SARASOTA DOLPHIN RESEARCH PROGRAM

Chicago Zoological Society

NICKS 'N' NOTCHES

Annual Summary of the Field Activities and Findings of the Chicago Zoological Society's Sarasota Dolphin Research Program

• January 2009 •

Dolphins, People and Conservation

By Stuart Strahl, PhD, President, Chicago Zoological Society

The mission of the Chicago Zoological Society (CZS) is to inspire conservation leadership by connecting people with wildlife and nature. This is a daunting task in an urbanized world in which people are increasingly dislocated from nature, and we approach it through programs at the Brookfield Zoo, serving over 2 million guests each year, as well as field programs in conservation and education around the world. For the past two decades, the CZS has been the proud sponsor of the Sarasota Dolphin Research Program (SDRP). During this period, we have helped to grow this program by almost 1,000% and dramatically expand its international components. Our excellent staff, led by Dr. Randy Wells, has provided remarkable field results that have furthered the understanding and conservation of dolphins worldwide.

As an organization focused on wildlife conservation, the CZS is particularly proud of the leadership role the SDRP has played in the local, regional, and international conservation of marine mammals. The importance of this program is profound, focusing on field studies and the direct application of data towards dolphin conservation. Through these studies, we have expanded the knowledgebase of dolphin and marine mammal ecology, life history, health, and behavior, and have informed scientists, agencies, and organizations with interest in marine mammals. Our research has also informed the public regarding these charismatic species, and engaged them directly in dolphin well-being through publicity and outreach programs.

The results of the SDRP also pertain to larger issues related to the long-term sustainability of wildlife, ecosystems, and human well-being. For instance, our research has brought national attention to the adverse impact of pesticides and other human-produced bio-accumulating compounds on the local estuarine and marine environment by demonstrating the effects of these chemicals on dolphins and their prey. Other significant areas of investigation include the impact of "red tide" on local and regional environments and the long term potential for global climate change as a key factor in the conservation of dolphins and their environments. Perhaps most importantly, the SDRP has grown as a training operation for dolphin biologists, ecologists, veterinarians, and conservation leaders worldwide, who continue this work on a global scale.

As a major zoological and conservation institution, the Chicago Zoological Society has a unique perspective on the broader effects of this research. In addition to education, training, and conservation programs, the CZS also operates the Brookfield Zoo, the first inland zoological facility to house dolphins and educate the public on their conservation status in the wild. The data produced by the SDRP on the behavior, demographics, health and breeding biology of bottlenose dolphins has directly and profoundly impacted marine mammal husbandry at Brookfield Zoo and on a global scale. This work has facilitated major shifts in captive management of dolphins, and facilitated our establishment of an international consortium of conservation breeding centers.

At the Chicago Zoological Society, we believe that people can be catalysts for conservation, and developing leaders among the public and scientists is our primary goal. There are few examples as striking and profoundly effective in this regard than our long-term work through the Sarasota Dolphin Research Program led by Dr. Randy Wells, and the many scientists, researchers, and volunteers who have made this outstanding international program so incredibly productive and successful. Congratulations!

Our approach toward helping dolphins

By Randall Wells, PhD

Our desire with each research or conservation project in Florida or elsewhere is to contribute to a better understanding of the structure and dynamics of populations of small cetaceans (dolphins, whales, and porpoises), as well as the natural and anthropogenic factors (factors of human origin) that impact them. We use an interdisciplinary and collaborative approach in conducting studies of bottlenose dolphins within a unique long-term natural laboratory. The primary goals of our program include:

(1) collecting biological, behavioral, ecological, and health data of importance to the conservation of small cetaceans, especially bottlenose dolphins,

(2) providing requisite information for bottlenose dolphin conservation to wildlife management agencies,

(3) disseminating the information generated by our program to scientific and general audiences in order to aid dolphin conservation efforts,

(4) using our model program to develop and refine hypotheses regarding bottlenose dolphins in other parts of the species' range as well as other species of small cetaceans,

(5) using the established natural laboratory to develop and test new research tools and methodologies of potential benefit to conservation efforts,

(6) training cetacean conservation workers and students from around the world in the use of these techniques,

(7) applying our unique program expertise to dolphin rescue operations and post-release follow-up monitoring, and

(8) applying the information we gather from free-ranging dolphins to improve the quality of care for dolphins in zoological park settings.

The work toward achieving these goals is conducted under the umbrella of the "Sarasota Dolphin Research Program" (SDRP). This name links the efforts of several organizations that work together to insure the continuity of the long-term dolphin research in Sarasota Bay. The Conservation, Education, and Training Group of the Chicago Zoological Society (CZS) has provided core staff salaries and administrative and operational support for the program since 1989. Dolphin Biology Research Institute, a Sarasota-based 501{c}3 non-profit corporation established in 1982, provides logistical support with its fleet of five small research vessels, two towing vehicles, computers, cameras, field equipment, etc. Since 1992, Mote Marine Laboratory has provided a convenient base on City Island in Sarasota Bay, with office, storage and dock space, and easy access to good boat launching ramps. The SDRP maintains academic connections including graduate student sponsorships primarily through the University of California at Santa Cruz, the University of North Carolina at Wilmington, and the University of South Florida.

All of our bottlenose dolphin research in the United States is conducted under National Marine Fisheries Service Scientific Research Permit No. 522-1785 and Institutional Animal Care and Use Committee approvals through the appropriate institutions.

CZS President Dr. Stuart Strahl (right) with franciscana dolphin conservation project leader Pablo Bordino (center) and CZS Sarasota Dolphin Research Program manager Dr. Randall Wells (left) during bottlenose dolphin health assessment in Sarasota Bay.

IN THIS ISSUE

Health and Physiology

Ecology, Population Structure, and Dynamics

Dolphin Rescues, Releases, and Follow-up Monitoring

Involvement in Other Marine Mammal Conservation and Research Activities

Education, Outreach, and Training

Program Operations

Depredation and fisheries interactions involving bottlenose dolphins

By Jessica Powell, MS Candidate, University of South Florida

C835 leaps as Jessica Powell photographs during a sighting in Sarasota Bay.

Kristen Burtch and Kim Atwater collecting data during a behavioral focal follow.

F109 stalks a fishing boat in New Pass.

Dolphins in the Sarasota Bay area have been observed and reported stealing bait or catch off fishing lines, stalking fishing boats to eat catch thrown back by fishermen, and even begging from boats. Such angler-interaction behaviors are defined as depredation: the act of stealing or damaging a prey item already captured by some other process. The consequences of depredation behaviors became evident in the spring of 2006 when 2% of the resident dolphin community died from ingestion of lures, hooks, and other recreational fishing gear. Simulation modeling by Dr. Bob Lacy of the Chicago Zoological Society showed that such losses to this population were unsustainable. In an effort to reduce this mortality, this project aimed to investigate a number of factors that could contribute to the increase in dolphin-fishing interactions. It was also our goal to help mitigate the problem by developing and distributing an informational card, "Dolphin-Friendly Fishing and Viewing Tips" (see inside back cover).

From May 2007 through April 2008, we monitored local fishing piers, both visually and acoustically, for dolphin presence, depredation events, and fishing effort. Findings showed that depredating dolphins are not attracted to specific bait, catch, or overall fishing effort. The depredation behavior from piers appears to be opportunistic or involve specific animals, such as adult male FB106, suggesting that this is a learned foraging strategy. Acoustic monitoring for depredating dolphins proved to be relatively ineffective; however, it did reveal that FB106 was echolocating during some depredation events. We were surprised to see that this animal used a high-energy sensory process like echolocation for depredation, which appeared to be a low-cost foraging strategy.

In summer 2007 and 2008, we conducted focal behavioral follows on pre-selected individuals in order to better understand the behavior of depredating animals. Overall, depredating dolphins allotted different amounts of time for specific habitat and activity use than did control animals (non-fishing interacting dolphins) of the same sex and similar age. Depredating dolphins spent less time traveling and naturally foraging and more time milling. In addition, fishing interaction dolphins spent more time in channels and passes and near fishing boats and lines than did non-fishing interaction animals. Currently, we are working on an analysis that will allow us to evaluate hearing capabilities and socialization patterns of depredating animals.

Unfortunately, analysis of long-term data has shown that dolphin-angler interactions have continued to rise since 2005. The greatest numbers of dolphin-angler interactions are recorded in March, a time of year in Sarasota when there are high numbers of tourists and seasonal residents present.

In an effort to raise public awareness and support on this issue, "Best Fishing Practices for Avoiding Interactions with Wild Dolphins" (developed by NOAA, working in conjunction with Mote Marine Laboratory, the Chicago Zoological Society, and Hubbs SeaWorld Research Institute) were incorporated into a 3x5 laminated informational card, "Dolphin-Friendly Fishing and Viewing Tips." Since January 2008, over 197,000 cards (English and Spanish) were distributed primarily throughout the state of Florida to fishing piers, bait and tackle shops, marinas, aquariums, boat rental facilities, and organizations with the ability to reach the target audience. Overall, the goal is to reduce human impacts on wild bottlenose dolphins so that populations will continue to thrive in Florida waters. Furthermore, since dolphin depredation and fisheries interactions are a problem worldwide, we hope our methods can serve as a template for evaluating and solving the same issues in other study areas.

F232 stalks a fishing boat in Longboat Pass.

A boater illegally feeds BEGR in Venice.

A fishing boat looks on as BEGR takes a fish.

This project was made possible by funding provided by the USF College of Marine Science Graduate Assistantship, with assistance from Fish Florida, and the Disney Wildlife Conservation Fund.

Assessment of depredation by bottlenose dolphins in the Northwest Florida and Alabama sport fishery

By Steve Shippee, PhD Candidate, University of Central Florida

During 2008, we initiated a new study to assess the problem of harmful interactions between bottlenose dolphins and the sport fishery along the Northwest Florida – Alabama Gulf Coast. Sport anglers and boat operators report increasing incidences of dolphins stealing hook-and-line caught fish, regulatory discards, and bait. Aside from anecdotal information, little else is known about the extent and frequency of this problem, or of the consequence to dolphins that are injured or killed by fishing gear and the retributions of upset anglers. It is also unknown if some dolphins have become dependent on depredation as a principal feeding strategy, as has been suggested by some anglers.

The population status of dolphins in the Northern Gulf of Mexico is not well known, especially after recent hurricanes, red tides, and Unusual Mortality Events (UMEs). Increased interactions with sport fishing may indicate a shift in dolphins' prey fish availability, suggesting ecological and habitat disturbance might underlie this problem. We speculate that discard requirements for undersized fish in the sport fishery also play a large role in exasperating dolphins' persistence to depredate since fishing boats and piers serve as easy prey sources. Presumably, the unintentional feeding of dolphins reinforces the interactions and promotes the problem as younger dolphins learn depredation behaviors from adults, which may have significant effects on juvenile survival.

Figure 1 - Entangled dolphin calf in Destin

Our study sites are in Destin, Florida and Orange Beach, Alabama, where there are frequent reports of dolphins depredating sport fishing in the estuaries, at fishing piers, and at the near-shore reefs. The occurrence of these interactions appears to be year-round. Since January 2008, there have been two cases of dolphins being entangled in fishing gear in Destin (Fig. 1) and one unconfirmed report of a dolphin trailing a buoy. We have partnered with members of the charter fishing fleets in both locations and are also monitoring dolphin depredation activity at two Gulf fishing piers (Fig. 2). We have already identified numerous dolphins that frequent the fishing piers and two that travel between the piers, a distance of over 33 miles (Fig. 3). Our project addresses four aspects of this issue: 1) examine the extent of the fishery depredation problem, 2) assess impacts on dolphins, 3) investigate mitigation approaches, and 4) develop and disseminate educational information on "dolphin-friendly fishing tips". Our objectives will be accomplished through direct observation of sport fishing, photo-identification of individual dolphins, angler surveys, and public outreach. We will be establishing community support for outreach opportunities as our study develops, and we look forward to reporting on our progress in the coming year.

Figure 2 - Dolphin patrolling Okaloosa Pier

This study is funded by the National Sea Grant Program of the U.S. Department of Commerce's National Oceanic and Atmospheric Administration under NOAA Grant NA07OAR4170511, the Mississippi-Alabama Sea Grant Consortium Project Number R/MG/BR-01A, and the Sea World Busch Gardens Conservation Fund.

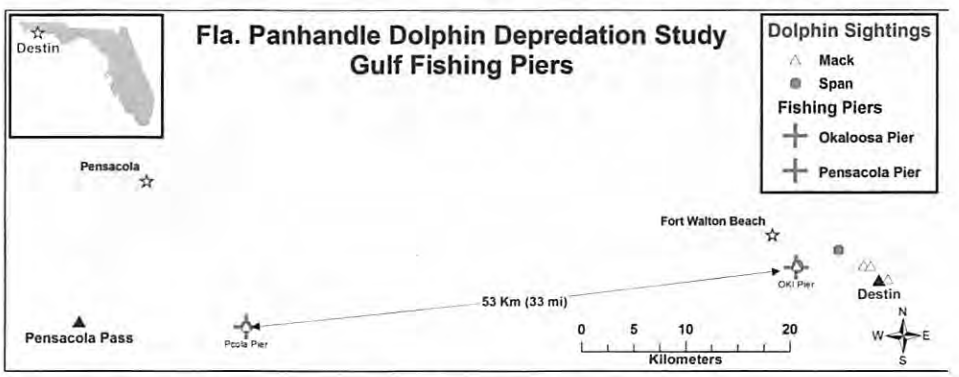


Figure 3 - Panhandle project map with dolphins at fishing piers

Assessing angler knowledge and experience with fishing line debris and wildlife interactions at the Sunshine Skyway Fishing Pier

By Robin Perrtree, BS and Kim Bassos-Hull, MS

During our pilot project on the South Sunshine Skyway Fishing Pier in 2006, we realized that the problem of dolphins stealing bait and catch from anglers' lines was worse than anticipated. In addition, lack of monofilament recycling bins resulted in a fishing line littering problem. In 2007 we teamed up with the Ocean Conservancy (TOC) and the National Marine Fisheries Service (NMFS) to clean up fishing line that accumulated on the pier and in the water under the pier. Together we assessed the knowledge, awareness, and attitudes of fishermen toward discarded fishing line and fishing around dolphins. The next step was to attempt to reduce the amount of fishing line that is getting into the environment through educational outreach and installation of recycling bins. In 2008, we reassessed angler knowledge, awareness, and attitudes. The expectation was that all of these efforts would reduce the amount of fishing line in the environment, therefore reducing the chance of entanglement for marine life, including dolphins.

