

Sirenews



Newsletter of the IUCN/SSC Sirenia Specialist Group

NUMBER 35

APRIL 2001

- IN THIS ISSUE:
- RECORD NUMBER OF MANATEES COUNTED IN FLORIDA (p. 10)
 - ANOTHER CAPTIVE BIRTH OF AN AMAZONIAN MANATEE (p. 9)

EDITORIAL: BACKLASH IN FLORIDA

For years we have predicted that there would someday be a collision between more stringent measures for manatee protection and the ever-growing numbers of Floridians and their boats. The time had to come when a critical mass of boaters, who were also voters (not to mention the marine manufacturers and dealers), decided they had suffered enough inconvenience and/or loss of profits as a result of speed and other restrictions enacted for the benefit of manatees. The time had to come when they went on the offensive to tear down the legal dikes that have been so laboriously built by Florida conservationists to shield manatees from the rising flood of humanity.

That time may now have arrived.

The coming of spring has found a series of assaults underway across a broad front -- against both state and federal regulations - by forces hostile to manatee protection. These are in part pre-emptive attacks on possible new regulations resulting from a lawsuit recently brought against federal agencies by The Save the Manatee Club (SMC), a non-governmental organization, and a coalition of other environmental groups. To boating-rights advocates, of course, it is the environmentalists who are assaulting them with new

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

UICN
Unión Mundial para la Naturaleza

Sirenews (ISSN 1017-3439) appears twice a year
in April and October and is edited by Daryl P. Domning,
Department of Anatomy, Howard University, Washington, D.C. 20059 USA
(fax: 1-202-265-7055). It is supported by the U.S. Marine Mammal Commission
and Sea World, Inc.

restrictions. But what alternative is there, when the sheer numbers of boats and boaters continue to grow without limit within a fixed area of waterways?

In any case, the attackers' resolve and potential scope are clear, as proclaimed by Byron Stout, writing on their behalf in the *Fort Myers News Press* (21 March 2001): "Once [boating-rights advocates] get clear targets, the number of procedural and constitutional and common-sense challenges they file [against these regulations] will be crippling in number."

If the ramparts of manatee protection are not yet actually crumbling, many of those charged with their defense seem on the point of a retreat that could at any moment turn into a rout.

A major stimulus to this spring offensive has been the news of this winter's statewide synoptic aerial survey, which counted far more manatees than had ever been seen in Florida before (see news item and "Florida Manatee Status Statement" below). For example, in an article headlined "Too Many Manatees?" (*Miami Herald*, 1 April 2001), the president of the Marine Industries Association was quoted as asking how many manatees are enough (and no, this was no April Fool's joke). The political climate for a backlash is also right, with the governments of both Florida and the United States as a whole firmly in the hands of the Republican Party (traditionally seen as more pro-business and anti-environment than the Democrats), and with environmentalists across the country consequently thrown onto the defensive.

There were earlier signs that public support for manatees might be softening. A new opinion poll of boaters in the Tampa Bay area, conducted in May-June 2000 on behalf of Florida's Fish and Wildlife Conservation Commission (FWCC), showed that the respondents generally supported manatee conservation efforts. However, they indicated more support for increased public education regarding manatees than for increased boating regulations or increased law enforcement patrols. Furthermore, comparisons with three previous surveys over the last ten years showed a decrease in knowledge about manatees and their protection, and a decrease in support for conservation efforts such as speed limits, no-entry areas, and increased patrols (see FWCC's *Manatee News Quarterly* 4(4): 6, Oct.-Dec. 2000).

Predictably, the January 2001 synoptic survey numbers have fueled calls for "downlisting" manatees from "endangered" to "threatened" legal status. This bears out another, decade-old prediction (see *Sirenews* No. 15, p. 9) that, despite years of strenuous rebuttals by the very manatee biologists who conduct these surveys, the very existence of such numbers would inevitably cause them to be interpreted by the public as *prima facie* indicators of population trends, when in fact they cannot validly be so interpreted. Even when (as in a 29 March 2001 "white paper" submitted to the FWCC by Dr. Thomas H. Fraser, a marine industries consultant) the limitations of these synoptic surveys are explicitly acknowledged, this does not prevent the author from relying in large part on these very numbers to infer trends and conclude that "the time for a petition to reclassify manatees in Florida is appropriate."

(Ironically, the synoptic survey counts and other estimates of manatee numbers that were made in the early 1990s and before were consistently and loudly denounced by boating industry spokesmen of the time as gross underestimates of the true number of manatees. Now, some of those same low numbers are being taken at face value by the boating industry, to support its current view that manatees have been rapidly increasing!

If the early counts were as far off as the industry would then have had us believe, or even somewhat less in error as scientists then warned they might be, the increase has not been nearly as impressive as the industry finds it useful to claim today.)

The idea of downlisting was already in the air before this year, however (cf. *Sirenews* No. 32, pp. 4-6), and even the federal agency responsible for manatees, the U.S. Fish and Wildlife Service (FWS), seems inclined to capitulate to the pressure being generated in certain quarters. This is reflected in troubling fashion in its draft for the third revision of the Florida Manatee Recovery Plan, which was circulated for public comment in December 2000. Several changes from the previous (1996) version have drawn objections from manatee biologists, and many of these objections are to changes to the Recovery Criteria - the criteria which, if satisfied, would legally allow downlisting.

The new criteria are based on data nearly a decade old, even though newer data will soon be available from a workshop scheduled to occur in 2002. Moreover, the new criteria specify numerical targets for estimates of manatee survival and population growth that are *already* satisfied for every area where data are available (i.e., 3 out of 4 areas of the state). The trouble is that no evidence or rationale is offered to show that these proposed criteria are biologically appropriate to ensure the future of Florida manatees; and this has raised suspicions that the new criteria were arbitrarily tailored to fit the existing data. In any case, if the new data soon to be available do not show a materially worsened picture (and the January survey figures make this unlikely), then the FWS will be positioned to proceed almost immediately to downlisting. In fact, the draft states (without references or evident scientific basis) that "the FWS believes that a population of more than 2,000 individuals ... should be sufficient" for manatee survival. Given that most synoptic survey counts since 1996 have been in excess of 2,000, this practically amounts to saying there are already enough manatees for downlisting, even apart from the January 2001 record count of at least 3,276 manatees in Florida.

