3:00 PM)
- Standard paper map series (B. Porter)
- Manatee atlas on CD-ROM (B. Weigle)
- Integrated modeling and decision making (R. Flamm)

Conclusion and discussion (4:00 PM, R. Flamm)

MANAGEMENT OF THE SHARK BAY DUGONG POPULATION: RESEARCH REQUIREMENTS

The dugong population at Shark Bay, Western Australia, estimated to include approximately 10,000 individuals of all ages, may represent 10-12% of surviving dugongs. It is one of the largest known, and the only one of its size that can be attributed to a relatively discrete and apparently isolated area. In the context of World Heritage listing for the Bay, and the establishment of the Shark Bay Marine Park, There is both an opportunity and a requirement for research essential to a well-founded management program.

Information gathered between 1974 and 1992 provides a substantial basis for further study and for management, but is incomplete in many areas. As I don't anticipate further research at the Bay in the near term (the next 4-5 years), I've outlined what I see as pressing needs for further study, hoping that my suggestions can be followed up when opportunities arise.

I. Habitat Use

A. Forage resources:

The full extent of the *Halophila spinulosa* bed discovered in 1992, and the seasonal persistence (or lack of it) of the high standing-crop biomass observed, need to be determined. The information could be readily obtained using the techniques applied in 1992 (Anderson, submitted to *Wildlife Research*). The bed is likely to be highly vulnerable to trawling operations and to have importance for the productivity of the Bay ecosystem as a whole. The degree of activity and impact of trawlers in northern Herald Bight should be investigated.

B. Summer distribution of dugong activity:

A summer survey, like that carried out in July 1989, is essential for an effective understanding of the habitat requirements of the Shark Bay dugong population. Although winds make summer survey work difficult to schedule, a comprehensive survey is <u>not</u> impossible. Ideally, two surveys (March and October) should be flown to bracket the summer season. Surveys at these times would avoid the windiest months.

C. Movements:

Seasonal distribution of dugong concentrations clearly varies from year to year under influence of temperature (influenced by weather and probably the Leeuwin Current). The 1989 discovery of large numbers of dugongs using the area N and E of Cape Peron raised the question of whether seasonal migration patterns may be separate on eastern and western sides of the Bay, or whether there is a single population that may vary in distribution from year to year. The question could be economically attacked through both photoidentification and a program of aerial spot surveys at selected localities over several years.

II. Reproductive Biology

A. Breeding season:

Our information on breeding seasons at Shark Bay is very limited. The lek at Gladstone runs from September through January (my paper on the lek should be submitted to *Behavior* in January 1994). A dead neonate was found at Monkey Mia in November. Neonates appear as late as March at Gladstone. At present, except by extrapolation from Queensland where breeding (August or September through December or January) is associated with a very different wet/dry season cycle, we have very little understanding of when dugongs at Shark Bay mate and give birth. Further information on the timing of mating is vital to any management program.

B. Mating:

The lek at Gladstone can account for only a small portion of annual matings. Are there other lek sites? Does the number of females visiting the lek vary from year to year? Do mating herds (as postulated in Queensland) occur in Shark Bay? My work on the Gladstone lek only scratches the surface of what might be done there, provided the site is properly protected from intrusive research, ecotourism, or documentary filming. It is possible that the site and associated behaviors are unique! If so, the site is of very high scientific value and further intensive (and non-intrusive) study is justified for scientific reasons alone.

C. Calving:

It is a reasonable assumption that dugongs are most vulnerable to predation at birth and in the first few weeks of life. Although I expect that calving will prove to be spatially and temporally dispersed, the rarity of observations suggests that there must be favored calving sites that are presently not visited by humans. It should be a management priority to discover when and where most calves are born and take appropriate measures for protection before unforeseen developments interfere.

III. Social Structure

A. Group composition:

My observations on scarring patterns suggested that adult males may be solitary, and that herds may consist of adult females and immatures of both sexes. If this is actually the case, it has implications for management. The issue could probably be resolved by an extended photoidentification study.

B. Group size:

May vary with season and location. As ecotourism develops, a compulsory system for recording locations of sightings, estimates of numbers, and proportion of cow-calf pairs should be instituted to provide information for management purposes.