The main role of the Sarasota Dolphin Research Program (SDRP) in this project was to assess the effectiveness of our outreach efforts. The SDRP and the TOC, together with a team of trained volunteers, completed pre-clean-up surveys of 400 fishermen in summer 2007, another 414 surveys in spring 2008 in the middle of our efforts, and a third round of 398 surveys in late summer 2008 at the end of the project. The goal of all of these surveys was to assess knowledge about the harm that fishing line can do in the environment, current fishing practices, and human-dolphin interactions, then evaluate how the anglers' responses changed over time.

In the Pre-project surveys, 65% of anglers had seen animals entangled in fishing line (birds, dolphins, manatees, sea turtles, and fish), and 53% reported having a dolphin steal either their bait or catch in the past, indicating that wildlife interactions were a very serious problem at this pier. After almost a year of outreach and clean-up efforts, we found a slight decrease in anglers who had a dolphin steal from them on the same day they were surveyed. Our survey showed that fishermen who have had dolphins steal their bait or catch are more likely to have a more negative view towards dolphins than those who have not had interactions with dolphins (Figure 1).

Unfortunately, most of the fishermen (70% during pre-surveys) toss leftover bait back into the water, which encourages wildlife to approach the pier where they could become entangled in the gear of other fishermen. One of the main outreach messages we tried to provide the anglers was the recommendation that leftover bait could be given to other fishermen or taken home for later use, rather than tossed back into the water. In the post-surveys, we observed a small, but statistically significant, drop in anglers reporting that they discard leftover bait into the water and a statistically significant increase in the number of anglers who reported taking their leftovers home to freeze and reuse later.

Thousands of pounds of debris were removed from the environment surrounding the pier in Fall 2007. After the clean-up, over 40 monofilament recycling bins and ten signs with "dolphin-friendly fishing tips" were installed on the pier. A pier walker program of volunteers who went out and talked to the fishermen a couple times a week about responsible line disposal, entanglement issues, and how to avoid dolphins was implemented. The pier walkers also helped to maintain and empty the monofilament recycling bins.

Our post-surveys showed that approximately 40% of anglers have been exposed to our outreach message either through the signs or pier walkers and just over half of those exposed have changed their fishing behavior based on our suggestions (Figure 2). As the educational component of this project continues, through the continued dedication of our pier walkers and the permanently installed signage, we hope that additional fishermen consider adopting the suggested "dolphin-friendly fishing tips," thus reducing the number of dolphins stealing from fishermen and preventing dolphin deaths from recreational fishing gear. This has the potential to reduce the frustration felt by fishermen when their catch is lost to dolphins. This project was funded by a NOAA Marine Debris Prevention and Removal grant and a National Fish and Wildlife Foundation grant with matching funds provided by the Chicago Zoological Society and Mote Marine Laboratory.

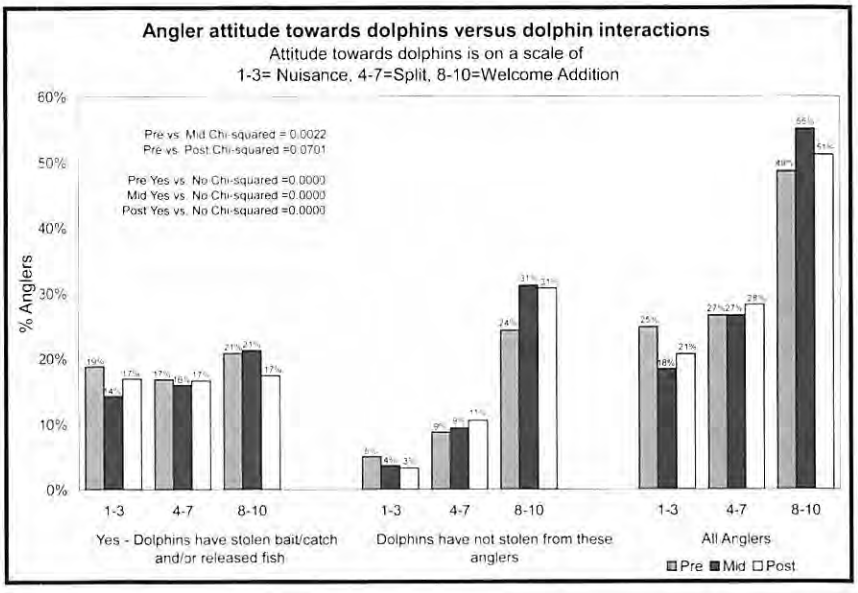


Figure 1. Angler attitude towards dolphins versus dolphin interactions.

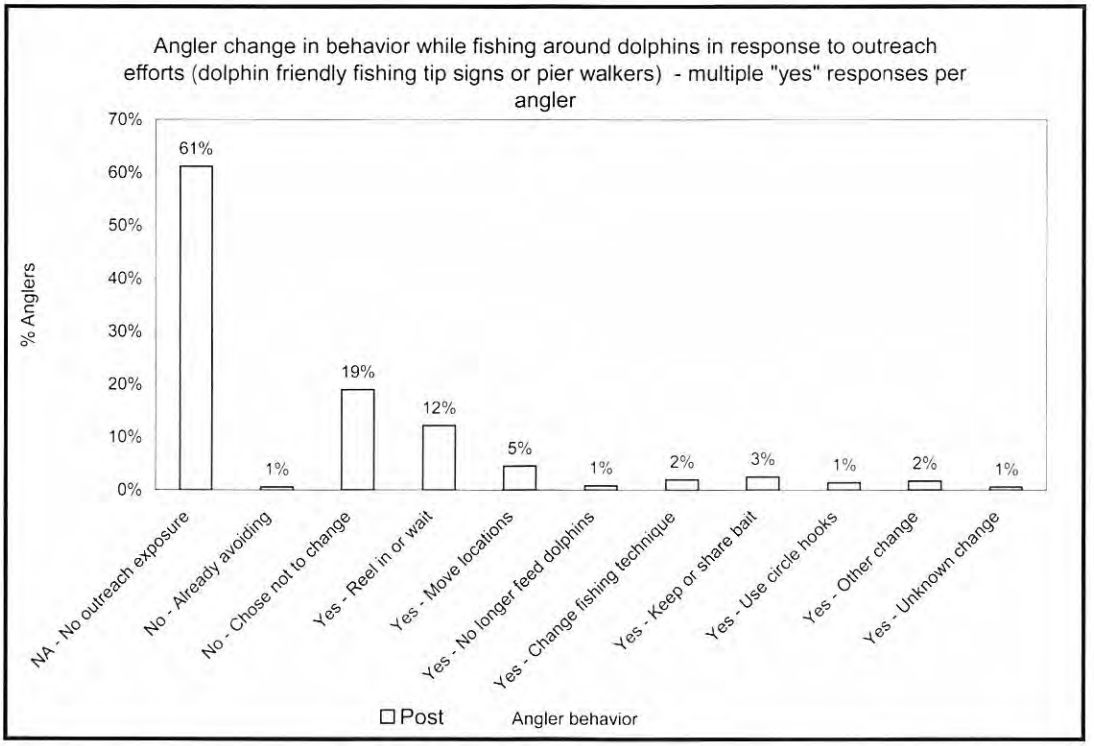
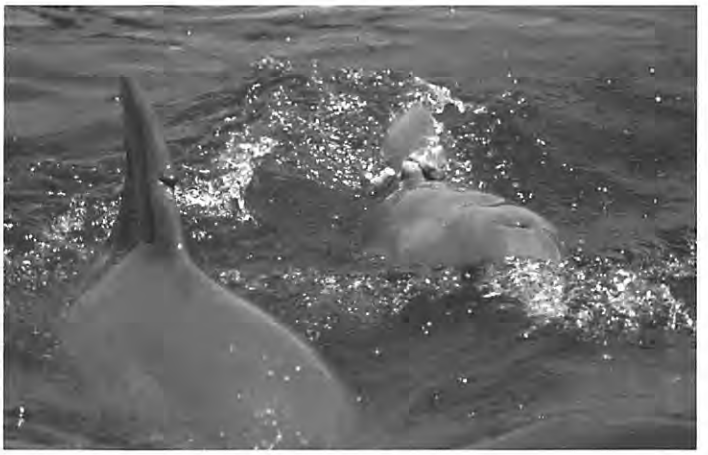


Figure 2. Angler change in behavior while fishing around dolphins in response to outreach efforts.

Robin Perrtree takes pictures for identification of a dolphin patrolling near an angler at the South Sunshine Skyway Fishing Pier.

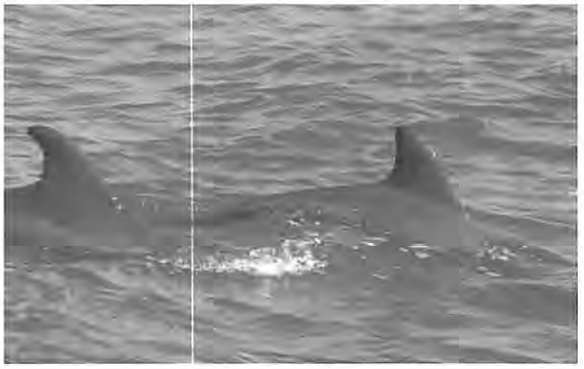


Mother (SRCA), with her entangled calf at the South Sunshine Skyway Fishing Pier in August 2008. This calf was seen starting in early August entangled in fishing line that was cutting into the dorsal fin. It was seen in late August with less line, but trailing the bobber seen in this image. Due to the location of this mother and calf pair, in deep water with swift currents near a fishing pier and reefs, a rescue was not possible. The SDRP and local stranding networks continued to monitor this animal through reports from local citizens as well as direct observations by experts.

Juvenile dolphin behavioral development and survival strategies

By Katherine McHugh, MS, PhD Candidate - University of California, Davis

The juvenile life stage is both fragile and formative for young marine mammals first learning to navigate their complex social and ecological environment independent of their mothers. While bottlenose dolphins are well-studied, virtually no prior work focused on understanding behavioral development between weaning and sexual maturity or determining factors influencing survivorship of independent juveniles. Because of the SDRP's long-term research, the "natural laboratory" of Sarasota Bay has provided a unique opportunity to address these issues in my doctoral research.



Two juveniles, F198 and Bud (F196), who are part of a group of young males just sorting out alliance partnerships.

To this end, the main objectives of my dissertation project are: 1) to develop a better understanding of social and behavioral development of juvenile bottlenose dolphins, and 2) to determine the major behavioral and ecological influences on survival of free-ranging juvenile dolphins. I have been investigating these questions by combining long-term sighting and mortality data from the resident dolphin community in Sarasota Bay with new information collected via focal animal observations on individually-identifiable juveniles in the community, providing both a longitudinal and cross-sectional perspective on juvenile behavior.

Fieldwork for this project began in summer 2005 and was completed in August 2008. In 2008, I spent most of my time in the field; carrying out my final winter and summer field seasons of behavioral observations and then finishing data entry and double checking data for all seasons this fall. Over the course of this project, I have collected over 585 hours of focal follow behavioral data on 27 individuals (14 females and 13 males) in the Sarasota community ranging in age from 2 to 13 years old. While a few of these animals have either died, gone missing, or had calves of their own since the project began, most were observed in each of my six seasons. It has been extremely interesting to watch their behavior and relationships change over the past three years, especially as several males have begun to form alliances and some females have gotten closer to becoming first-time mothers.

Now that data collection is complete, I have moved fully into analysis and writing mode. One of the main areas I've explored so far has been the effects of red tide on juvenile dolphin behavior. While not originally intended to be a focus of this study, my first two field seasons coincidentally took place during periods in 2005 and 2006 when red tide was a factor. Preliminary analysis from those seasons showed that both social behavior and activity budgets differed substantially during red tide, potentially as a consequence of underlying changes in relative prey availability and distribution (see Gannon, Berens, and Camilleri article in this edition). I am currently working on more extensive analysis of the changes in social behavior and social networks observed during red tide events and preparing a manuscript for publication from these results. Additionally, I am beginning to work on the major analyses for my dissertation, using focal follow data to explore sex, seasonal, and age-related differences in juvenile behavior (primarily looking at association and ranging patterns, habitat use, and activity budgets) and drawing on long-term data to investigate factors influencing age at independence for dolphin calves as well as behavioral and ecological effects on juvenile dolphin survivorship. This research will reveal the range of variability in developmental trajectories of bottlenose dolphins and provide missing data on how juvenile dolphin behavior patterns vary by sex, age, season, and time since weaning. Such information will provide a more comprehensive understanding of dolphin life history and survival strategies, which may have implications for conservation and management of long-lived coastal cetaceans.

Support for this project has come from the Chicago Zoological Society, NOAA Fisheries, the UC Davis Graduate Scholars Fellowship in Animal Behavior, the Animal Behavior Society's Cetacean Behavior and Conservation Award, and an NSF Graduate Research Fellowship.

Conducting behavioral observations of juvenile male F224 from the SDRP's research vessel Nai'a.

Juvenile female, Allison (F137), babysitting her newborn sibling (calf of Pecan Sandie, F157).

SOCIAL STRUCTURE, BEHAVIOR, AND COMMUNICATION

Analyses of genetic relatedness within a dolphin community

By Debbie Duffield, PhD, Portland State University

We have been conducting analyses of new and archived genetic samples along with existing data to develop a more complete understanding of the genetic structure of the Sarasota Bay dolphin community. In particular, we are interested in defining the role of relatedness in observed social patterns. Building on previous genetic analyses confirming mother-calf pairings, identifying tentative sires, and distinguishing between adjacent population units, we are examining the degree of relatedness of social associates as one factor that may define group structure.

This project represents the culmination of well over 20 years of genetic work on the Sarasota Bay dolphin community. Over this time, we have brought a diverse array of genetic tools to the investigation of social structure in a well-known core population of dolphins. We have developed various parts of this picture in previous studies and have now added a complete array of microsatellite DNA data for the Sarasota Bay dolphin community. We now have an estimated 1750 microsatellite panels run for this community (8 loci for 216 animals). We are currently in the process of confirming all the mother-calf pairs and completing paternity exclusions for each calf. We are also engaged in confirming the presence or absence of a supernumerary chromosome marker found in this population for the more recently-sampled animals from which blood was drawn. These data taken together provide the basis for a comprehensive investigation of social unit structure in the Sarasota Bay dolphin community. In no other bottlenose dolphin community studied has it been possible to individually profile an entire community over generations with both genetic analyses and long-term behavioral observations.