The problem with all of this, of course (as pointed out in Judith Vallee's editorial in *Sirenews* No. 34), is that the threats to manatee survival are growing even faster than the manatee population, assuming that the latter is in fact growing (an inference not supportable by the synoptic survey data alone). People and boats are increasing; manatee habitat is being nibbled away by development; and few if any meaningful restraints on these threats are in sight -- especially if existing regulations end up gutted by the gathering backlash.

The new Recovery Plan draft does give assurances that separate recovery criteria for manatee habitat are to be developed by October 2002. But it also says, lamely, that these criteria merely "may" be necessary to provide a complete picture, so it is not clear that any such hurdles would, in practice, be allowed to stand in the way of the growing momentum for downlisting. Significantly, the new draft also omits language in the 1996 Plan that made downlisting explicitly contingent on control of threats to manatees and their critical habitats, and substitutes arguably weaker and vaguer language.

So, if this draft is adopted in substantially its present form, without realistically addressing not only manatee population parameters but also, and especially, the growing nature of the anthropogenic threats, then the road to downlisting will stand wide open.

Things are no better on the state front, where the FWCC, the state agency responsible for manatees, has publicly (on its website) endorsed the recovery criteria in the draft Recovery Plan, with just as little attention to the issues of habitat and threats.

The SMC and other environmental groups also recently sued the FWCC in federal court to force adoption of more stringent manatee protection. According to the *St. Petersburg Times* (20 April 2001), an agreement in this case has just been reached -- thanks in part to Florida's Governor, Jeb Bush, who reportedly urged the FWCC to settle "so that state officials, not a federal judge, [would] make decisions about boating restrictions" and in order to "persuade federal officials to drop more onerous restrictions."

As the *Times* goes on to report, downlisting criteria are central to this dispute: "Boating advocates unhappy at the prospect of further limits on their recreation urged the [FWCC] to set a target for how many manatees it will take to declare them no longer in danger of extinction. 'We want to know when enough is enough,' said Jim Kalvin of the boating-rights group Standing Watch. So in addition to the settlement, the [FWCC] agreed to work with federal wildlife officials in setting a goal for manatee recovery."

This battle is already devolving into a public-relations melee, in which the SMC and other manatee advocates are fighting to defend their own reputations for integrity of their data against shrill charges of environmental extremism. Given the forces arrayed against them, the outcome will depend on their successfully rallying ordinary boaters and other Florida citizens, who have traditionally supported manatees against the commercial marine interests. Of course there are also commercial interests that should be pro-manatee, including dive shops and other tourist-oriented businesses that profit from people's desire to see manatees. But these have not yet found their voice; the public can be fickle; and the long-term outlook is admittedly discouraging.

Even if boaters and environmentalists collaborate with the best will in the world, this will not resolve the underlying crisis. Boaters, developers, and the officials who go along with their demands are not the real problem, but merely the sharp edge of a huge demographic ax. Human nature's first and most basic instinct is selfish, so restraints on our behavior will never be popular. It follows that the more humans there are, the less room there will be for unspoiled nature. - **DPD**

NEW STUDIES ADDRESS CAUSES OF URBAN SPRAWL AND HABITAT LOSS

L. Kolankiewicz and R. Beck. 2001. *Weighing sprawl factors in large U.S. cities: a report on the nearly equal roles played by population growth and land use choices in the loss of farmland and natural habitat to urbanization*. Arlington (VA), NumbersUSA.com: 1-64.

L. Kolankiewicz and R. Beck. 2001. *Overpopulation = sprawl in Florida: a report quantifying the impact of Florida's population boom on sprawl*. Arlington (VA), NumbersUSA.com: 1-43.

As stated on p. 12 of the second of these two reports, "[t]he authors embarked upon this study after a literature search found that most anti-sprawl efforts are based on the belief that population growth is not a significant factor in the worsening sprawl. Most anti-sprawl leaders have decided that curbing population growth is not one of many possible solutions to sprawl problems."

The error of that decision is demonstrated in detail in these studies, which conclude that, on a nationwide basis, population growth and land use choices play nearly equal roles in driving urban sprawl and causing loss of farmland and natural habitat. However, the relative contributions of these two factors vary markedly from region to region. U.S. Census data (1970-1990) on the 100 largest urbanized areas in the U.S. were sorted into 12 geographic regions, which were further classified into five categories (based on quintiles of shares of sprawl) according to the relative contributions made to sprawl by population growth and per capita growth in land consumption. It was found that population growth was at least a "significant" factor (20% or more) in all 12 regions of the country, at least a "primary" factor (40% or more) in nine of them, and the "overwhelming" factor (81% or more) in four of them. One of these latter four regions was the state of Florida -- where, in other words, per capita sprawl was a minor factor (0-19%) and population growth was the overwhelming factor (81-100%) in generating overall urban sprawl.

The implications of these data for protecting wildlife habitat over the long run are grim. The U.S.-wide study comments as follows (p. 16):

This study failed to find any American community that has shown an inclination to adopt the regulations and make the personal behavior changes that would counteract the effects of population growth for even a few years, let alone in perpetuity -- which essentially is what would be required if current national population policies stay in place.

The Florida report continues in the same vein (pp. 31-32):

Even if Florida's citizens were to accept the escalating governmental regulations that would be required to handle each year's population growth within existing boundaries [of urbanized areas], such a success would not ease the massive "ecological footprint" on the rest of the state.