IV. Response to Disturbance

A. In a situation where recreational boat traffic and ecotourism can be expected to grow, dugongs may be subject to increasing harassment. A program in which observers were posted on tour boats, to monitor tour boat activity and to record dugong responses, should be set up to establish a basis for management regulations.

B. There have been proposals in the past (e.g., sand mining, establishment of artificial shelters for rock lobsters in seagrass beds) that could impact the dugong population. Other proposals for commercial exploitation of the Bay are likely in the future. Data gathered on all aspects of dugong biology in the Bay should be assembled in data bases designed to be readily accessible in the event of both anticipated and unanticipated development proposals.

C. As early as 1988 I was promised that consideration would be given to establishment of a dugong sanctuary encompassing both the northern and the southern coves at Gladstone. To my knowledge nothing has been done. This is basically a people-management problem, and implementation requires some focused research on human use of the Gladstone area, and on alternative sites that could meet human demands while adequately protecting lek and foraging areas in and near the Gladstone embayment. - **Paul K. Anderson**

LOCAL NEWS

CUBA

Recent Activities. - Lourdes Ferrer reports that she and Alberto Estrada have presented papers on manatees at two recent meetings in Cuba:

- "The manatee as a possible tourist attraction in Cuba" by L. T. Ferrer, at the International Workshop on Ecotourism, held in Santiago de Cuba, 22-25 Nov. 1993.
- "Aerial censuses of the Antillean manatee in the Zapata Peninsula" by L. T. Ferrer and A. R. Estrada, at a meeting on Tropical Ecology held in Havana, 6-10 Dec. 1993.

They are also revising for publication their summary paper on manatee distribution in Cuba.

In March 1994, Miriam Marmontel came to see them in her new capacity of interim regional manatee coordinator (see Report of Caribbean Manatee Workshop, above). They found her visit very stimulating, and we look forward with pleasure to increased Cuban participation in the new regional efforts to protect manatees.

FLORIDA

Florida Manatees Are Still Endangered. - Manatees in Florida have been granted protection for almost a century, but the population is still considered in danger of extinction because of excessive mortality and habitat limitations. During a statewide aerial survey in 1992, fewer than 2,000 manatees were sighted. In order to guide species recovery, a recovery plan was developed in 1980 and revised in 1989 and 1994. One of the major research objectives of the plan is to better understand manatee population biology.

As a graduate student at the University of Florida, I analyzed data and material collected during a 16-year period by a team of federal, state, and non-government agencies involved in manatee research. The existence of over 1,200 skulls of manatees recovered dead from Florida's waterways allowed me to develop a technique to estimate age from bones. These data were then coupled with information derived during necropsies of most of those specimens, yielding information on age-related aspects of mortality and reproduction for the Florida manatee population.

Collision with boats is the most prominent identifiable cause of death among manatees, affecting all ages indiscriminately. Mortality takes a larger toll on younger manatees, as it does in most mammals. Once manatees reach maturity, the rate of mortality decreases considerably and remains constant throughout the rest of life. Adult survival is considered high, on the order of 90%, a value comparable to other marine mammals. Manatees may mature at 4 years of age, but females produce only one calf roughly every 3 years. With such low reproductive capacity, they could not persist without extreme longevity of adults. Indeed, manatees may live up to and beyond 50 years of age.

Because of manatees' longevity and low reproductive rate, it is very difficult to detect population changes quickly enough to implement corrective management actions. For that reason I conducted a population viability analysis through computer simulations. Modelling allows a range of manipulations of population parameters in a way that would not be possible in the wild, given the manatee's level of endangerment. The simulations do not predict with certainty what will happen to the Florida manatee, but project the most likely outcome for the population under the parameters provided. Modelling also identified fecundity and mortality (especially adult mortality) as the factors that contribute most to the population's growth or decline.

A scenario with an initial population size of 2,000 and population parameters calculated from the 16 years of data resulted in a gradually declining population, a probability of persistence of 44% in 1,000 years, and a mean final population size equivalent to only 10% of the original value (or about 200). A chance of persistence of less than 50% in 1,000 years is very low for a large mammal like the manatee, and such a negligible final population size will certainly not guarantee the necessary levels of genetic variability for maintenance of the population.

When adult mortality was reduced by 10% in the model, population growth improved considerably, but when adult mortality was increased by 10% the population

quickly dwindled. Only under constant conditions, absence of catastrophes, or very large population sizes did the manatee population show high chances of surviving in the long term.