Signature whistle identification, perception and development

By Laela Sayigh, PhD, WHOI and UNCW and Vincent Janik, PhD, SMRU, St. Andrews, UK

In 2008, we completed experiments (described in previous issues of *Nicks'n'Notches*) aimed at determining whether dolphins can recognize each others' whistles by means of voice cues, in the same manner that most people recognize the voices of people that they know. Data are being prepared for publication, and analyses so far indicate that dolphins do not use voice cues to recognize whistles of other individuals. This is an interesting finding, indicating that dolphins are apparently unique in the animal kingdom in their use of the frequency modulation patterns of whistles alone to recognize conspecifics (members of the same species).

We also continued two other studies started in previous years. We continued our playback experiments that are looking at how dolphins react when their own signature whistle is copied by someone else. This copying is common in the wild and we would like to know how animals react to it. Our preliminary data suggest that they show a much stronger response to a playback of their own whistle than to hearing signature whistles of others. This supports the idea that signature whistle copying can be used by dolphins to address or find another dolphin at sea. We also continued our ongoing study of signature whistle development. Bottlenose dolphins are unusual among mammals in that they learn their individually distinctive signature whistles. With a dataset of 111 calves born from 56 mothers since 1975, we are looking at factors that influence the whistle development process. We used both visual assessments and a neural network whistle classification program called ARTWARP to assess the similarity of whistles of mothers and calves. So far, results from this program are in good agreement with the visual classifications. For 103 calves of known sex, 38 (36.9%) produced whistles similar to those of their mothers. We are currently examining possible factors that may be influencing the tendency of calves to produce whistles similar to or different from those of their mothers, including group size and birth order.

Another important part of our studies is to collect acoustic recordings to add to the Sarasota Whistle Database, and we continue to work on digitizing this resource so that it can be freely accessible to researchers. This data set represents a unique resource to study dolphin communication. In 2008, we used it to develop a signature whistle identification method that can be used on any recordings from the wild. This was needed since not all field sites are suitable for capture-release projects, where signature whistles can be easily identified. We found that signature whistles are delivered in specific sequential patterns. Using ARTWARP and whistle bout analysis we can find these patterns that indicate signature whistles. This is an important breakthrough which now allows us to use signature whistles in mark-recapture studies, in which we can monitor habitat usage in dolphins by deploying automatic recording devices at sea, even when capture-release studies are not possible. Thus, we were able to provide a new tool for monitoring dolphin abundance and ecology, which will help conservation efforts worldwide.

This work was funded by a Protect Wild Dolphins Grant to L. Sayigh and R. Wells from the Harbor Branch Oceanographic Institute Protect Wild Dolphins Program, and a Royal Society University Research Fellowship from the UK to V. M. Janik.

Whistle playback experiment near Longboat Pass

Whistles as potential indicators of stress in bottlenose dolphins

By H. Carter Esch, MS, PhD candidate, WHOI, Laela Sayigh, PhD, UNCW and WHOI, James Blum, PhD, UNCW and Randall Wells, PhD

We recently had a manuscript accepted by the *Journal of Mammalogy* reporting the potential use of whistles as indicators of stress in bottlenose dolphins. In particular, we examined the possibility that parameters of bottlenose dolphin signature whistles may serve as indicators of some level of stress. Bottlenose dolphins in Sarasota Bay, Florida, have been recorded during brief capture-release events, which are potentially a source of short-term stress to these dolphins, although no effects of chronic or long-term stress have been observed over the 38 year duration of the research. Whistles recorded during both brief capture-release and undisturbed, free-ranging conditions were examined to determine whether whistle parameters differ: (1) during capture-release versus undisturbed conditions; (2) at the beginning of a capture-release session versus at the end of a session; (3) during an individual's first capture-release session versus later capture-release sessions; and (4) when a mother is caught and released with a dependent calf versus when she is between calves (i.e., she has no dependent calf at the time of capture-release). We examined a variety of acoustic parameters, including whistle rate, number of loops (repetitive elements), maximum and minimum frequency, and loop, inter-loop, and whistle duration. In addition, we developed a generalized linear model to determine the effects of age, capture-release number, and sex on whistle rate. We found that: 1) whistle rate and number of loops were greater during brief capture-release events than during undisturbed conditions; 2) number of loops decreased and loop duration increased over the duration of a capture-release session; 3) whistle rates decreased with increased number of capture-release sessions; and 4) females caught and released with dependent calves produced whistles with higher maximum frequencies and shorter inter-loop intervals than when they did not have dependent calves. Decreases in whistle rate with capture-release experience remained robust when the influence of age and sex were considered.

Thus, whistles appear to have potential as non-invasive indicators of stress in bottlenose dolphins. Further research is warranted in this area, for example, by correlating physiological indices to whistle rates under varying levels of stress. Reliable, non-invasive correlates of stress could be used to monitor dolphins in a variety of circumstances, such as during exposure to anthropogenic noise.

Quantifying parameters of bottlenose dolphin signature whistles

By H. Carter Esch, MS, PhD candidate, WHOI, Laela Sayigh, PhD, UNCW and WHOI and Randall Wells, PhD

In an effort to standardize how multi-looped whistles are treated across studies, we recently had a note accepted by the journal *Marine Mammal Science* demonstrating that inter-loop intervals in stereotyped sequences of disconnected loops (multiple elements) are shorter and more consistent (less variable) than are the intervals between successive whistles. For whistles with multiple disconnected loops, the stereotyped silence between loops may serve as another characteristic by which individual dolphins can distinguish themselves uniquely. In addition, the presence of a characteristic introductory or terminal loop in some signature whistles implies that the series of elements is produced as a punctuated unit. The results of this study indicate that it is appropriate to consider these loops as components of a single whistle, rather than as separate whistles. In addition, we extended the published value for maximum frequency of signature whistles to 27.3 kHz.

Argentinean trainee Agustina Caride helps keep a dolphin cool and wet during acoustic recordings and hearing tests.

Bottlenose dolphin health assessments in Sarasota Bay

By Randall Wells, PhD

We resumed dolphin health assessments in Sarasota Bay in 2008, conducting operations on six days in May. The project, again sponsored by Dolphin Quest, involved the efforts of 99 people from the United States, Argentina, Bermuda, Brazil, Canada, and Scotland. With about 70 people on the water in nine boats each day, we captured, examined, sampled, measured, and released 13 dolphins (9f:4m), ranging in age from two to 24 years, and including five handled for the first time. One experienced dolphin was determined to be pregnant, and as a result she was not brought aboard the veterinary examination vessel and did not undergo the full sampling and measurement routine. She delivered a healthy calf one month later, which is doing fine as of January 2009.

The primary purposes of the capture-release program were: 1) to continue our investigation of seasonal changes in concentrations of environmental contaminants as part of our ongoing study of the dynamics and role of environmental contaminants in dolphin health; 2) to sample and mark 2-4-yr-old calves of well-known mothers before they leave their mothers; 3) to complete sampling of other individuals for which one or more samples are needed; and 4) to facilitate any other high quality research that can be accomplished without placing the dolphins at additional risk. Data, samples, and/or measurements were obtained from each animal in support of 29 different projects in the areas of health assessment, environmental contaminants, biotoxins, life history, population structure, ecology, hearing, and communication.

Of particular interest this year was information on body condition. During the June 2006 health assessment, following the severe red tide of 2005 when the dolphins' prey fish were drastically reduced, dolphins were in poorer body condition than in most years. This was especially evident for calves, with an average 23% decline in mass. In 2008, body mass index values had returned to normal levels. Red tide has been largely absent from Sarasota Bay for more than a year, and fish stocks have returned to pre-red-tide levels.

It is not clear if it will be possible to conduct planned health assessments in Sarasota Bay in 2009. We recently learned that due to the economic situation, our principal funding source for this project will not be able to provide the needed support.

Two dolphins are readied for release following health assessment in May 2008.

Persistent organic pollutants in bottlenose dolphins

By Jennifer Yordy, PhD Candidate, Medical University of South Carolina, and John Kucklick, PhD, National Institute of Standards and Technology

Bottlenose dolphins are long-lived, fish-eating marine mammals that are at or near the top of the food web in coastal ecosystems. As a result, they are vulnerable to accumulating heavy burdens of persistent organohalogen contaminants (POCs). POCs are man-made compounds that are used in industry, agricultural, and domestic settings with uses such as electrical insulating fluids, flame retardants, and insecticides. They were released into the environment before their toxicities and environmental consequences were fully understood; however, we now know that POCs can persist in the environment for decades and can have effects ranging from cancer to effects on the immune system and reproduction. POCs found in dolphins include banned compounds such as the polychlorinated biphenyls (PCBs) and chlorinated pesticides (e.g., DDT) which were banned from production in the 1970s, as well as compounds in active use such as the polybrominated diphenyl ethers (PBDEs). Mixtures of all of these compounds can be readily detected in the bottlenose dolphins of Sarasota Bay.

POCs do not occur in dolphins as single compounds but rather as mixtures with dozens of other POCs. It is well known that contaminants interacting in mixtures may have toxicities differing significantly from those found for single compounds. Therefore, knowledge regarding mixture composition is important for understanding the link between contaminant burden and adverse health effects in marine mammals. Many factors influence how dolphins are exposed to contaminant mixtures, including diet, age, reproductive maturity and nutritional state. The Sarasota Dolphin Research Program provides an unparalleled opportunity for assessing contaminant exposure at the population level as many of these parameters are known for the resident bottlenose dolphins.

To assess the degree of POC exposure and potential health effects in the Sarasota Bay bottlenose dolphin population, approximately 195 blubber, blood, and milk samples were collected for contaminant analysis during health assessments since June 2000. In addition, the primary Sarasota dolphin prey, including pinfish, pigfish, and mullet, were analyzed for 81 POC compounds to assess the role of diet on dolphin contaminant exposure.

To date, this collective data set indicates that the mixture of POCs in a dolphin changes throughout its lifetime. Contaminant profiles in both young and older juvenile animals (ages 1.5-10 years) are highly reflective of a milk diet, despite the gradual shift to a fish-based diet that starts as early as 18 months old. In male dolphins, profiles appear to shift with increasing age to contain higher proportions of compounds that dolphins are unable to break down and excrete. In contrast, female bottlenose dolphins experience dramatic shifts in POC mixture profiles upon reaching reproductive maturity, when compounds are selectively offloaded into her milk and passed to her first-born calf. Since POC mixtures differ in toxicity, there may be health implications associated with the shifts in contaminant profiles throughout the lifetime of Sarasota bottlenose dolphins. Future plans include assessing the toxicity of these mixtures using *in-vitro* bioassays. This data may also be used in the future to assess potential health effects in other wild cetacean populations.

Funding for this project was provided by the National Marine Fisheries Service and the National Institute of Standards and Technology.

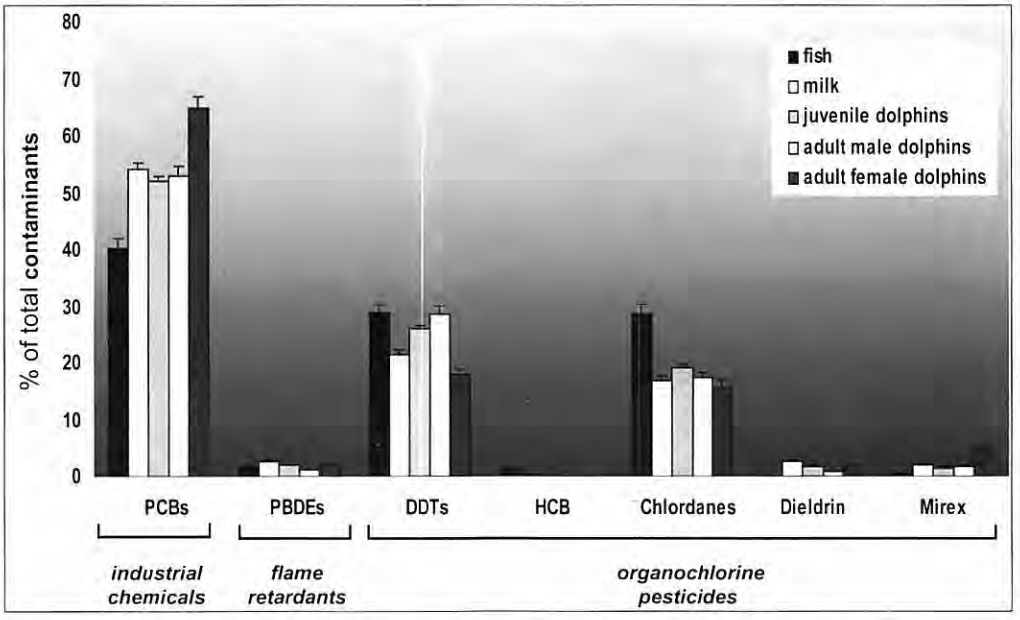


Figure 1. POC mixture profiles in Sarasota Bay dolphins and primary diet sources.

The prevalence and progression of lobomycosis in Sarasota Bay dolphins

By Leslie Burdett, PhD Student, Medical University of South Carolina

Lobomycosis (*Lacazia loboi*) is a fungal skin disease that naturally occurs only in dolphins and humans. The skin disease is endemic in human populations inhabiting tropical areas in Central and South America, however, the mechanism for disease acquisition and transmission is uncertain. Currently, there are no effective treatments and although it is not known to cause death, it can be severely debilitating. The skin disease manifests in humans as wart-like lesions that proliferate on extremities such as the arm and leg. In dolphins, similar lesions are observed, which are characterized by light-gray/white nodular masses, often appearing on appendages such as the dorsal fin, pectoral fins, and tail flukes.

In dolphins, lobomycosis has been reported in 3 species and among animals inhabiting Venezuela, Brazil, the coastal waters of Texas, and eastern and western Florida. The first reported North American case of lobomycosis in bottlenose dolphins occurred in Sarasota Bay in 1971, on a dolphin recovered by the SDRP founders Blair Irvine and Randall Wells. On the eastern coast of Florida, reports of lobomycosis in dolphins from the Indian River Lagoon have been documented since the mid-1970s. These documented cases in Florida provide evidence that lobomycosis may be a skin disease that is endemic to dolphins in this southern state.

The prevalence of lobomycosis in the Sarasota population is unknown. Throughout the years of studying the Sarasota dolphin community, animals have been sighted with lobomycosis-like lesions, and the disease has been confirmed during health assessment projects. Because the lesions can occur on areas of the body that may not be visible during photo-id surveys, photo-id sighting data may not provide an accurate estimate of the disease prevalence. Our study goal is to determine the prevalence of lobomycosis in the Sarasota population using a retrospective analysis of historical health assessment data. In most cases, a thorough skin assessment is conducted by a veterinarian, and lesions are biopsied for histological analysis. These health assessment records will provide a confirmation of lobomycosis for lobomycosis-like lesions, and the full-body skin assessment resolves the issue of missing lesions that cannot be seen in the field. The disease confirmation paired with long-term abundance data will provide a precise estimate for the prevalence of lobomycosis in the Sarasota dolphin community.