It is important to recognize that the per capita land consumption figure upon which all conventional anti-sprawl efforts focus includes only the land consumed by an average resident inside his/her own Urbanized Area. It does not include all the rural land in other parts of Florida and other states that is required to obtain the food, fiber, minerals and energy for that resident, and to dispose of that resident's wastes. ...

... The average American has an ecological footprint of 12.6 acres. This impacted area is roughly 25-50 times greater than the built-up space (i.e. developed or urbanized land) of one-fourth to one-half acre for each resident inside most Florida Urbanized Areas.

Of particular relevance to manatee habitat protection, the Florida report concludes that:

... those who would stop sprawl in Florida will need to address three levels of government: (a) local incentives that entice more people to move into particular cities, (b) state policies that attract residents from other states, and (c) federal policies that add population to the nation as a whole.

...
According to the Census Bureau, current immigration, fertility and domestic migration trends will drive Florida's population to 20.7 million residents by 2025, with no peak in sight. Nothing that has occurred in Florida's cities thus far suggests that sprawl will not continue its march across the state's ever-more-beleaguered rural and open spaces. In the process, the state's environment and quality of life for residents will pay an ever-higher price for the government's unwillingness to allow the population to stabilize.

... **Studies and plans from state commissions, think tanks, universities and advocacy groups that purport to offer blueprints for combating sprawl without dealing with population growth look either naïve, foolish or deceptive in light of the findings of this study.** [p. 9; emphasis added]

Though this point is not discussed in these reports, it is important to be clear about which migrants are causing the manatees' worst problems. While foreign-born immigrants and their American-born children account for over 70% of Florida's population growth, they are not the main culprits. Those entering Florida from Latin America and the Caribbean, for example, tend to be poorer than the average American; they tend to settle in areas that are already densely populated, and live in apartments or other small housing units with relatively high numbers of people per unit; they are less likely than other Floridians to own cars and more likely to depend on public transportation; and they are less likely to own high-powered boats or spend their leisure hours dashing recklessly around on the water. In short, they have a much smaller per-capita ecological footprint and are less of a threat to the Florida environment in general, and manatees in particular, than immigrants from other parts of the U.S. Many of the latter are affluent retirees who like to settle in single-family homes (often newly built on sizable waterfront lots with chemical-treated lawns in sprawl-creating, low-density developments) and drive cars and boats. Even if these older folks are not the most reckless people on the water, they are making a major contribution to sprawl and habitat destruction, and adding to the watercraft congestion and pollution that manatees must cope with.

As quoted from the report above, Floridians concerned about these things need to address "state policies that attract residents from other states". One of the most obvious of these attractants is Florida's lack of a **state income tax**. If there are any environmentalists left in Florida who have not yet been called "extremists" for swimming against the political current, there's an issue they can take on! Or do you see a way to seriously come to grips with the problem anywhere short of that? - **DPD**

(P.S. Also of interest is a study of about 150 nations that found a highly significant positive correlation [$P \ll 0.01$] between population size and levels of threat to birds and mammals: M.L. McKinney, 2001. Role of human population size in raising bird and mammal threat among nations. *Animal Conservation* 4: 45-57.)

CALL FOR PROPOSALS

SIRENIAN INTERNATIONAL, INC., is a grassroots organization dedicated to manatee and dugong research, education, and conservation worldwide. We promote and support networking among students and scientists on a global scale, career development of students, development of inter-cultural relationships, and collaboration with local communities in scientific, educational, and conservation projects.

We are interested in sponsoring research, conservation, and education projects involving manatees and/or dugongs around the world, with priority given to projects in developing nations where funding is traditionally difficult to secure. Typical awards are US \$500 - \$1,000.

In keeping with our vision of networking, career development, inter-cultural collaboration, and community development, we will use the following criteria to evaluate grant proposals:

1. Involvement of recognized representatives of host countries (e.g., governmental agencies, NGOs, academic institutions) in the planning, implementation, and/or evaluation of the proposed project.
2. Inclusion of local people in project design, implementation, data collection, and/or data reduction.
3. Sound project design, meeting the standards of peer review.
4. Demonstrated effectiveness at presenting results to popular and technical audiences.
5. Intent to publish findings at scientific meetings, in peer-reviewed journals, and/or through the public media (e.g., popular magazines, newsletters, radio, TV, Internet).
6. Plan for information outreach prior to, during, and/or after the conclusion of the project (e.g., newsletter articles, local presentations).

The benefits of projects meeting the above criteria reach far beyond academia, to facilitate sharing of knowledge with local communities, students, governmental agencies, non-governmental agencies, and other conservation groups. Although our focus is on manatees and dugongs, SI hopes that our grant recipients will better understand the complexity of conservation issues, and the compelling need for partnerships among all parties involved, in both developing and industrialized nations.

Each grant recipient will be required to join Sirenian International as a Participating Member (FREE) and to submit information about his or her project to SI for use on our website and in our newsletter. To apply for a small grant, please submit the following:

1. Cover letter, briefly outlining your request for funds.
2. A short proposal that includes:
 - a. relevance of study and appropriate background information, including a literature review;
 - b. clearly stated objectives and how the anticipated results of the project relate to the stated goals of any appropriate manatee or dugong conservation efforts within your host country or at the regional level if your host country has no conservation program;

- c. clearly stated methods, estimated duration of the project, and plans for follow-up, application of results, and/or future work;
 - d. resumé or CV for each investigator listed;
 - e. detailed budget, including matching funds (if necessary to complete project), and whether those funds are applied for or already secured.
3. Two (minimum) to three (maximum) letters of recommendation, complete with your references' contact information (e-mail addresses and phone numbers preferred). If you are a student, one letter should be from your academic advisor; if you are working within an organization, one letter should be from your supervisor or executive director.