It is important here to make a distinction between short-term viability in face of normal events, and adaptability or long-term survival. A problem associated with trying to save endangered species is that people often find it difficult to plan beyond a human's lifespan. Although 1,000 years may seem like a long time, it is in fact very short in ecological terms. Manatees have inhabited Florida's waters for millions of years. It would be a shame if the human race could only plan for manatee survival for the next few decades.

Results from my study indicate that the Florida manatee population is still at high risk of extinction in the long term. What seems clear is that any variability in the population parameters, any additional stress, or a catastrophe might tip the balance towards a greater risk of extinction.

Man can improve the prospects of the manatee population by preventing loss of habitat, allowing free manatee movements along traditional travel routes, and increasing the network of sanctuaries and refuges. Manatees are able to respond to their environment and exhibit considerable flexibility in adjusting to local long- and short-term habitat conditions. If habitat is protected, especially in areas important for manatee reproduction and feeding, and mortality levels are reduced, the species can be recovered. However, given the high incidence of boat-related mortality and rapid growth in boat traffic and coastal development, the prognosis is not good. Man can dramatically alter natural processes of habitats, and habitat alteration is likely to become even more significant in the future.

The goal of the Florida Manatee Recovery Plan is to downlist the species from endangered to threatened. Florida and Georgia probably contain the largest population of West Indian manatees. In all other parts of its range throughout the Caribbean and northern South America, the species is faced with threats of habitat alteration and local hunting. Manatees in the southeastern United States have the best chance of persisting into the future, but their protection and preservation will continue to require political decisions and public awareness and support. - **Miriam Marmontel** (for the Save the Manatee Club)

U.S. Fish and Wildlife Service Reorganization. - The Sirenia Project based in Gainesville, Florida is officially no longer a part of the U.S. Fish and Wildlife Service, having been incorporated into the new National Biological Survey. In other respects, however, it remains unaltered, still doing business at the same address (412 NE 16th Ave., Room 250, Gainesville, FL 32601) under the capable leadership of Dr. Lynn Lefebvre.

West Coast Manatee Telemetry Study. - The Florida Department of Environmental Protection (DEP) is currently tracking 12 manatees in Tampa Bay and along the west coast of Florida through VHF and satellite telemetry. Six of these manatees were tagged during a winter capture held at the Tampa Electric Company's Big Bend power plant in Apollo Beach on January 31-February 2, 1994. Since the project's initiation in February 1991, the DEP has tagged 37 manatees. The information gathered by this project includes habitat utilization, animal associations, age and sex differences in movement patterns, climatic effects on behavior, and life history parameters.

Prior to attaching the tags, measurements are taken on each animal, blood samples are collected, and blubber measurements and scar photographs are taken. In addition, two passive integrated transponder (PIT) tags are implanted in each animal, in the upper head region, between the skin and blubber layers. These tags, slightly larger than a grain of rice, provide long-term identification of individual animals. Recently, a manatee that had PIT tags and a radiotransmitter was recovered dead. The carcass was very decomposed, but the PIT tags were still present and functional. If the radiotransmitter had not been recovered with the animal, the animal would still have been identified through the PIT tags even though no other marks were recognizable. - **Beth Wright**