Lobomycosis has not been cultured in the laboratory, and little is known about the progression of the disease and the environment that supports its growth. The long-term sighting history of dolphins in Sarasota provides the perfect opportunity to examine the progression of the disease. Case studies will be identified from the health assessment data, and photographs of the lesions will be examined over time. The photographs are registered to a standard size using distinct reference points on the body. A grid overlay is applied to the photographs and grid blocks are classified according to the presence or absence of lesioned areas (Figure 1). The grid data are recorded onto a spreadsheet, and the proportion of lesion coverage on the body is calculated using the grid block assignments (Figure 2). Finally, the rate of lobomycosis progression is determined by using Poisson regression analysis.

This examination of lobomycosis highlights the importance and utility of long-term sighting and health assessment data. The incidence of lobomycosis has been documented in several dolphin species and populations around the globe, however, no long-term studies of the progression and prevalence have been conducted. As lobomycosis as been implicated in dolphins with suppressed immune systems, monitoring the prevalence and progression of the disease may serve as a proxy for overall health status.

This work was funded by the Medical University of South Carolina's College of Graduate Studies Student Assistantship. Future analysis will be supported by funding from South Carolina Sea Grant.

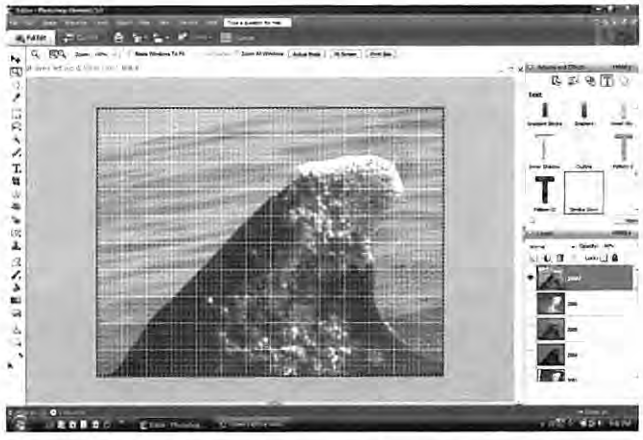


Figure 1: Grid overlay onto image from photo-id survey.

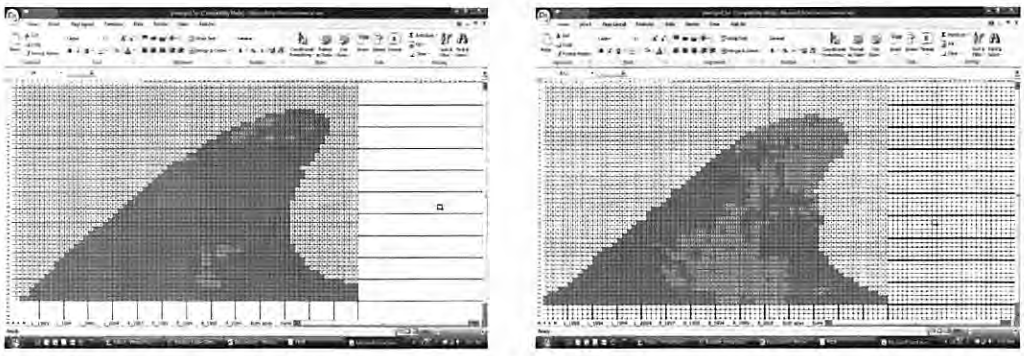


Figure 2: Spreadsheet data from grid block assignments for two different years (1989 and 2004 - same animal, FB28).

Total circulating antibody levels and eosinophil counts are higher in the Sarasota Bay dolphin community than in managed collection populations

By Carolina Ruiz, DVM and Hendrik Nollens, DVM, MSc, PhD, Marine Mammal Health Program, College of Veterinary Medicine, University of Florida and Stephanie Venn-Watson, DVM, MPH, US Navy Marine Mammal Program

Cetacean immunology continues to be one aspect of marine mammal health in which little is known. While researchers have made great strides in characterizing acquired immunity, the lack of diagnostic tools available to marine mammal veterinarians continues to lag behind that of other species. Understanding cetacean immune function is critical in the diagnosis, treatment, and management of diseases in both free-ranging and collection dolphin populations. By establishing and comparing immune function of free-ranging and managed collection populations, researchers and veterinarians can evaluate the effects of age, housing (collection *vs.* free-ranging), infectious diseases, toxin exposure, and other factors on immune function among distinct populations.

In order to gain further insight into cetacean immunology, we recently developed an assay to quantify bottlenose dolphin immunoglobulin G (IgG), a predominant antibody sub-class of the humoral immune system. The enzyme-linked immunosorbent assay (ELISA) was used to establish reference ranges in 3 separate populations of bottlenose dolphins. It also allowed us to compare IgG levels between age groups, sex, and different housing conditions. Results showed that free-ranging Sarasota Bay bottlenose dolphins had significantly higher mean circulating IgG levels (9.1 mg/ml) when compared to 2 separate managed collection populations housed in closed pool systems (5.7 mg/ml) and open bay netted enclosures (6.2 mg/ml). When comparing complete blood cell count variables to IgG concentrations in serum, total white blood cell counts and eosinophil counts were the best predictors of IgG levels. This finding suggests that higher IgG levels in free-ranging dolphins are most likely attributable to a higher internal parasitic load. Dolphins in managed collections are fed frozen-thawed high-quality fish and are routinely treated with anti-parasite medications, where their free-ranging counterparts are not. These differences between populations emphasize the importance for establishing specific population reference ranges for immune function evaluation and overall health assessment.

Other applications for quantifying circulating IgG in dolphin serum, include its use in diagnosing immune disorders, such as agammaglobulinemia, immunosuppression or stimulation from drug therapy or infectious diseases, and disease syndromes associated with monoclonal gammopathies. The assay has also been used to quantify IgG in bottlenose dolphin colostrum and milk, and in diagnosing failure of passive transfer in neonates. An estimate of the onset of actively acquire humoral immunity in neonates can thus be established, along with recommendations for treatment of failure of passive transfer in both managed collections and stranded free-ranging dolphins.

Funding for the IgG project was provided by Merck Merial Veterinary Scholars.

Two novel dolphin viruses: Parainfluenza and Enterovirus

By Carolina Ruiz, DVM and Hendrik Nollens, DVM, MSc, PhD, Marine Mammal Health Program, College of Veterinary Medicine, University of Florida and Stephanie Venn-Watson, DVM, MPH, US Navy Marine Mammal Program

Through the use of advanced molecular diagnostics, our laboratory has recently isolated a novel parainfluenza virus and an enterovirus never before described in bottlenose dolphins. The parainfluenza virus (TtPIV-1), closely related to human and bovine parainfluenza viruses, was isolated from a dolphin with respiratory disease. Serosurveys for TtPIV-1 of Sarasota Bay dolphins indicated the presence of antibodies to this virus in at least 7%, and up to 59%, of the animals surveyed. A similar prevalence of positive antibody titers to TtPIV-1 was seen in a managed collection dolphins (15%-59%). These findings show that dolphin parainfluenza virus is a common marine mammal virus that may be of human health concern given its similarity to human parainfluenza virus. A serologic survey for the enterovirus yielded similar results. Exposure to this virus appeared equally common in free-ranging and collection animals.

Funding for the parainfluenza virus project was provided by the Office of Naval Research.

Effects of red tide on dolphins, sea turtles and sea birds

By Deborah Fauquier, DVM, MPVM, PhD student, University of California, Santa Cruz

We have been investigating the impacts of red tide on Sarasota Bay dolphins, sea turtles, and sea birds over the last several years. Although the Sarasota Bay area did not experience a red tide bloom during 2008, we are still investigating the impacts of Florida red tide blooms during 2005, 2006, and 2007 on these species. We have collected data from stranded dolphins, sea turtles, and sea birds to determine brevetoxin levels and the effects brevetoxin has on increasing morbidity and mortality in these species. In sea turtles and sea birds we have been able to collect blood and/or fecal samples from live animals suffering from brevetoxicosis and determine how quickly or slowly these animals clear the toxin from their blood.

Seventy-six percent of dolphins stranding in Southwest Florida (not necessarily Sarasota Bay residents) during 2006-2007 (n=21) had brevetoxin levels above the detection limit and were classified as brevetoxin positive animals. Of these positive animals, 30% were determined to have died from brevetoxin intoxication or it was implicated as a contributory factor to death. A proportion of sea birds and sea turtles stranding live during 2005-2007 had clinical signs of red tide intoxication including circling, paralysis, and seizures. Red tide intoxication appeared to be the primary cause of stranding in 42 of 78 (54%) live-stranded sea birds and 59 of 71 (83%) live-stranded sea turtles. Sea birds

were able to clear the toxin from their blood in 10 days, while it took up to 50 days for some sea turtles to clear the toxin due to their lower metabolic rate.

Findings from this study are only preliminary, but the fact that the majority of the live sea birds and sea turtles sampled during these red tide events were positive for the red tide toxin indicates that red tide intoxication plays a larger role in the morbidity and mortality of sea birds and sea turtles off the west coast of Florida than was previously recognized. In addition, the information that sea birds can clear the red tide toxin from their bodies within 10 days of rehabilitation whereas it may take up to 50 days for sea turtles to clear the toxin can be used by rehabilitators to modify treatment plans for animals suspected of suffering from red tide intoxication. We have just received funding to investigate cholestyramine (Questran), a bile acid binder, which may be a useful treatment for brevetoxicosis in loggerhead sea turtles and double-crested cormorants. Cholestyramine has been used to treat cases of toxin exposure in humans and domestic animals. Use of cholestyramine treatment may lead to quicker elimination of brevetoxin and increased survival in affected animals. If this treatment is successful it would prove useful in future red tide events by increasing treatment success for these and other threatened/endangered species.

Our research was supported by funding from the John H. Prescott Grant Program, Morris Animal Foundation and the Florida Sea Turtle License Plate Sea Turtle Grants Program.

Blubber deposition during development in free-ranging bottlenose dolphins: balancing disparate roles of insulation and locomotion

By Shawn Noren, PhD, Institute of Marine Science, University of California Santa Cruz and Randall Wells, PhD

Insulation from blubber is a critical component of marine mammal body temperature regulation (thermoregulation). This may be particularly important in dolphins because they spend their entire lives in water, which conducts heat away from a body 25 times faster than air at the same temperature. For young dolphins, heat loss is exacerbated by their relatively small body size, resulting in larger surface area relative to their volume as compared to adults, theoretically promoting heat loss to the environment. The greater propensity for heat loss in the smallest, youngest dolphins could be circumvented by maintaining thicker blubber layers than larger, older members of the same species (conspecifics). However, blubber also contributes to buoyancy, and individuals who are positively buoyant must expend more energy to dive than individuals who are neutrally buoyant. Therefore, the cost of descent to overcome blubber's buoyant force while diving could constrain blubber deposition in dolphins.

The results from our study using the long-term data set across age class and season from dolphins in Sarasota Bay provided interesting insights into dolphin thermoregulation. For animals measured during summer, yearlings had significantly thicker blubber than 2-12 year-olds; this was expected. However, this difference diminished by winter because blubber deposition in response to the colder water temperature was smaller in yearlings (2 mm increase) compared to 2-12 year-olds (3-6 mm increase). This may be explained by the buoyant force of blubber and the associated locomotor costs (increased energy devoted to swimming) to overcome buoyancy while diving. During summer, yearlings had positive buoyancy compared to neutral buoyancy for 12 year-olds. As a result, the calculated mass-specific cost of descent to overcome buoyancy on a theoretical 10 m (32.5 ft) dive was greatest in yearlings. Limits to costs of diving may be set by the inability of yearlings to produce large amounts of thrust for swimming due to diminutive body size and underdeveloped locomotor muscles. Thus yearlings may have difficulty balancing the energetic demands of thermoregulation and locomotion. Ultimately, this trade-off could constrain the lower temperature limits yearlings are able to withstand.

Hearing abilities of bottlenose dolphins in Sarasota Bay

By Mandy Cook, PhD, Portland State University, and Eric Montie, PhD, and David Mann, PhD, University of South Florida

Bottlenose dolphins are exposed to a wide variety of noise in their environment, both naturally-occurring and anthropogenic (man-made), and there is concern that these noises may have negative effects on their hearing. Because dolphins rely heavily on acoustics to navigate, forage, and communicate with each other, hearing losses in these animals can be especially damaging. Dolphins can hear from about 75 Hertz to over 150 kiloHertz, which is a much larger hearing range than most other mammals (most humans can hear from 20 Hertz to 20 kiloHertz).

We measured the hearing thresholds of bottlenose dolphins in Sarasota Bay using an auditory evoked potential (AEP) protocol based on techniques used to measure hearing in human infants. Short duration tones of varying frequencies and sound levels were played to the dolphins using a jawphone (a speaker embedded in a suction cup and attached to the lower jaw of the animal), and sensors in suction cups on the surface of the dolphin's head measured microvolt potentials produced by the brain in response to the tones. The brain's responses to the sounds were then analyzed to determine each dolphin's hearing abilities. Animals had their hearing tested both in water and in air to determine if there were measurement differences between the two environments.

Data were collected from 9 bottlenose dolphins (5 females and 4 males, ages 3-18 years) during May's health assessments. Our findings suggest that bottlenose dolphins exhibit a large degree of variability in their hearing abilities. Overall, the bottlenose dolphins in Sarasota Bay do not exhibit increasing hearing losses with increasing age nor are male dolphins more likely than female dolphins to have a hearing deficit. Also, these dolphins do not exhibit substantial hearing losses due to daily exposure to environmental noise, including anthropogenic sources of noise. There is still unexplained variability in hearing thresholds that is being investigated using the unique data set available on the lives of the Sarasota Bay dolphins.

Support for this research was provided by: the NOAA Office of Protected Resources.

Sarasota Bay dolphin monitoring program 2007-2008

By Jason Allen, BS

We have been able to continue our year-round monthly monitoring of the Sarasota dolphin community thanks to support from NOAA Fisheries Service. The Sarasota bottlenose dolphin community is the most thoroughly-studied, free-ranging dolphin population in the world. We continue to address increasingly refined questions about the lives of these animals with the benefit of information gained through our intensive year-round studies of their distribution, social, and reproductive patterns.