Electronic submissions are preferred. Send as attachment to e-mail [MSWord document (.doc) or Rich Text Format (.rtf)] OR as text within the body of an e-mail to <caryn@sirenian.org>. Alternatively, send on a 3.5-inch PC diskette; OR IF a paper application is your only option, mail two copies to: Caryn Self Sullivan, 200 Stonewall Drive, Fredericksburg, VA 22401 USA. All applications will be sent for review to our Scientific Advisory Council (SAC); grants will be awarded by our Board of Directors (BOD) based on recommendations from the SAC and the availability of funds. NOTE: There is no deadline for applications; grants are awarded year-round subject to available funds.

SIRENIAN INTERNATIONAL, INC., is a non-profit, tax-exempt 501(c)(3) corporation; for more information on Sirenian International, Inc., please visit our website at <<http://www.sirenian.org>>.

NEW ELECTRONIC NEWSLETTER

SirenianVoice is a free electronic newsletter (not an e-mail group) edited by Caryn Self Sullivan of Sirenian International, Inc. It will be sent out to subscribers every 3-8 weeks. Articles will focus on manatee and dugong research and conservation around the world, and provide updates on Sirenian International and its activities. To learn more, please visit <<http://groups.yahoo.com/group/SirenianVoice>>.

If you are interested in an e-mail discussion group about manatees and dugongs, the Manatee Watchers Listbot Group is available. You can subscribe to it at: <<http://www.homesafe.com/manatee/index2.html>>.

LOCAL NEWS

AUSTRALIA

Funding for Dugong Tracking Project in Shark Bay. - The Western Australian Department of Conservation and Land Management, in conjunction with Shark Bay Yadgalah Aboriginal Corporation, Edith Cowan and James Cook Universities, recently received a

Natural Heritage Trust Grant for the continuation of what has turned into a very successful and exciting project.

Beginning with efforts in 1999 by Dr. Nick Gales, dugongs within Shark Bay have successfully been caught and GPS locational tags deployed. After a year of trials and fine-

tuning, five GPS tags were deployed for a 6-week period from August last year. All units were successfully retrieved by a remote release mechanism and were full of location positions. The subsequent plotting of the data showed the extent to which these five animals used areas of Shark Bay. Time-depth recorders (TDR's) were also attached to the harness system around the dugong's tail, allowing us to gain insight into the diving behavior of those animals as well as their movements.

With GPS now giving <5 m accuracy, the August 2000 deployment facilitated some fine-scale habitat analysis of those areas where the tagged dugongs had been concentrated. With seagrass analysis expertise from Edith Cowan University we are using videographic techniques to determine seagrass composition and cover within high-use dugong areas. Plotting dugong positions into Arcview with baseline seagrass data, distribution maps are produced which, used as management tools, will assist in the decision-making process for proposed developments within the Bay

With the receipt of this grant the project will continue on for at least two more years, with at least four deployments each year. The working relationship established between all parties and the local community has been one of the highlights of the program. In the years to come we hope to apply the Shark Bay model with indigenous communities further north and up into the Kimberley region, and begin a program in those areas to understand the movements of dugongs along the entire Western Australian coastline. - **Dave Holley** (Marine Fauna Zoologist, Dept. of Conservation and Land Management, Technology Park, 17

Dick Perry Ave, Kensington, Western Australia 6151; phone (08) 9334 0290 Mb: 0417 952 118; fax: (08) 9334 0278; e-mail <DavidHo@calm.wa.gov.au>

BRAZIL

Second Conception and Birth in Captivity and the First Case of Adoption in an Amazonian Manatee. -

After ten months of naturally weaning her two-year-old baby, Boo, a 26-year-old Amazonian manatee (see *Sirenews* No. 30), gave birth to her second calf conceived and born in captivity on 19 February 2001. This time it was a female 82.5 cm long and 8.4 kg in weight. Unfortunately the newborn was found dead. The necropsy showed no air in her lungs, suggesting that she didn't reach the surface to breathe. Birth was unattended and took place in a pool with several other young manatees.

Five days before, an orphan male manatee was rescued near Santarém and brought to INPA, in Manaus. He was 8.2 kg and 81 cm long, emaciated and already eating some aquatic vegetation. He was called "Tapajós". A few hours after Boo's dead calf was removed from the pool, Tapajós and Boo were put together in a separate pool. She started to vocalize continuously and accepted him immediately. With great patience and very gently, Boo taught Tapajós how to find her nipples, driving him to the walls of the pool and stretching her flipper in front of him. Only after more than 12 hours together did Tapajós start suckling - initially only on the left teat and at long intervals.

After almost a month of being raised by his foster mother, Tapajós has gained 2 kg, and is feeding on both nipples twice every hour, for about 1 to 1.5 minutes each time. This is the second

event of conception and birth of *Trichechus inunguis* in captivity, and the first case of successful adoption in the species. - Vera M. F. da Silva

FLORIDA

Record Number of Manatees Counted in 2001; Florida's Governor Stands Up for Manatees. - Perfect weather conditions played a role in the January manatee count by the Florida Fish and Wildlife Conservation Commission's (FWC) Florida Marine Research Institute (FMRI). The first of three aerial surveys for 2001 seems promising for the Florida manatee. The count produced a total minimum number of 3,276 manatees. On Florida's Gulf Coast, observers counted 1,756 manatees while observers on the East Coast counted 1,520. The previous highest statewide minimum count was 2,639, obtained in 1996.

Researchers from 15 state, federal and county agencies, research labs and universities cooperated to survey manatees at all wintering sites on both coasts. Teams of observers included 16 aircraft crews and nine crews on the ground.

Possibly contributing to this high total was the fact that manatee mortality during 2000 was not as bad as expected: 273 manatees died from all causes, only 4 more than in 1999. Watercraft-caused deaths were also down, to 78 as compared with 82 in 1999. Initial expectations for the year had been pessimistic, in view of record numbers of boat kills in February, March, and April.