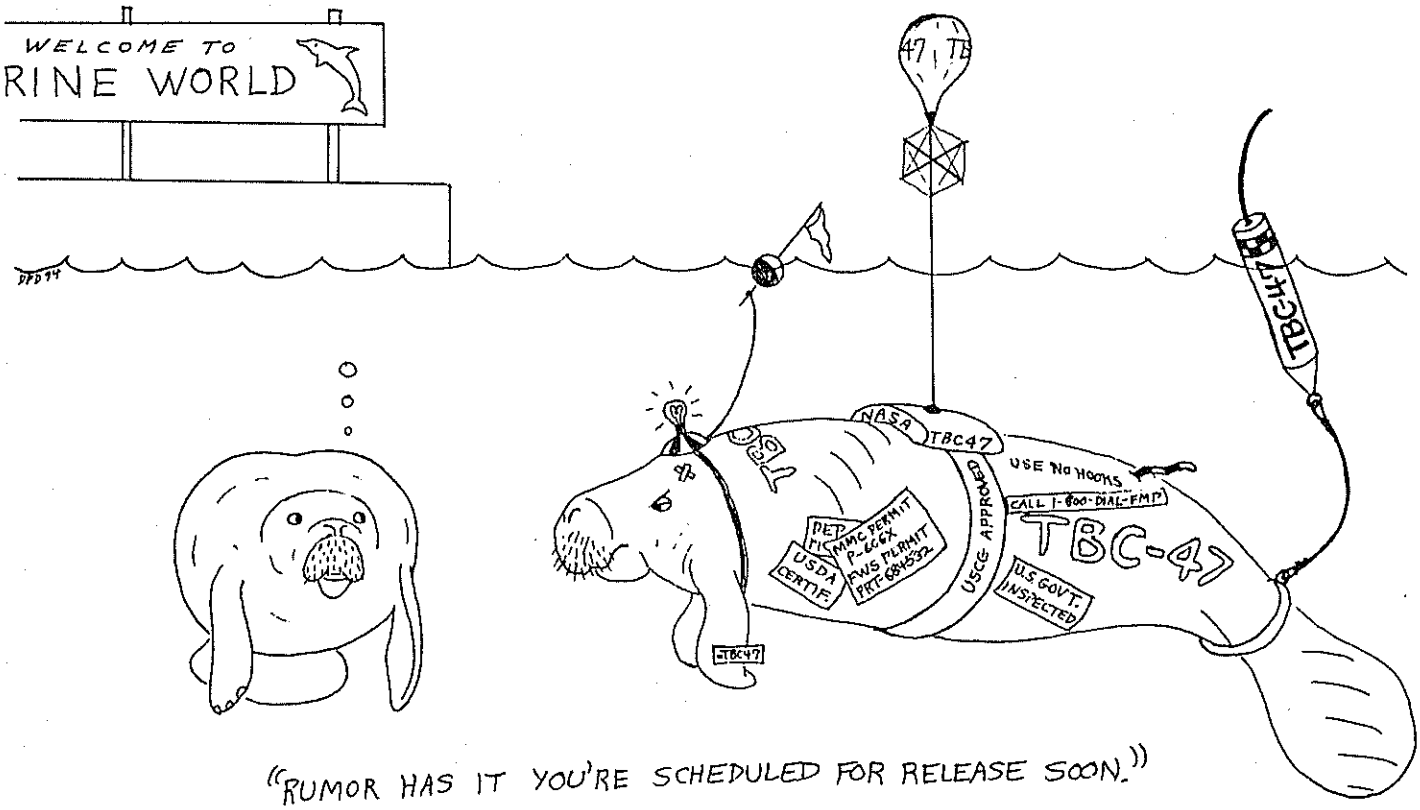
INDONESIA

Cafeteria Experiment with Captive Dugong in Surabaya Zoo. - Within the framework of the Dugong Management and Conservation Project, a so-called "cafeteria experiment" was carried out during 1993 with a captive dugong in Surabaya Zoo. This experiment was similar to the "salad-bar experiment" performed with captive manatees by Wanda Jones at Homosassa Springs (Florida) during 1993-94, and a comparison of both studies may reveal some interesting features of sirenian feeding ecology.

The aim of this test was to determine dietary preference of the dugong for a range of seagrasses. The dugong, a female with a total length of 2.70 m, had been caught in 1975 in Teluk Graganan, southeast Java, and had been kept in good health since in a reservoir of 60 m3. The reservoir was refreshed weekly with a truckload of seawater obtained from the Strait of Madura, some 30 km from the zoo. The dugong had been fed daily at 8:00 A.M. with approximately 50 kg of fresh *Syringodium isoetifolium* leaves, which were transported to the zoo by truck over 300 km from Muncar on the south coast of Java. The main reason for feeding *Syringodium* leaves was the fact that they float after being cut and thus are easily collected. During a field trip to Muncar, we observed five fishermen who collected 250 kg fresh weight of *Syringodium* leaves in less than 2 hours.

A first analysis of the data obtained indicated a preference of the dugong for seagrasses in sequence, from high to low preference, as follows: 1) *Halodule uninervis*, 2) *Halophila ovalis*, 3) *Cymodocea rotundata*, 4) *Syringodium isoetifolium*, 5) *Thalassia hemprichii*. The observed preference for *Halodule* and *Halophila* confirms findings of Marsh (1982), Preen (1993), and Lanyon (1993) on free-ranging dugongs.