Photo-identification surveys were conducted on 110 days from November 2007 through October 2008 with the assistance of dedicated volunteers and undergraduate interns. We had 943 group sightings that totaled 2,848 dolphins (including resighted animals). Monthly values varied (Figure 1), but overall we averaged about 8.6 sightings and 30 dolphins per day. These values have remained fairly consistent over the past several years. We had a high of 17 group sightings on 17 November 2007 and 62 dolphins on 25 August 2008. Our single largest group of Sarasota Bay residents was observed on 17 January 2008 and was comprised of 17 animals including Pi, Noah, Pokey, Lasagna, Boxer and calf, Claire and calf, Yorick and others.

We documented the births of ten new calves to long-term resident mothers during the summer of 2008 while monitoring the Sarasota dolphin community. Low Point, FB 127, and 49C-4 had their second calves while FB 175 and Fat Top had their third and Saida Beth had her ninth! Other moms included Moonfin Look-a-like, A-4, and Pecan Sandie. FB 159 was observed with her first calf, which represents a second five generation lineage resident to Sarasota Bay; unfortunately this first-born calf died in December. Interestingly, this lineage's matriarch (FB 19) was the first known grandmother and great-grandmother in the population.

In addition to the loss of FB 159's calf, we confirmed the loss of one other resident this year. On 17 October 2008, our survey project recovered the body of Ms. Mayhem; a 54-year-old female and long-term Sarasota Bay resident. She was last seen nine days prior to recovery when our field team noted that she appeared skinny and had fresh shark bite wounds. Unfortunately, the carcass was badly decomposed and an exact cause of death could not be determined. Since first observed in Palma Sola Bay on 8 May 1976, she had been documented in almost 700 group sightings. We know that she gave birth to at least five calves, one of which is a female (Pumpkin) who has produced five grandcalves.

This year, we have accounted for over 98% of the dolphins who use Sarasota Bay on a regular basis. As of October 2008, the number of dolphins regularly using the waters of Sarasota Bay stands at approximately 160 animals.

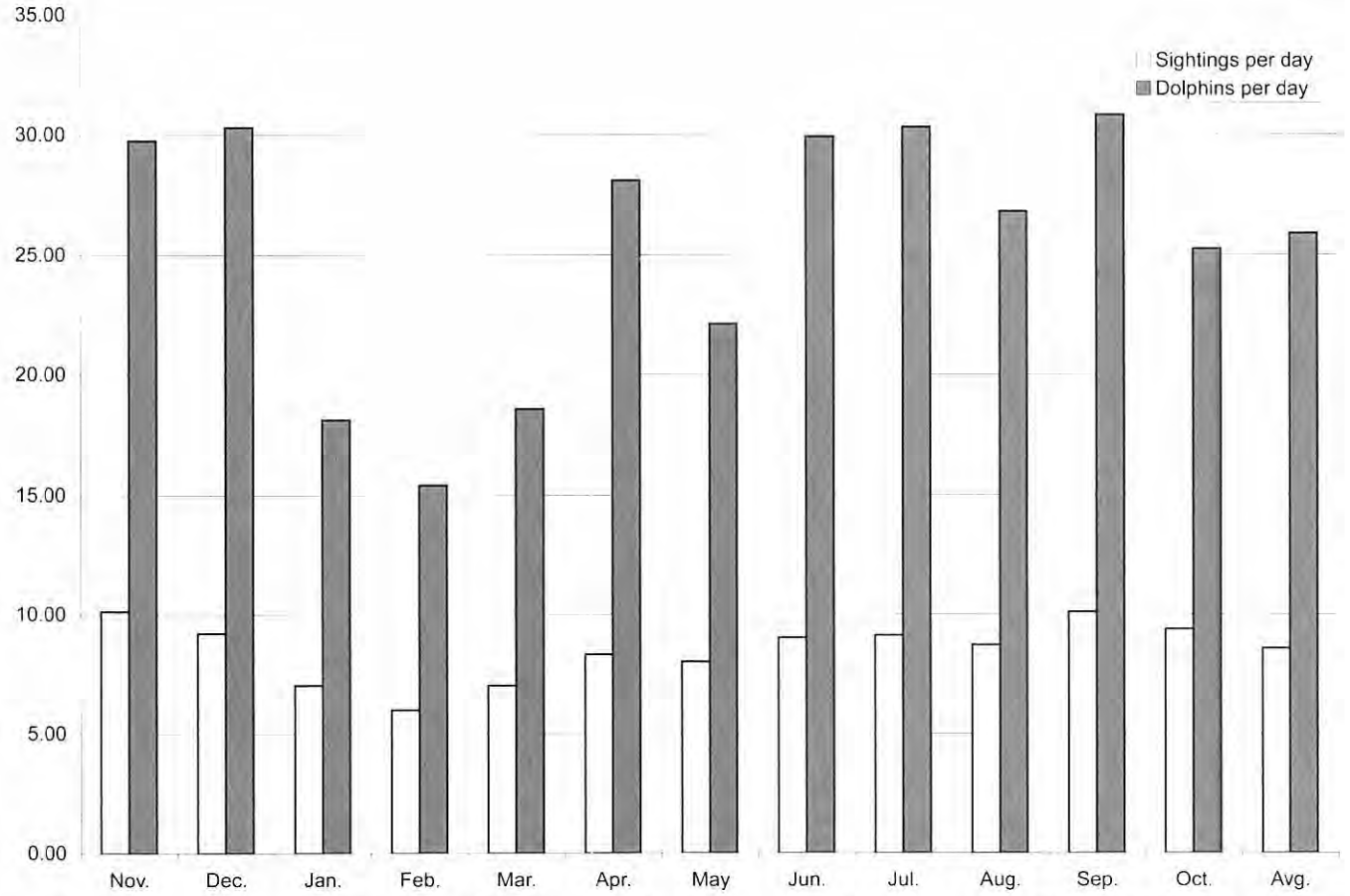


Figure 1: Average number of dolphin sightings and total dolphins per day from November 2007 through October 2008.

Table 1: Births, deaths, and losses (missing animals) to the Sarasota Bay population over the past year. Ten new calves were born and nine well-known animals have not been recently sighted.

Community Gains and Losses in 2008

New Mothers

ID	Name	Calf
FB27	Moonfin Look-a-like	Sixth
FB33	Saida Beth	Ninth
FB54	A-4	Seventh
F127	FB 127	Second
F157	Pecan Sandie	Fifth
F159	FB 159	First
F175	FB 175	Third
F181	Fat Top	Third
49C4	49C-4	Second
LWPT	Low Point	Second

Missing

ID	Name	Last Sighting
FB17	Y-2	17-Jul-06
F183	Triangle Mama	25-Apr-06
F201	Filly	1-May-07
C933	C93-3	6-Dec-06
F106	3 Nick 3	27-Aug-07
F174	Tip Nick Low V's	23-Mar-06
F218	Conrad	16-Jul-06
C255	C25-5	13-Jul-06
1834	C183-4	25-Apr-06

Dead

ID	Name	Date recovered
FB63	Ms. Mayhem	17-Oct-08
1591	C159-1	17-Dec-08

The first observation of F175's third calf. From sighting records of F175, we know that it is less than one week old in this picture.

Petey (Ms. Mayhem's son) and Pi (her grandson) together in December 2008

The last sighting of 54-yr-old Ms. Mayhem alive. Two shark bites in front of and below her dorsal fin are visible. Her carcass was recovered just nine days later.

Bobbit leaps out of the water during a socializing bout near Cortez Bridge.

Stable isotopes in bottlenose dolphin teeth as tools in population differentiation

By Nélio Barros, PhD, Mote Marine Laboratory and Portland State University, Peggy Ostrom, PhD, Michigan State University, Craig Stricker, PhD, USGS, and Randall Wells, PhD

Bottlenose dolphins are the most frequently-sighted cetaceans in coastal waters of the southeastern U.S. Records also indicate that they are the most common species to strand in this area. As such, they are widely represented in marine mammal museum collections throughout the region. In the most extensive of these collections, a wealth of associated biological data may accompany these materials. Often, however, little is known about the history of most stranded animals. Without information on where the animals have been or to which population they belong, the interpretation of data collected from them may be limited. Since bottlenose dolphins occur as near shore populations resident to estuaries and bays or transient to coastal waters, as well as offshore waters beyond the continental shelf, the difference in distribution and ranging patterns may be reflected in the biological and ecological attributes these animals present.

Off west-central Florida, cetacean strandings have been studied for the past two decades by biologists at Mote Marine Laboratory in Sarasota. The osteological collection it houses includes skulls and necropsy records of over 500 stranded bottlenose dolphins, most of which are of unknown history.

To help understand the population membership of these animals, and therefore be in a better position to make sense of their associated biological data, we tested the hypothesis that dolphins of different distribution (and likely belonging to different populations) have different feeding ecology. To that end, we analyzed stable isotopes; a long-term indicator of feeding history, in the teeth of a subset of bottlenose dolphins stranded in west-central Florida belonging to three general putative populations: resident members of the Sarasota Bay community (SB, n= 39), dolphins occurring along the nearshore Gulf of Mexico (Gulf; n= 36) and members of the offshore ecotype (Off; n= 7). The former comprises animals from a well-studied resident community, observed across a span of five concurrent generations over nearly four decades, and the latter two include animals for which no history on origin and population membership is available. The principle behind the stable isotope approach is that the isotopic composition of a predator reflects that of its prey, as elements are assimilated through the food chain. Therefore, the isotopic signature of the predator is influenced by habitat type and distribution of its prey. In this study, we examined the carbon, nitrogen, and sulfur isotope values ($\delta^{13}C$, $\delta^{15}N$ and $\delta^{34}S$) of dolphin tooth collagen with the goal of gaining insight into the general habitat occupied by bottlenose dolphins off west-central Florida.

The results obtained indicate that dolphin groups differed significantly for all three isotopes analyzed. Pair-wise comparisons showed that teeth from the Gulf and Off groups had lower carbon values relative to teeth from SB animals. For nitrogen values, pair-wise comparisons showed that teeth of the SB dolphins were lower than those of the Gulf and Off groups. Dolphin teeth from all three groups differ in sulfur values. A comparison across the three groups showed a decreasing trend in sulfur with Off > Gulf > SB. Additionally, the sulfur values of teeth from the Off group were significantly higher than Gulf animals, with non-overlapping ranges. When a combination of two elements is used, C-S and N-S clearly separate the three groups of dolphins examined, whereas C-N distinguish SB dolphins from the Gulf and Off dolphins.

This is the first study using stable isotopes to differentiate groups of small cetaceans in the Gulf of Mexico and adjacent nearshore waters. Stable isotopes appear to be a powerful means of distinguishing among groups of dolphins along an inshore-offshore gradient. This technique will be applied to the remainder of the bottlenose dolphin osteological collection at Mote Marine Laboratory, to determine if stranded animals originated in inshore vs. coastal vs. offshore waters.

Effects of red tide on dolphin prey fish availability

By Elizabeth Berens, MS, Damon Gannon, PhD, and Sandra Camilleri, BS

Since 2004 we have been measuring fish abundance, distribution, and species composition in Sarasota Bay, with particular interest in species that are important food sources of bottlenose dolphins. This has provided us with an opportunity to examine red tide effects on the estuarine fish community. The phenomenon known as red tide is a familiar sight to those living along the coasts of Florida. It is caused by the single-celled alga *Karenia brevis* which, under the right conditions, can bloom to over 1,000,000 algae cells per liter of sea water. *K. brevis* produces lethal neurotoxins, called brevetoxins, which affect the respiratory system of vertebrates including fish, manatees, sea turtles, seabirds, and dolphins. Fish are exposed to brevetoxins by inhalation through their gills or by consuming food containing the toxins. Severe red tide blooms will result in extensive fish kills. The toxic conditions resulting from red tide blooms can be exacerbated by hypoxia (low levels of oxygen in the water) caused by the large numbers of decomposing fish. For dolphins, the main route of bevetoxin exposure is most likely food consumption. However, strong indirect effects could result from dramatic drops in prey abundances and/or shifts in species composition.

To date, we have completed 869 purse seine (sampling gear) sets in 5 distinct habitats, sampled 350,215 fish (primarily catch and release sampling), and identified over 132 different species. Our 2008 summer (Jun.-Sept.) sampling targeted the seagrass habitat because it is one of the most productive habitats in Sarasota Bay. We completed 40 purse seine sets, sampled 50,610 fish, and identified 56 species during this sampling period. Since 2004, two red tide periods have occurred within Sarasota Bay. A severe and prolonged red tide occurred from February to December of 2005 and covered much of the west coast of Florida. A moderate red tide occurred from mid-August to December 2006. Our previous sampling has shown that in general the relative abundance of fish decreased 10% when non-red tide periods and red tide periods from 2004-2007 were compared. Previous work suggests that soniferous (noise-making) fishes, such as pigfish and spotted seatrout, are selected and consumed by dolphins using passive listening. These soniferous species decreased 85-97% in relative abundance during red tide periods as compared to non-red tide periods. Additionally, species diversity dropped and the fish community shifted from dominance by bottom-dwelling species like pinfish, mojarra, silver perch, and pigfish toward dominance

by pelagic filter feeders, such as the Atlantic thread herring during red tide periods.

Within the last 20 years, Sarasota Bay has been affected by red tide about every 2-3 years. We must not only understand the effect that red tide has on fish and dolphin populations but we must also understand the speed at which these populations recover. Since the 2005 and 2006 red tide events, we have seen a complete recovery of the Sarasota Bay estuarine community. In the seagrass habitat, the overall relative abundance of fishes rebounded by summer 2006 (132% over 2004 levels) despite the moderate red tide during the late summer months. However abundances were mainly due to the red-tide-induced shift in community structure, resulting in an increase in the abundance of pelagic filter feeders. Species richness remained 86% of 2004 levels.

By 2007, Sarasota Bay had experienced two red tides and fish abundance in the seagrass habitat was 74% of 2004 levels. Currently, most fish species have reached or exceeded their 2004 pre-red tide abundance levels. Fish caught per purse seine set in the seagrass habitat increased by 40% from summer 2004 to summer 2008 and soniferous fishes increased by 137% within that same period (Figure 1). Overall species richness reached and exceeded pre-red tide levels by summer 2007, and the fish community structure has shifted back to being dominated by bottom-dwelling species once again. Our data indicate that some species take longer to recover from red tide than others, fish abundance on its own may not be an accurate reflection of the estuarine community's recovery, and both species richness and soniferous dolphin prey abundance may take up to two years to recover to pre-red-tide levels.