These early alarms led to heightened manatee-protection efforts by state authorities. These included well-publicized actions by Florida's

Governor, Jeb Bush (brother of the new U.S. President), who has publicly called the manatee his "favorite mammal". In July 2000, he pledged that "Florida's manatees are not going to vanish on my watch."

During the summer, Governor Bush led the Florida Cabinet in calling for increased participation by local governments in the fight to protect manatees. A message was sent that the Cabinet would consider local governments' progress in manatee protection when making decisions about approving submerged land leases. It is hoped that this incentive will rejuvenate the process of generating legally-mandated Manatee Protection Plans in the several counties where this process has stalled.

Next, the Governor personally appeared in public service announcements encouraging Floridians to do their part in protecting manatees. Then, on October 19, he convened a "manatee summit" meeting of manatee experts and stakeholders in Tallahassee, and charged them with the goal of reaching consensus on what actions should be taken for manatee protection. (One of the main points of consensus reached was that additional law enforcement officers are needed.) The media attention resulting from this meeting put manatee conservation issues back in the statewide spotlight. - (Sources: FWC and FMRI)

Florida Manatee Status Statement. - Years of scientific study of the Florida manatee have revealed both good news and some cause for concern regarding the status of this endangered aquatic mammal, according to the interagency Manatee Population Status Working Group. The Manatee Population Status Working Group

comprises biologists from the U.S. Geological Survey, U.S. Fish and Wildlife Service, Florida Fish and Wildlife Conservation Commission, Chicago Zoological Society, and Wildlife Trust. The group's primary tasks are to assess manatee population trends, to advise the U.S. Fish and Wildlife Service on population criteria to determine when species recovery has been achieved, and to provide managers with interpretation of available information on manatee population biology.

Long-term studies suggest four relatively distinct regional subpopulations of the Florida manatee: Northwest, Southwest, Atlantic (including the St. Johns River north of Palatka), and St. Johns River (south of Palatka). These divisions are based primarily on documented manatee use of wintering sites and from radio-tracking studies of individuals' movements. Although some movement occurs among subpopulations, researchers found that analysis of manatee status on a regional level provided insights into important factors related to manatee recovery.

The exact number of manatees in Florida is unknown. Manatees are difficult to count because they are often in areas with poor water clarity, and their behavior, such as resting on the bottom of a deep canal, may make them difficult to see. A coordinated series of aerial surveys and ground counts, known as the statewide synoptic survey, has been conducted in most years since 1991. The synoptic survey in January 2001 resulted in a count of 3,276, the highest count to date. The highest previous count was 2,639 in 1996. Survey results are highly variable, and do not reflect actual population trend. For example,

statewide counts on 16 and 27 January 2000 differed by 36% (1,629 and 2,222, respectively). Excellent survey conditions and an unusually cold winter undoubtedly contributed to the high count in 2001.

Evidence indicates that the Northwest and Upper St. Johns River subpopulations have steadily increased over the last 25 years. This population growth is consistent with the lower number of human-related deaths, high estimates of adult survival, and good manatee habitat in these regions. Unfortunately, this good news is tempered by the fact that the manatees in these two regions probably account for less than 20% of the state's manatee population.

The picture is less optimistic for the Atlantic coast subpopulation. Scientists are concerned that the adult survival rate (the percentage of adults that survives from one year to the next) is lower than what is needed for sustained population growth. The population on this coast appears to have been growing slowly in the 1980s but now may have leveled off, or could even be declining. In other words, it's too close to call. This finding is consistent with the high level of human-related and, in some years, cold-related mortality in the region. Since 1978, management efforts to reduce human-related manatee deaths have included strategies focused on reducing manatee collisions with boats, reducing hazards such as entrapment in water control structures and entanglement in fishing gear, and protecting manatee winter aggregation sites to reduce cold-related mortality. Managers are continually challenged to develop innovative protection strategies, given the rapidly growing human population along Florida's coasts.

Estimates of survival and population growth rates are currently underway for the Southwest region. Preliminary estimates of adult survival are similar to those for the Atlantic region, i.e., substantially lower than those for the Northwest and Upper St. Johns River regions. This area has had high levels of watercraft-related deaths and injuries, as well as periodic natural mortality events caused by red tide and severe cold. However, pending further data collection and analysis, scientists are unable to provide an assessment of how manatees are doing in this part of the state.

Over the past ten years, approximately 30% of manatee deaths have been directly attributable to human-related causes, including watercraft collisions, accidental crushing and drowning in water control structures, and entanglements in fishing gear. In 2000, 34% (94 of 273) of manatee deaths were human-related. The continued high level of manatee deaths raises concern about the ability of the overall population to grow or at least remain stable. The Manatee Population Status Working Group is also concerned about the negative impacts of factors that are difficult to quantify, such as habitat loss and chronic effects of severe injuries.

The group agrees that the results of the analyses underscore an important fact: Adult survival is critical to the manatee's recovery. In the regions where adult survival rates are high, the population has grown at a healthy rate. In order to assure high adult survival the group emphasizes the urgent need to make significant headway in reducing the number of human-related manatee deaths. - **Manatee Population Status Working Group** (Lynn Lefebvre, Chair - 9 March 2001)

VENEZUELA

Ecological Damage to Orinoco Delta. - "In the mangrove forests of the Orinoco River Delta in Venezuela, Citi [Citigroup, North America's largest bank] sponsored the financing of a [US]\$2 billion oil drilling and pipeline project for DuPont's Conoco and Venezuela's Petróleos de Venezuela (PDVSA). The project has already caused irreversible pollution of the sensitive mangrove ecosystem, threatening the lives and culture of local inhabitants, including the traditional Warao people." (Source: Rainforest Action Network *Action Alert* 152, Feb. 2001.)

ABSTRACTS

The following abstract is of a paper presented at the XVII International BioAcoustics Council meeting, Chartres, France, 6-11 April 1999.