Measurements and observations of the dugong in Surabaya Zoo indicated that the animal showed no stunted growth and appeared to be in good health. The animal was well taken care of by the Management of Surabaya Zoo and is one of the few dugongs kept successfully in captivity. Another dugong, originating from the Philippines, has



"RUMOR HAS IT YOU'RE SCHEDULED FOR RELEASE SOON."

been kept in good condition in the Toba Oceanarium (Japan), while being fed with *Zostera marina*.

Earlier investigations of two captive dugongs in the Ancol Oceanarium in Jakarta, which died in 1992, clearly showed stunted growth of these animals, which was probably due to the small size of the reservoir in which they were kept. Based on this observation, it seems important to develop guidelines for captive conditions for dugongs. - **Hans de Iongh**

THAILAND

Tame Dugong. - Since October 1993, a young male dugong has been seen repeatedly at Had Chao Mai National Park in Thailand's southern Trang Province. Fishermen at Chao Mai village said that this dugong initially became trapped in a tide pool and that the children of Chao Mai took pity on it and towed it back to the open water. But the dugong became trapped in the same tide pool two more times. After a while he became used to humans and seems to enjoy their presence, especially that of children.

Now, when the tide goes down, whoever wishes to see this playful dugong may do so. One needs only to enter the tide pool, about 60 cm in depth, and slap his hand on the surface of the water to call him. He is very amiable, and doesn't mind being handled. A staff member of the Fisheries Department said that this dugong may be the same one that was released last year after becoming stranded.

We are not sure why this young male has taken such a liking to humans. I am investigating dugongs in the area and would be interested to know whether there are recorded cases of dugongs or manatees in other areas of the world that have exhibited similar behavior. My colleagues and I will be conducting a census of the population in the Had Chao Mai area again this year, using aerial surveys. - **Suwan Pitaksintorn** (Marine National Parks Division, Royal Forest Dept., Phaholyothin Road, Chatuchak, Bangkok 10900, Thailand)

WASHINGTON, D.C.

Progress on Publication of Sirenian Bibliography. - The digitized manuscript of Domning's *Bibliography and Index of the Sirenia and Desmostylia* was delivered to the Smithsonian Institution Press on 12 April 1994. It will form contribution no. 80 in the series *Smithsonian Contributions to Paleobiology*. A publication date has not yet been set, but will hopefully be before the end of 1994. Instructions for obtaining copies will be included in the next *Sirenews*. Possible on-line and/or CD-ROM availability in the more distant future is also being contemplated. - **DPD**

ABSTRACTS

Estimate of the Distribution and Population Size of the Manatee *Trichechus manatus* (Trichechidae-Sirenia) in Guatemala (**Ester Quintana Rizzo**). - The manatee (*Trichechus manatus*) has been listed since 1975 as an endangered species by CITES, and since 1982 as Vulnerable in the IUCN Red Data Book. Commonly known as the West Indian manatee, it is distributed from the southern USA through the Caribbean and along the Atlantic coast of Central and South America as far as Brazil.

No quantitative information exists concerning the species in Guatemala. In this study the distribution and density of manatees in Guatemala are estimated by means of the aerial survey technique developed by authors such as Powell et al. and Rathbun et al. The various parts of the Guatemalan Atlantic coast were overflown during four months (January, March, April, and May). In 40 hours of surveys, a total of 73 manatees (66 adults and 7 calves) were seen.

Based on estimates made in accord with Schaeffer et al., the manatee population in Guatemala consists of 53 animals, with a population density of 0.401 manatees per square kilometer. The population throughout the study area remained constant during the study, but its its distribution within this area depended on the availability of food, shelter, warm water and depth. The results reveal that Lago de Izabal is the most important area for the species in the country, and it was assessed for the factors mentioned previously.

The results obtained constitute a solid basis of data concerning the needs for manatee conservation in Guatemala, and allow for the development of a conservation and management plan for the species in this country. [Abstract of a thesis in Biology submitted to the Universidad de San Carlos de Guatemala in April 1993. Translated from Spanish.]

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