While we have determined that severe red tides greatly decrease fish abundance, decrease species composition, and shift fish community structure, within two years most species recovered to or exceeded pre-red-tide abundance levels and measures of species richness. Questions we would like to focus on in the future include the effect of red tides on the growth rates, body condition, reproductive rates, habitat selection, and behavior of both fishes and dolphins. We hope to answer more of these questions by extending our long-term fish sampling program in Sarasota Bay.

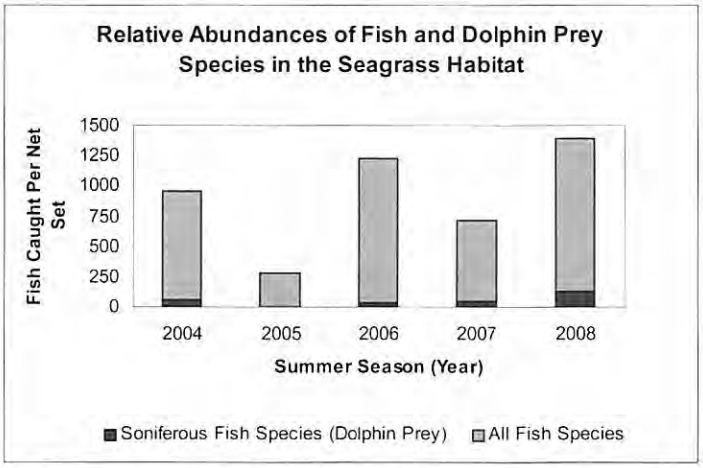


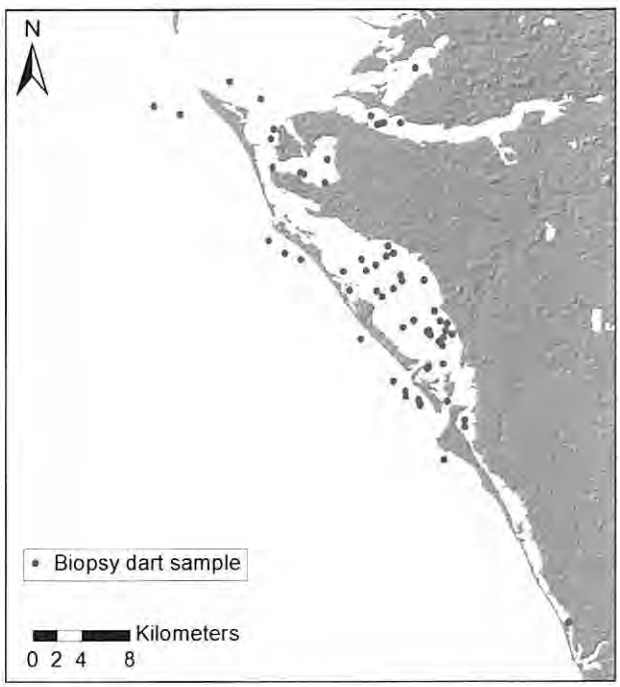
Figure 1. Differences in the yearly relative abundances of fish species and soniferous fish species. Abundance trends are based on purse-seine catch rates in and around Sarasota Bay.
*** Indicates summer seasons with severe red tide blooms.*
** Indicates summer seasons with moderate red tide blooms.*

Genetic and contaminant sampling of mid-Sarasota Bay and new dolphins

By Brian Balmer, MS, PhD Student, University of North Carolina Wilmington

Beginning in the mid-1990s there has been an unprecedented increase in the numbers of dolphins using Sarasota Bay, from a 20-year average of about 100-120 dolphins to more than 175 dolphins in the early 2000's. Some of this increase was a result of recruitment through successful reproduction of long-term residents, but many of the animals appeared in the bay as juveniles or adults, originating elsewhere. Because these "newcomers" rarely enter waters shallow enough to support our standard capture-release techniques, we conduct biopsy darting to obtain genetic samples for examination of mitochondrial DNA haplotypes and microsatellites, and to determine sex as part of our long-term program of monitoring population structure. Blubber obtained from the biopsy darting is analyzed for organochlorine contaminant concentrations. In combination, genetic and contaminant profiles may provide indications of the origins of the animals, allowing evaluation of a previously-undocumented mechanism for variation in dolphin population structure.

Since 2003, 58 biopsy dart samples have been obtained from bottlenose dolphins that have not been previously handled during health assessments. Samples have been primarily collected from mid-Sarasota Bay but have extended from the Manatee River to Venice Inlet. Genetic analyses of these samples are currently being run by Dr. Debbie Duffield of Portland State University. Contaminant samples have been banked at the National Institute of Standards and Technology in Charleston, SC. In addition to the principal goal of collecting skin and blubber from previously unsampled individuals, over the years this project has trained a number of US and foreign researchers in the practice of biopsy sample collection and processing.



Sampling locations for all biopsy samples from 2003 to 2008 (n = 58).

Long-term site fidelity, residency, and ranging patterns of bottlenose dolphins in Charlotte Harbor and Pine Island Sound

By Kim Bassos-Hull, MS

Longitudinal studies spanning decades allow documentation of long-term residency, site fidelity, behavior, ranging, and association patterns as well as trends in abundance. A lot has been learned about the dolphins that inhabit Sarasota Bay through such long-term studies. Do the dolphins that inhabit the next closest estuary to the south of Sarasota Bay show similar patterns? Research efforts in Charlotte Harbor during 2001-2007 added to a long-term database that was begun in 1970. The Sarasota Dolphin Research Program (SDRP) began tagging efforts in Charlotte Harbor in 1970 and 1971 by tagging five female and four male bottlenose dolphins. A few of these individuals were re-sighted a few weeks after tagging, indicating at least short-term residency. The SDRP conducted opportunistic survey and tagging efforts in Charlotte Harbor in 1982 and 1984 and a few of the individuals photographed and tagged were re-sighted over 20 years later. Dr. Suse Shane began behavioral studies of dolphins in Pine Island Sound in 1985 and continued collecting opportunistic photos through 1996. She shared her photo-id catalog containing 276 marked individuals with SDRP (now archived by SDRP) which allowed us to match 90 individuals photographed during our surveys to her catalog.

During 1990-1994, 1996, 2001-2004, and 2006, SDRP conducted systematic boat-based surveys in Charlotte Harbor and Pine Island Sound to establish population estimates and trends. With the addition of the photo-id data since 2001 we were able to gain a long-term perspective on the dolphins that use these waters. From a total of 565 boat days in the study area since 1982, 1,157 different marked dolphins were identified within study area boundaries. Of these individuals, 141 were seen once, 797 were seen on 2-9 days, and 249 were seen on at least 10 days. Two hundred and eighteen individuals were observed only within a single year and are considered transients. The remaining 939 individuals were sighted over two or more years and are considered residents. Overall, 30% of dolphins identified in the study area were observed over a ten year period or more and are considered long-term residents. The 249 dolphins re-sighted on ten or more days in the study area were observed over a span of 3-24 years (average =12 years). Most of these individuals (82%) showed strong site fidelity as they were never observed outside of the ~750 km^2 study area boundary. Hurricane Charley impacts did not appear to affect individual site-fidelity within the study area. Out of 192 dolphins that were sighted on ten or more days both before and after Hurricane Charley, 94% were re-sighted in the same general region within the study area.

Funding sources contributing to this long-term project include: Mote Scientific Foundation, the Chicago Zoological Society, Harbor Branch Oceanographic Institution's "Protect Wild Dolphins" program, Mote Marine Laboratory, the National Marine Fisheries Service, and Earthwatch Institute.

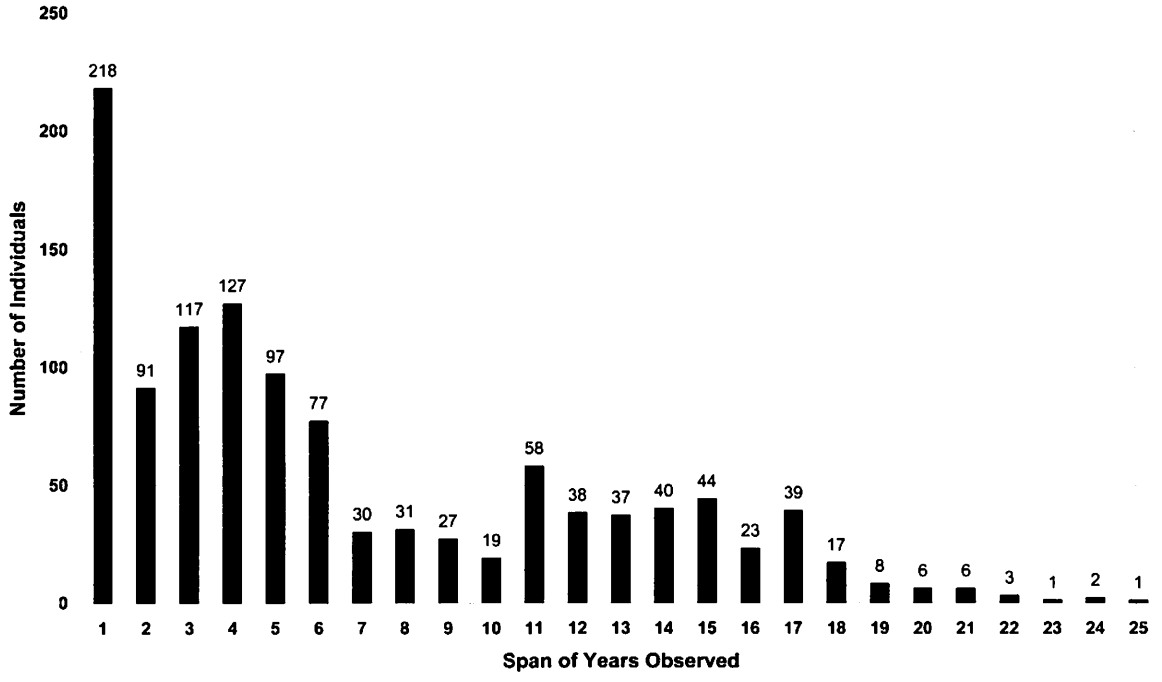


Figure 1. Span of years seen within the Charlotte Harbor and Pine Island Sound study area for 1,157 individuals.

Monitoring site-fidelity of bottlenose dolphins in the St. Joseph Bay region of the Florida Panhandle following multiple Unusual Mortality Events

By Brian Balmer, MS, PhD Student, University of North Carolina Wilmington

Intensive photo-identification and radio tracking studies during 2004-2007 have provided insight into the potential effects of multiple Unusual Mortality Events in and around St. Joseph Bay. However, the recovery rate of bottlenose dolphin populations along the Florida Panhandle cannot be determined without long-term photo-identification surveys in this region. In collaboration with the Florida Department of Environmental Protection and the St. Joseph Bay State Buffer Preserve, photo-identification surveys were conducted in and around St. Joseph Bay to monitor site-fidelity of bottlenose dolphins within this region. Surveys were conducted for five days during June 2008, in which 71 previously known individuals and 14 new individuals were identified. In addition, 18 calves and 7 young-of-the-year were also identified. Of the 23 individuals handled during the 2005 and 2006 St. Joseph Bay health assessments, seven freezebranded individuals were resighted during this survey period.

All transects in the St. Joseph Bay photo-identification region were completed once during the five days of this study. Previous abundance estimates in this area have been generated utilizing a survey design where each transect was completed twice. Although not as robust as the earlier estimates, the June 2008 surveys estimated abundance between 113 and 182 individuals. This estimate is comparable to the June/July 2007 abundance estimate of 140 to 164 individuals in the St. Joseph Bay region. Continuation of these seasonal, mark-recapture, photo-identification surveys is crucial to identify changes in abundance, survivorship, and site-fidelity of bottlenose dolphins following multiple mortality events along the Florida Panhandle.

This research would not have been possible without the logistical support from Kim Wren, Jean Huffman, and Neil Jones. The funding for this project was provided by NOAA Fisheries Service, Florida Department of Environmental Protection, the St. Joseph Bay State Buffer Preserve, and the Chicago Zoological Society

Dolphin X22, a known resident of St. Joseph Bay that was radio tracked during July-October 2005.

Assessing bottlenose dolphin health as an indicator of overall ecosystem health; an ongoing study in the Turtle/Brunswick River Estuary and Sapelo Island National Estuarine Research Reserve

By Brian Balmer, MS, PhD Student, University of North Carolina Wilmington

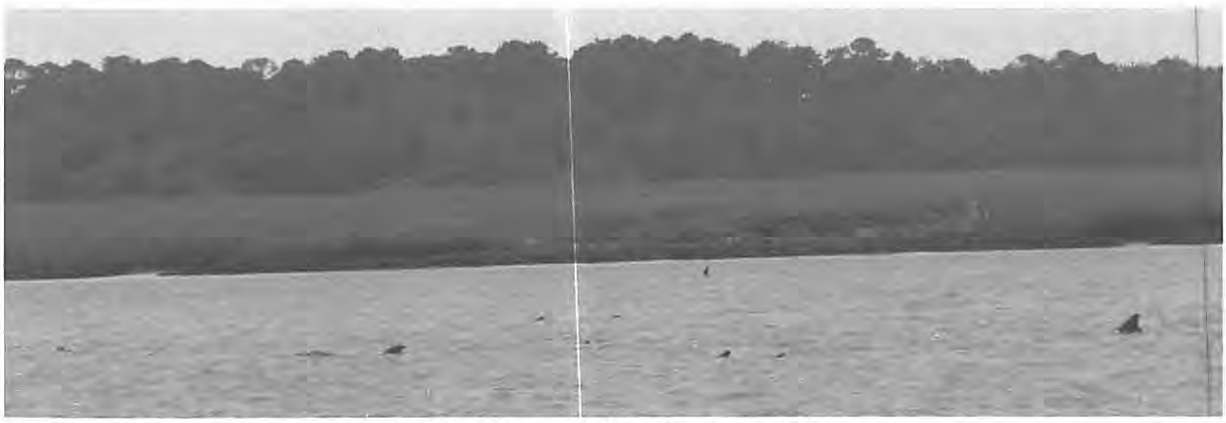
For my dissertation, I am working with NOAA to compare bottlenose dolphin populations near EPA superfund sites in Georgia to those at a nearby national estuarine reserve. The Turtle/Brunswick River Estuary (TBRE) located in Glynn County, Georgia, includes the Turtle and Brunswick Rivers, St. Simons Sound, St. Simons Island, and Jekyll Island. The LCP Chemical manufacturing plant, to the west of the city of Brunswick, is currently on the National Priority List (NPL), a list of all toxic waste sites that are eligible for federal assistance toward clean-up.