Individual Distinct Vocalization in Amazonian Manatees *Trichechus inunguis* (Sousa Lima, R. S., Paglia, A. P. and Fonseca, G. A. B.) (Departamento de Zoologia do Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Brasil <pboi@mono.icb.ufmg.br>). - Amazonian manatees have historically been exploited in Brazil, but there is little information on population status and trends. The difficulty of tracking individuals in turbid water habitats restrains the assessment of behavioral

characteristics, which in turn could be helpful in determining some key parameters about their conservation status. Currently, acoustic signals are assumed to form the basis of manatee communication, for which prior empirical evidence has been reported. Therefore, if manatees can recognize each other by acoustical means, it should be possible to identify individual vocal patterns. Vocalizations were recorded of 14 captive Amazonian manatees, temporarily and individually housed. The vocalizations were digitized and seven variables were recorded. These were subjected to multivariate statistical treatment. Principal Components Analysis grouped the data indicating that some individuals could be distinguished on the basis of variables related to the fundamental frequency of vocalizations (axis 1 of the PCA). We have also observed a significant difference in axis 1 between sexes, with a tendency of females to have greater fundamental frequency values than males. No difference was observed between different age classes in axis 1 of the PCA. Axis 2 of the PCA was positively related with the signal duration, isolating a mother and calf pair with greater signal duration values than the others. An inverse relation between body size (total body length) and the range of the fundamental frequency was verified. This study reinforces the possibility of identifying individual manatees by their vocal patterns, hence making bioacoustics a useful tool for behavioral and social studies, in addition to providing needed information on conservation strategies for the species.

The following abstract is of a paper presented at the Coastal Geotools 2001 conference, Charleston, South Carolina, 8-11 January 2001.

GIS Modeling of Warm-Water Refugia for Manatees in Florida: Alternatives to Power Plants (C. Friel, F. Sargent, L. Ward, and J.E. Reynolds III). - Manatees prefer access to warm water in winter and power plant discharges have partially fulfilled this need in Florida. Certain power plants in Florida have provided shelter for nearly 600 manatees during occasional periods of cold weather. As the 21st century begins, energy industry de-regulation and technological obsolescence may force the retirement of some of these plants. If these warm water sources disappear, these animals will either have to decide quickly to abandon areas they have learned to depend upon, or they may die. Florida Power and Light Company (FPL) has invested considerable funding into studying manatee use of power plant discharges. FPL proactively funded Eckerd College to investigate the identification of a series of locations that make sense as alternative, long-term warm-water refugia - assuming innovative ways for delivering low-cost warm water to these locations with minimal environmental impact could be developed.

Beginning in March 2000, the Florida Marine Research Institute (FMRI) provided scientific and GIS modeling support to Eckerd College for a spatial analysis of refugia locations on the East Coast of Florida. John Reynolds led an iterative process to identify and specify various habitat and human use criteria that would be combined using map algebra to identify candidate refugia locations. These "filter" criteria were re-stated as inclusionary (high proximity to seagrass or other manatee food) or exclusionary (minimize levels of human-related noise and disturbance due to boats). GIS databases were selected and manipulated to generate a series of maps that reflected the distribution of these criteria. Manatee, habitat, and GIS experts were assembled to debate and refine

the criteria and resultant maps based on their collective understanding of manatee distribution, physiology, and use of power plant discharges in winter. It became exceedingly clear that certain areas of the East Coast appeared to be very good candidates as possible new warm-water sites, whereas others were extremely unsuitable, based on those same criteria.

Four areas were identified with the greatest potential, and GIS experts added additional databases and filters to further characterize the site and situation of these areas. Some of those layers include: bathymetry (escape routes for manatees); boundaries of existing protection zones; and locations of non-pristine, disturbed areas (such as mosquito impoundments) about which property owners may lack strong feelings. The overall recommendation was that these areas should be considered as part of a system of sanctuaries designed to protect manatees along the East Coast of Florida. Additional measures could include: 1) formal designation as managed areas, 2) educating the public about these areas, 3) developing means to deliver warm water to these areas in the winter, and 4) implementing a monitoring program to determine changes in manatee distribution and habitat use as the new areas, complete with warm water, come into being. FMRI and Eckerd College plan to expand and refine these analyses for a more robust risk assessment in the future.

RECENT LITERATURE

- Alava, M.N.R., and A.A.S.P. Yaptinchay. 1997. Marine mammals. *Philippine Red Data Book*. Makati City (Philippines), Bookmark, Inc. (xiii + 262 pp.): 169-246.
- Angelici, F.M., I. Grimod, and E. Politano. 1999. Mammals of the Eastern Niger Delta (Rivers and Bayelsa States, Nigeria): an environment affected by a gas-pipeline. *Folia Zool.* 48(4): 249-264.
- As-Saruri, M.L., P.J. Whybrow, and M.E. Collinson. 1998. Discovery of fruits, seeds and vertebrates in the Kaninah and Mayfa'ah Formations (Middle Eocene), Republic of Yemen. *Zs. Geol. Wiss.* 26(5-6): 697-703.
- Astibia, H., X. Murelaga, A. Payros, X. Pereda, and J. Tosquella. 1999. Fossil turtles and sirenians from the marine Eocene of Navarre and Jaca Basin. *Geogaceta* 25: 15-18.
- Baldwin, R. 1995. Abu Dhabi and the disappearing dugong. *Tribulus* 5(2): 7-8.
- Baldwin, R. 1996. Marine mammals. In: P.J. Vine (ed.), *Natural Emirates: wildlife and environment of the United Arab Emirates*. London, Trident Press (248 pp.): 199-212.
- Chow, B.A. 1997. Biological and management aspects of a Caribbean mangal: West Harbour, Jamaica. *Publ. Found. Sci. Res. Carib. Region* 139: 1-22.

- Colares, E.P., I.G. Colares, A. Bianchini, and E.A. Santos. 2000. Seasonal variations in blood parameters of the Amazonian manatee, *Trichechus inunguis*. *Brazilian Archs. Biol. & Technol.* 43(2): 165-171.
- Colbert, D. & Bauer, G.B. (1999). Basic husbandry training of two West Indian manatees (*Trichechus manatus latirostris*). *Soundings* 24: 18-21.
- De Iongh, H. 1999. Optimizing the design of marine reserves to protect dugongs in a small island ecosystem. *Tigerpaper* (Bangkok) 26(2): 6-13.
- Dermastia, M. 1997. [Florida manatees and their newly discovered relatives. Morphological studies using molecular biology data.] *Proteus* 60(2): 79-81.
- Deutsch, C.J. 2000. Winter movements and use of warm-water refugia by radio-tagged West Indian manatees along the Atlantic coast of the United States. Final Report prepared for the Florida Power and Light Company and U.S. Geological Survey. 133 pp.
- Deutsch, C.J., J.P. Reid, R.K. Bonde, D.E. Easton, H.I. Kochman, and T.J. O'Shea. 2000. Seasonal movements, migratory behavior, and site fidelity of West Indian manatees along the Atlantic coast of the United States as determined by radio-telemetry. Final Report. Research Work Order No. 163. Florida Cooperative Fish and Wildlife Research Unit, U.S. Geological Survey and University of Florida. 254 pp. + xii.
- Dinesen, Z. 1998. Management of the Great Barrier Reef Marine Park. In: J.G. Greenwood and N.J. Hall (eds.), *Australian Coral Reef Society 75th Anniversary Conference Proc.* (viii + 286 pp.): 67-76.
- Domning, D.P. 2001. Sirenians, seagrasses, and Cenozoic ecological change in the Caribbean. *Palaeogeogr. Palaeoclim. Palaeoecol.* 166(1-2): 27-50.
- Domning, D.P. 2001. Evolution of the Sirenia and Desmostylia. In: V. de Buffrénil and J-M. Mazin, eds., *Secondary Adaptation of Tetrapods to Life in Water*. Munich, Verlag Dr. Friedrich Pfeil: 151-167.
- Domning, D.P. 2001. Supposedly unique features of the desmostylian tibia are also found in other mammals. *Bull. Ashoro Museum of Paleontology* No. 2: 39-42.
- Eduardo, S.L., A.A.P. Yaptinchay, and T.M.S. Lim. 1998. Some helminth parasites of a sea cow (*Dugong dugon*, Muller, 1776) (Mammalia: Sirenia) in the Philippines. *Phil. Jour. Veter. Med.* 35(1-2): 27-36.
- Faulkner, D. 2000. *Of manatees and man*. Xlibris Corp.: 1-101. [Order from: <Orders@Xlibris.com>]
- Gaeth, A.P., R.V. Short, and M.B. Renfree. 1999. The developing renal, reproductive,

and respiratory systems of the African elephant suggest an aquatic ancestry. *Proc. Natl. Acad. Sci. USA* 96(10): 5555-5558.

- Guissamulo, A. 1997. Class Mammalia - marine mammals. In: M.D. Richmond (ed.), *A guide to the seashores of eastern Africa and the western Indian Ocean islands*. Stockholm, SIDA/Dept. for Research Cooperation, SAREC (448 pp.): 384-389.
- Hotta, A. 1998. *Manatee*. San Francisco, Chronicle Books: 1-96.
- Hulbert, R.C., Jr., R.H. Reinhart, G.S. Morgan, and A.E. Pratt. 2001. Sirenians. Pp. 322-330 in: R.C. Hulbert, Jr. (ed.), *The Fossil Vertebrates of Florida*. Gainesville, University Press of Florida (350 pp.).
- Inuzuka, N. 2000. Aquatic adaptations in desmostylians. *Historical Biology* 14(1-2): 97-113.
- Jefferson, T.A., and S. Leatherwood. 1995. [Marine mammals.] In: W. Fischer, F. Krupp, W. Schneider, C. Sommer, K.E. Carpenter, and V.H. Niem (eds.), *Guia FAO para la identificacion de especies para los fines de la pesca. Pacifico centro-oriental. Vol. 3: Vertebrados - Parte 2. [The FAO guide to species identification for use in the Central and Eastern Pacific fishery. Vol. 3: Vertebrates - part 2.]* Rome, UNFAO (v + 1201-1813): 1669-1744.
- Klima, M. 1999. Development of the cetacean nasal skull. *Advances in Anat. Embryol. & Cell Biol.* 149: viii + 143.
- Koelsch, J.K. 2001. Reproduction in female manatees observed in Sarasota Bay, Florida. *Mar. Mamm. Sci.* 17(2): 331-342.
- LaBonne, D.L. 1998. Today's innovations in life-support technology set the stage for the 21st century. *Amer. Zoo & Aquarium Assoc. Regional Conference Proc.* 1998: 476-483.
- Lal Mohan, R.S. 1998. Mortality of marine mammals along the Indian coast. *Tigerpaper (Bangkok)* 25(4): 13-16.
- Lee-Long, W.J., R.G. Coles, and L.J. McKenzie. 2000. Issues for seagrass conservation management in Queensland. *Pacif. Conserv. Biol.* 5(4): 321-328.
- Mignucci-G., A.A., R.A. Montoya-O., N.M. Jimenez-M., M.A. Rodriguez-L., E.H. Williams, Jr., and R.K. Bonde. 2000. Manatee mortality in Puerto Rico. *Envir. Management* 25(2): 189-198.
- Morgan, U.M., L. Xiao, B.D. Hill, P. O'Donoghue, J. Limor, A. Lal, and R.C.A. Thompson. 2000. Detection of the *Cryptosporidium parvum* "human" genotype in a dugong (*Dugong dugon*). *Jour. Parasitol.* 86(6): 1352-1354.