The LCP Chemical NPL site covers approximately 550 acres of tidal marsh adjacent to the Turtle River and 15km upriver from St. Simons Sound. Over the past 70 years, LCP Chemical has operated an oil refinery, paint manufacturing plant, and chlor-alkali plant on this site. These industrial influences have resulted in high levels of mercury, polychlorinated biphenyls (PCBs), and semi-volatile contaminants within the soils, groundwater, and marsh biota surrounding the region. In addition to the LCP Chemical plant, three other NPL sites are in and around Brunswick; Terry Creek Dredge Spoil/Hercules Outfall, Hercules 009 Landfill, and Brunswick Wood Preserving. Hercules Inc., the company responsible for the Terry Creek Dredge Spoil/ Hercules Outfall and Hercules 009 Landfill, manufactured an organochlorine pesticide known as toxaphene, from 1948-1980. The Terry Creek Dredge Spoil/Hercules Outfall is in close proximity to Dupree and Terry Creeks which empty into St. Simons Sound. High concentrations of toxaphene in all trophic levels surrounding this site have been identified.

In contrast to the TBRE, the Sapelo Island National Estuarine Research Reserve (SINERR), located approximately 30km northeast of Brunswick, encompasses the fourth largest and one of the most pristine barrier island systems along the Georgia coast. The SINERR is a part of the National Estuarine Research Reserve System (NERRS) and is a focus of long-term ecological research projects such as water quality monitoring, primary productivity assessment, and fisheries sampling. Thus, the TBRE and SINERR offer the opportunity to investigate polluted and relatively pristine field sites that are geographically adjacent to each other. NOAA and its partners have recently conducted a study, which included portions of the TBRE and SINERR, to assess indicators of ecosystem health including nutrient loads, pathogen indicators, water quality, sediment contaminants, and oyster tissue contaminants. As a complementary project, contaminant exposures of bottlenose dolphins are also being measured.

Bottlenose dolphins are long-lived, apex predators that bio-accumulate persistent organochlorine contaminants (POCs) in their lipid-rich blubber. Along the southeastern United States, many dolphin populations demonstrate high levels of site-fidelity to localized regions. Thus, the bottlenose dolphin has been

LCP Chemical National Priority List Site



Sapelo Island National Estuarine Research Reserve

identified as a sentinel of coastal ecosystem health. Bottlenose dolphins also forage on a variety of recreational and commercial marine species, suggesting they may also be an indicator for human health risks in a particular region.

Remote biopsy dart samples from bottlenose dolphins in both regions have been obtained and a subset of these samples has been analyzed to identify persistent organochlorine contaminants (POC), including 66 PCB congeners, 7 PBDE congeners and a number of organochlorine pesticides. Chemical analyses are being conducted at the Hollings Marine Laboratory by the National Institute of Standards and Technology (NIST) laboratory. Preliminary data suggest extremely high levels of PCBs in dolphins sampled from the TBRE. Surprisingly, relatively high levels of PCBs were also found in dolphins sampled from SINERR. However, without knowing the ranging patterns of the biopsy-sampled individual dolphins, the origin of these contaminants is currently unknown. For this reason, photo-identification research to investigate the distribution and movement patterns of dolphins along this area of the Georgia coast is essential.

This project will be the first to evaluate and compare seasonal abundance, site-fidelity, habitat utilization patterns, and contaminant specificity for bottlenose dolphins across two geographically adjacent, yet ecologically different regions of the Georgia coastline. Intensive seasonal mark-recapture surveys utilizing photo-identification of individuals' dorsal fins will be used to determine bottlenose dolphin abundance in both regions. Comparing sighting histories for all identified individuals will provide site-fidelity indices (i.e. amount of time dolphins are spending within each of the two areas) throughout the course of the study. Strahler Stream Order, a quantitative technique used to classify estuarine habitats, will be used in combination with sighting distribution to characterize habitat utilization of bottlenose dolphins within and between the TBRE and SINERR field sites. In addition to remote biopsy dart samples from known dolphins, sighting histories will be used to identify fine-scale geographic contaminant specificity of bottlenose dolphins in both regions; are there contaminant congeners specific to the TBRE and SINERR regions? In addition, these results may also identify a pathway for contaminants in a salt marsh estuarine ecosystem; are dolphins absorbing these contaminants by traveling between the TBRE and SINERR regions, or are the contaminants reaching the dolphins in another way, such as dolphin prey traveling between regions?

Assessing ecosystem health requires a multi-faceted analysis of all trophic levels of an ecosystem. Prior studies have identified high levels of PCBs and other contaminants surrounding NPL sites in Brunswick. The biopsy dart samples from bottlenose dolphins in both the TBRE and SINERR have provided preliminary evidence for elevated levels of PCBs in bottlenose dolphins within both regions. However, there are still numerous questions left unanswered to identify the overall health of these two ecosystems. Identifying bottlenose dolphin abundance, site-fidelity, habitat use, and contaminant specificity for these regions is one method toward providing insight into bottlenose dolphin health and thus ecosystem health within the TBRE and SINERR.

This research would not be possible without funding from NOAA Fisheries Service, Georgia Department of Natural Resources, and Chicago Zoological Society.

Bottlenose dolphins in the Big Bend region of Florida

By Rene Tyson, MS, Florida State University

The waters stretching from St. Vincent Sound to Alligator Harbor in the Big Bend of Florida represent one of the least understood areas of the state in regards to bottlenose dolphins. Recent large scale mortality events, together with an increasing potential for human impacts in this area, led to studies of abundance and stock structure of dolphins in this region. Dr. Doug Nowacek's group at Florida State University, working in collaboration with the SDRP and other colleagues, documented the year-round presence of dolphins throughout the area although with seasonal and annual variations. The present study implemented mark-recapture surveys using photographic-identification techniques to estimate the abundance of dolphins in this region in the summer of 2007 and winter of 2008. Because the region is large and recent work here suggests that at least two distinct communities exist in these waters, the region was divided into the two areas in which these communities appear to reside (St. Vincent Sound/ Apalachicola Bay and St. George Sound/Alligator Harbor, Figure 1), and independent estimates of abundance were calculated for each area and each season.

Mark-recapture estimates of abundance were similar within each survey area for each season: in the St. Vincent Sound/ Apalachicola Bay survey area 182 ± 58 animals inhabited the survey area in the summer and 178 ± 77 animals in the winter; in the St. George Sound/Alligator Harbor survey area 365 ± 164 animals inhabited the survey area in the summer and 359 ± 87 animals in the winter. Results from this study provided further evidence that at least two communities reside in these waters as only 2.4% of animals identified during the study were found in both survey areas.

The results from this study can be used by the NOAA Fisheries Service to aid in their stock assessment process and help manage animals in this region more appropriately under the Marine Mammal Protection Act. These results can also be used as a baseline from which future modifications of the ecosystem might be gauged if/when potential threats (such as disrupted flow of the Apalachicola River, increased development and activity by humans, and future UMEs, etc.) occur.

This project was funded by the Florida State University Department of Oceanography and the HBOI Protect Wild Dolphins Grant 2004-2006 & 2005-2012. In addition, some logistical and field support and project guidance were provided by the Chicago Zoological Society through Brian Balmer and Randall Wells.

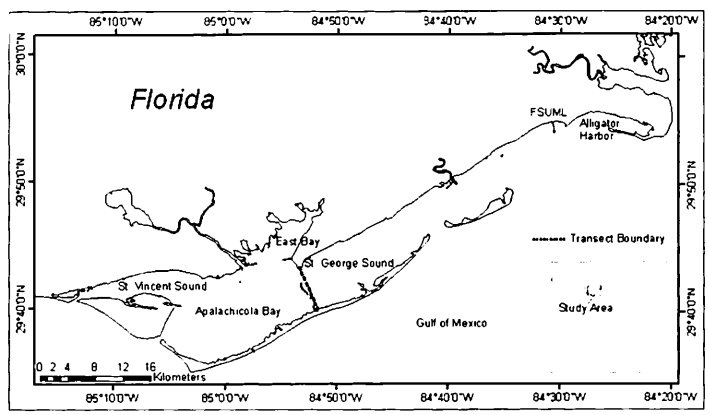


Figure 1.

DOLPHIN RESCUES, RELEASES, AND FOLLOW-UP MONITORING

In the last months of 2008, the Sarasota Dolphin Research Program was given temporary responsibility for cetacean stranding response in Sarasota and Manatee Counties due to unexpected staffing issues within Mote Marine Laboratory's Stranding Investigations Program. Prior to October, 2008 had been an unusually quiet year, with no strandings by Sarasota Bay resident dolphins. In October, a long-term resident, 54-year-old female FB63, died after being attacked by sharks and was recovered by SDRP staff. The second half of December was very busy for SDRP staff, with a live stranding by the 3.5-year-old first-born calf of FB 127 (Ginger, described below), recovery of the carcass of the first-born young-of-the year calf of FB 159, recovery of an unknown 3-year-old male from Longboat Key, and recovery of a fresh carcass of a young-of-the-year from Terra Ceia Bay. During the same period, two reports of cetacean strandings were found to involve injured or dead sharks (see account below).

Responsibility for stranding response is labor intensive. Staff must be prepared to respond to reports at any hour of the day (one of the dolphin-that-turned-into-a-shark reports came in at 1:00 pm on Christmas Day). Response for dead animal reports involves driving to a beach or searching by boat to confirm the report, then towing a carcass to shore, loading it onto a truck, and delivering it to the Florida Fish and Wildlife Conservation Commission's Marine Mammal Pathobiology Lab in St. Petersburg for a necropsy. Live animal response involves stabilizing the animal on the beach until a team can be mobilized from Mote's dolphin hospital to pick it up and transport it to Mote.

Bottlenose dolphin Ginger rescued from Siesta Beach

By Randall Wells, PhD

A young female bottlenose dolphin that stranded early in the morning on 16 December 2008 on Siesta Key Public Beach was brought to Mote Marine Laboratory's Dolphin and Whale Hospital for treatment. The dolphin, known as Ginger, is a 3½-year-old female recognized by scientists with the Sarasota Dolphin Research Program by the unique nicks on her dorsal fin. She is the first calf born to a 13-year-old mother referred to as "F127." Ginger separated from her mother last spring prior to the birth of a new sibling in June and has been on her own since. Ginger's 50-year-old grandmother, a long-term resident of Sarasota Bay, has been studied by the program since August 1975.

Ginger began swimming shortly after being admitted to Mote's dolphin hospital. She was found to have pneumonia, gastro-intestinal problems, fungus in her blowhole, and was underweight. She was placed on a diet of live local fish only, in order to minimize the possibility that she would start to approach humans for bait or catch once she returns to the wild. By early January, most of her health problems had resolved and she was gaining weight, on a trajectory for release in a few weeks. Plans for post-release monitoring of this local resident include tagging with a small VHF radio transmitter and regular tracking and observation.

Mote dolphin hospital volunteer Connie Murk assists Ginger on Siesta Beach.

Update on bottlenose dolphin Scrappy rescued from a bad apparel choice

By Jason Allen, BS

Two years ago we reported on the rescue of Scrappy, a Sarasota Bay resident bottlenose dolphin who had become entangled in an extra large men's Speedo bathing suit. He was first observed entangled in the material on 6 July 2006. On 3 August, a rescue team captured Scrappy, brought him aboard a veterinary examination boat, removed the material, evaluated and treated his wounds, performed a health examination, and returned him to the wild.

Since Scrappy's rescue, he has been observed more than 70 times. He has been seen feeding, traveling and socializing with other dolphins, generally in the same deep waters of Sarasota Bay that he inhabited before his entanglement. His respiration and diving behavior seem normal and his body condition appears healthy. Unfortunately, we have not had any direct observation of the wounds on his pectoral fins, but can assume from behavioral observations that they have not significantly hindered his ability to forage, interact with other dolphins or avoid predators.

"Scrappy" from a sighting on 9 October 2008, more than two years after his rescue. He was socializing in a group with other well known males including "FB 142", "C35-4", "IKN-2", "FB 234" and "Pokey".

DOLPHIN RESCUES, RELEASES, AND FOLLOW-UP MONITORING

Follow-up on disentanglement of FB28

By Aaron Barleycorn, BS

Last year we reported on the field disentanglement of FB28, a 42-year-old Sarasota Bay resident male dolphin who was entangled in monofilament fishing line. He was first seen with the line tightly wrapped three times from the leading edge of the dorsal fin to his tail fluke on 22 June 2007. FB28 also suffers from a condition called lobomycosis, a fungal infection causing large white lesions to protrude from the skin. The line appeared to be caught on some of these lesions and was cutting into the dorsal fin. On 6 July 2007, a rescue team was able to cut the line free from around the dorsal fin using an extendable cutting tool while the dolphin swam freely. Unfortunately, a small amount of line remained entangled around and trailing behind the tail fluke

Since the rescue, FB28 has been observed on 22 days. On three occasions, he was seen "fish-whacking", a foraging strategy involving striking fish with the fluke. On six days, FB28 was seen in the shallows near the Anna Maria City Pier. The entanglement could still be seen, but the dolphin appeared to be behaving and moving normally. These sightings provide encouraging evidence that the fluke can still be actively used.

On 2 May 2008, FB28 was seen during the SDRP dolphin health assessment. The on-site veterinarian decided that due to the dolphin's advanced age, lobomycosis, and previous behavioral observations, the added stress of temporarily capturing FB28 to remove the rest of the monofilament would not be in his best interest.

Funding for rescue efforts was provided by NOAA's Fisheries Service.

Yes, I can see it!!

By Jason Allen, BS

It had already been an unusual morning. Randy Wells had just responded to Ginger's stranding on Siesta Key Public Beach (see above), and we had just started to take pictures of a young dolphin that had been badly raked by other dolphins. So I was surprised when I got a call from Randy that another stranding had been reported near our current location. As I hung up the phone to finish our current sighting and began looking for the possible stranded animal, I noticed a crowd of people gathered on the beach.

I motored the boat as close as I could, safely, to the group of people and asked if anyone had called in a stranding. Someone in the group said yes and then another yelled, "It's right here!" and pointed in front of him. I asked again if they were sure it wasn't the small dolphin we had just been observing. They were sure. It was right in front of them in a deep trough of water running between a small sand bar and the beach. The waves were small, but breaking over the bar just enough to block my view of what was beyond. Out of other options, we anchored the boat as close as possible; I took off my jackets and jumped into the 66 degree water.