- Mukhametov, L.M., O.I. Lyamin, I.S. Chetyrbok, A.A. Vassilyev, and R.P. Diaz. 1994. Sleep in an Amazonian manatee, *Trichechus inunguis*. In: V.E. Sokolov (ed.), *Mlekopitayushchie Peruanskoi Amazonii [Mammals of Peruvian Amazonia]*. Moscow, Nauka (301 pp.): 283-288. [In Russian.]
- Muller, J.F., D. Haynes, and M.S. McLachlan. 1998. PCDD/Fs in the Great Barrier Reef environment of Australia. *Organohalogen Compounds* 39: 105-108.
- Noreno-Barroso, E., O. Zapata-Perez, V. Ceja-Moreno, and G. Gold-Bouchot. 1998. Hydrocarbon and organochlorine residue concentrations in sediments from Bay of Chetumal, Mexico. *Bull. Envir. Contam. & Toxicol.* 61(1): 80-87.
- Oliver, J., and R. Berkelmans. 1999. A dugong research strategy for the Great Barrier Reef World Heritage Area and Hervey Bay. *Great Barrier Reef Marine Park Authority Res. Publ.* 58: iii + 52.
- Pervesler, P., R. Roetzel, and D.P. Domning. 2000. Lower Miocene seacows from Austria. In: W.E. Piller et al., *Palaeontological highlights of Austria. Mitt. Oesterr. Geol. Ges.* 92: 213-215.
- Platt, S.G., T.R. Rainwater, B.W. Miller, and C.M. Miller. 2000. Notes on the mammals of Turneffe Atoll, Belize. *Carib. Jour. Sci.* 36(1-2): 166-168.
- Ramakrishna, S. Talukdar, J. Sarkar, and S. Mitra. 1999. Dugong and dolphin stranded at Digha Beach, West Bengal. *Environment and Ecology (Kalyani)* 17(4): 1031-1032.
- Rathbun, G.B., and R.L. Wallace. 2000. Florida manatee. In: R. P. Reading and B. Miller (eds.), *Endangered animals: a reference guide to conflicting issues*. Westport (Connecticut), Greenwood Press (383 pp.): 107-111.
- Richardson, W.J., C.R. Green, Jr., C.I. Malme, and D.H. Thomson. 1995. *Marine mammals and noise*. San Diego, Academic Press: xvi + 576.
- Sidorov, Ye. 1998. Will the monument to the sea cow be installed? (A letter to the editorial office.) *Rybnoe Khozyaistvo* 5-6: 48-49. [In Russian.]
- Silva, M.A., and A. Araújo. 2001. Distribution and current status of the West African manatee (*Trichechus senegalensis*) in Guinea-Bissau. *Mar. Mamm. Sci.* 17(2): 418-424.
- Silva, M.A., A. Araújo, F. Djedo, L. Gomes, and H. Monteiro. 1999. Status of the West African manatee (*Trichechus senegalensis*) in Guinea-Bissau. *European Research on Cetaceans* 13: 263-266.

- Stewart, D. 1999. Making sense of manatees. *National Wildlife* 37(3): 40-47.
- Taylor, M.A. 2000. Functional significance of bone ballast in the evolution of buoyancy control strategies by aquatic tetrapods. *Historical Biology* 14(1-2): 15-31.
- Wallace, R.L., and T.W. Clark. 1999. Solving problems in endangered species conservation: an introduction to problem orientation. *Endangered Species Update* 16(2): 28-34.
- Walsh, M.T., and G.D. Bossart. 1999. Manatee medicine. In: M.E. Fowler and R.E. Miller (eds.), *Zoo and wild animal medicine: current therapy*. 4th Ed. Philadelphia, London, etc., W. B. Saunders Co. (xxiii + 747 pp.): 507-516.
- Whiting, S.D. 1997. Opportunistic observations of marine mammals from the coastal waters of Fog Bay, Northern Territory. *Northern Territory Naturalist* (Australia) 15: 16-26.
- Yamamuro, M. 1999. Importance of epiphytic cyanobacteria as food sources for heterotrophs in a tropical seagrass bed. *Coral Reefs* 18(3): 263-271.

SIRENIAN WEBSITE DIRECTORY

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

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

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

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

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

Columbus (Ohio) Zoo manatee exhibit, live camera: <<http://www.discovery.com/cams/manatee/manatee.html>>

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

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>>

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

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

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

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

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

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

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

Sirennews (texts of current and recent issues): <<http://pegasus.cc.ucf.edu/~smm/>>

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>>

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>>

CHANGES OF ADDRESS

Dr. Chip Deutsch, 13905 NW 56th Ave., Gainesville, Florida 32653 USA (phone: 352-331-2610; e-mail: <deutsch@nersp.nerdc.ufl.edu>

Jessica Koelsch, Florida Marine Wildlife Project Manager, Southeast Atlantic & Gulf of Mexico Regional Office, 449 Central Ave #200, St. Petersburg, Florida 33701, USA (phone: 1-727-895-2188; fax: 1-727-895-3248; website: <www.cmc-ocean.org>)

Dr. James A. "Buddy" Powell, Florida Marine Research Institute, 100 8th Ave. SE, St.

Petersburg, Florida 33701 USA (phone: 1-727-418-9136; e-mail:
<powell@wpti.org>)

Alastair G. Watson, Department of Physiological Sciences, 264 College of Veterinary
Medicine, Oklahoma State University, Stillwater, Oklahoma 74078-2014, USA

>>> COPY DEADLINE FOR NEXT ISSUE: OCTOBER 1, 2001 <<<

The *Sirenews* fax number is 1-202-265-7055 (USA).

Material may also be submitted by e-mail to: <ddomning@fac.howard.edu>

Read *Sirenews* on the Internet

at <<http://pegasus.cc.ucf.edu/~smm/>>

If the electronic edition meets your needs and you no longer need to receive
the hard-copy edition, please notify the Editor (D. Domning) at the above address
so that we can save on printing and postage. Thank you!



Printed on recycled paper with soy ink