After a short swim, I arrived on the bar. Now close enough to the people on the beach to speak without yelling, they told me that the dolphin had a wound on its head. Was it the mother of the smaller animal offshore and had it suffered a worse fate? I walked beyond the bar and into the deeper water of the trough, but the water was cloudy and I really couldn't see anything. About the time I was waist deep and I could hear one of the people saying, "Do you see the wound? Do you see it?" something swirled and swam towards me. Out of the murky water appeared a shark whose head was about as wide as both of my legs. The good news was that I could now see the wound on its head, but only because it was about a foot away from me and swimming closer! Thankfully, the shark veered to its left so I stepped to my left as well. As it passed me, I saw that it was only a nurse shark (though it was at least six feet long) and that besides the small wound on its head it appeared ok. It was probably just trapped in the trough by the low tide and would cross the bar and be on its way when the water rose again. I explained all of this to the group that had gathered, thanked them for calling us, and started my chilly swim back to the boat.

As I pulled myself back onto our boat, dripping wet and cold I thought 'what did I learn from this'? Easy... next time, send an intern in first to investigate!!!

The small injured dolphin later identified as the 2005 calf of Moon Fin Look-alike (foreground) and the group of beach-goers gathered around the "stranding" (background).

Echo update: 18 years back in the wild

By Kim Bassos-Hull, MS

Echo, one of a pair of dolphins that were returned to the wild 18 years ago, was resighted in the southwestern part of Tampa Bay on three different days in June 2008 by the Eckerd College Dolphin Research Program (see Figure 1 photo). SDRP researchers had last seen Echo on 20 August 2003 in southwestern Tampa Bay. Misha, the other dolphin in this pair, died in 2006 near Port Manatee and the core of his home range. Necropsy results were found to be inconclusive relative to cause of death, but infection was suspected. Both Echo and Misha were the subjects of a unique two-part scientific experiment. Echo and Misha were initially collected in Tampa Bay in July 1988 and spent two years at the University of California at Santa Cruz's Long Marine Laboratory where researchers studied their echolocation processing abilities and behavior patterns. Then, as planned prior to collection, on 6 October 1990 they were released back into Tampa Bay after a transition period in a seapen at Mote Marine Laboratory. During intensive monitoring during the first year following their release, both Echo and Misha were observed feeding, interacting with other local dolphins, and in general displaying typical behavioral, ranging, and social association patterns as well as excellent body condition.

Echo and Misha separated after the first few months back in the wild, but researchers continued to observe both dolphins through opportunistic sightings. Misha was sighted on 70 days since release along the southeast coastline of Tampa Bay. The last sighting of Misha by our program before his death was on 16 August 2005 in the Manatee River (southeastern Tampa Bay) where he was observed with longtime associate, KATT. With Echo's most recent summer sightings, he has now been re-sighted 58 times since release. Figure 2 shows Echo's and Misha's capture, release, and sighting locations since 1984.

Figure 1. Echo on 3 June 2008 near Pinellas Point in southwestern Tampa Bay. Photo courtesy of the Eckerd College Dolphin Research Program.

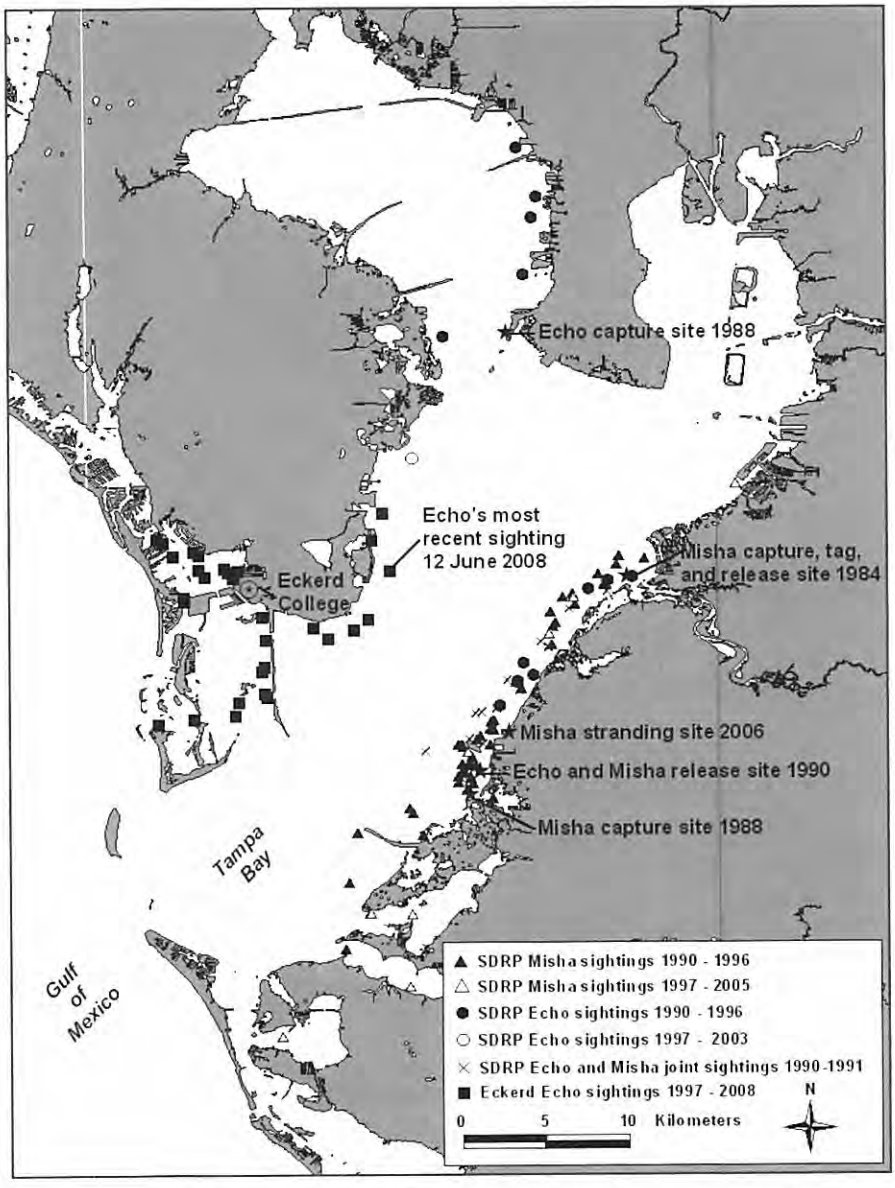


Figure 2. Map displaying capture, release, and sighting locations since 1984 for Echo and Misha.

INVOLVEMENT IN OTHER MARINE MAMMAL CONSERVATION AND RESEARCH ACTIVITIES

Tagging and tracking of franciscana dolphins in Argentina, Year 4

By Randall Wells, PhD, Pablo Bordino, MS, Fundacion Aquamarina, and M. Andrew Stamper, DVM, Disney's Animal Programs

In March 2008, CZS conservation scientists Randall Wells, Jason Allen, and Aaron Barleycorn returned to Bahia San Blas, Argentina, to work with Pablo Bordino and his dedicated Aquamarina team of students, colleagues, and fishermen, and a veterinary team from Disney's Animal Programs, to conduct additional satellite-linked tagging of franciscana dolphins. Building on the tagging and tracking work during 2007 that indicated a high degree of residency to Bahia San Blas over periods as long as six months, the next phase of the project was designed to apply time-depth recording tags (TDRs) to address specific questions about:

1) what part of the water column the dolphins use – if the dolphins show preference for water of particular depths, then fishermen might be able to set their nets at different depths in order to avoid the dolphins.

2) developing correction factors for aerial and boat surveys for dolphin abundance that take into account the dive patterns of the animals. The TDRs provide information on dive durations and time spent at specific depths where the animals might be visible to scientists.

3) social patterns. By deploying tags with identical duty cycles, it is possible to determine if the animals exhibit a stable or fluid pattern of social associations, through examination of their location data to see if they remain together or separate. Genetic samples collected during the tagging process allow determination of relatedness of dolphins caught together.

Four dolphins (two male/female pairs) were tagged, three with TDR tags and one with a location-only tag. The tags continued to transmit for two to nearly six months. As before, the dolphins remained in a fairly localized area centered on Bahia San Blas, but they moved on occasion a bit farther to the north and south than during 2007 (see map below). Photo-identification efforts found one dolphin in the same area as where it had been photographed one year before, suggesting multi-year residency to the bay. One of the male-female pairs remained together throughout the multi-month tracking period, while the other pair separated and returned to one another from time to time. In both cases, genetic analyses indicated that the animals were not related, suggesting the possibility of long-term breeding associations.

Franciscana research team, Bahia San Blas, March 2008.

The dolphins typically swam at depths of less than 5 m although occasionally they dove to 30 to 35m, equal to the deepest depths in the area, suggesting they can use the entire water column. Typical dives were of less than 1.5 min duration, although each dolphin demonstrated an ability to make occasional dives lasting up to 4-5 min. Analyses of dive data are continuing.

Major support for this project was provided by Disney's Animal Programs and the Chicago Zoological Society, and tags and tag data processing assistance were provided by Dolphin Quest.

An adult female franciscana is released by Aquamarina research team members (from left to right, Leo Berninsone, Ariana Oberti, Natalia Asplanato, and Ignacio "Nacho" Bruno), with guidance from Jason Allen (background), following tagging. Leo and Nacho have received training through internships with the SDRP in Sarasota in recent years.

INVOLVEMENT IN OTHER MARINE MAMMAL CONSERVATION AND RESEARCH ACTIVITIES

Conservation genetics of franciscana dolphins

By Martin Mendez, PhD Candidate, Columbia University and Fundacion Aquamarina

This project seeks to evaluate franciscana dolphin population structure and stock identity along the species distribution range, with a focus on its southernmost portion located off the coast of northern Argentina. Furthermore, we are interested in identifying those environmental features that may be, at least in part, responsible for coastal cetacean population structure. Our analysis uses cutting-edge genetic tools, which allow an unparalleled level of accuracy on population identification and gene flow estimation. In order to assess both maternal and bi-parental lineage structure, such tools are used on a combination of nuclear and mitochondrial DNA. This genetic information is evaluated in an explicit environmental framework, taking into account a suite of oceanographic and ecological features.

Our results to date support the previous proposition of two franciscana populations in Brazil, and further suggest the existence of at least two previously unidentified populations in Argentina, to the south of the La Plata River estuary. Contrary to what is common for many cetacean species, franciscana population structure does not respond to a pattern of isolation by distance, by which the further apart populations are, the greater their genetic isolation. Rather, abrupt breaks in oceanographic conditions seem to play a major role on the genetic structure patterns of this species.

Understanding population structure patterns is key for conservation strategies, as it aids in the identification of important areas to preserve demographically independent groups of individuals or populations. In fact, effective management strategies *require* the identification of such populations and population areas. Further, by adding the environmental dimension, we will be able to gain a better understanding of how the environment influences the structure of franciscana populations, and hence how potential environmental changes may impact such structure.

This work would not be possible without the invaluable support of the entire Fundacion Aquamarina staff and volunteers, or without the collaboration of the local wildlife authorities. Funding for this project comes from Wildlife Trust and the Cetacean Conservation and Research Program at WCS and the AMNH.

Ecology and conservation of Guiana's dolphin in the Colombian Caribbean Sea (2002-2009)

By Salomé Dussán-Duque, MS, PhD Candidate, Sea Mammal Research Unit, University of St. Andrews, Scotland

Guiana's dolphin (*Sotalia guianensis*) was known until 2007 by its common name of marine tucuxi. It was recognized as the marine ecotype of a single species distributed in the Atlantic coastal areas of Central and South America, as well as in the Amazon River and its tributaries. The concept of one species with two ecotypes, one marine and one riverine, was changed based on morphological characteristics and genetic divergence. Although the number of studies on both species has increased in the last decade, they still remain listed as "Data Deficient" by the IUCN. The majority of these studies have been conducted in Brazil, and as a result, the populations from there are known fairly well and their status is not classified as endangered. In Colombia, Guiana's dolphin was designated as Vulnerable in 2005 by the Ministry of Environment and Territorial Development of Colombia. The main reasons that gave support to this resolution were: a suspected and/or observed reduction in population size over the last 10 years based on a decline in area of occupancy and/or quality of habitat, and actual levels of exploitation.

It seems like yesterday when I arrived in 2002 in Sarasota, asking the Sarasota Dolphin Research Program for help to conduct research with Guiana's dolphin in Colombia. SDRP team members offered their knowledge, training, support and care for this project from the beginning. Without their support this project would not be the longest ongoing project conducted with marine dolphins in Colombia. The main goal of this project is to advance knowledge of the ecology of the Guiana's dolphin in the Gulf of Morrosquillo, Colombia, and to use this knowledge to develop guidelines for the management and long-term conservation of this species and its ecosystem.

For those who are not familiar with this species and its habitats, the question of why or how we chose this specific area in Colombia to conduct research may arise. For 30 years the Gulf of Morrosquillo has been the only area in Colombia where Guiana's dolphins have still been reported. It may be the only area in Colombia where this species still resides. Therefore, it is extremely important for the conservation of this species and the ecosystems where it is found in Colombia, to conduct studies in this area to determine if a population decline has occurred or is occurring. An understanding of the basic species' needs in this region is required for its survival. It is necessary as well to identify the principal causes for habitat loss in the study area and to recognize how they may affect directly or indirectly the dynamics of this species.

From November 2002 through June 2006, 194 boat survey days were accomplished in the southern area of the Gulf of Morrosquillo. The surveys were made during the three climatic seasons: rainy, dry, and semi-dry, and covered approximately 8,226 km. The data collected include: environmental, behavioral, photographic, acoustic, and carcass. We have learned so much about this species in Brazil and Colombia in recent years. We know now, for example, that the different communities adapt to

Releasing a Guiana's dolphin after illegal collection by an aquarium in Isla Palma, Morrosquillo Gulf, Colombia.

local geomorphologic characteristics, showing a high grade of plasticity and social learning. We also learned that it is impossible to generalize about suitable conservation methods for this species since the threats and ways that Guiana's dolphins respond to them vary for each population. A strong tendency for site fidelity and permanent residency seems to be the common for this species along its distribution, but the number of individuals in a certain area at any moment depends on the carrying capacity. Guiana's dolphins are strongly associated with estuarine ecosystems (mangrove areas), they feed and reproduce in these areas, and their survival is connected to the future of these ecosystems. We cannot separate the vulnerability of this dolphin species and the vulnerability of its coastal ecosystems. Two of the results of this study showed a decline in the number of sightings compared to previous reports from the area and a probable shift in their distribution and habitat selection caused mainly by habitat loss (anthropogenic origin).

So, what are we doing to minimize the problem? At the moment we are analyzing data to gain basic knowledge on Guiana's dolphins in the study area. We are going back to the field in 2009 and 2010 to collect more data, and we aim to expand the study area with the help of Colombian students who are interested in continuing research with this species. In addition, we aim to develop a Conservation Plan by the end of 2010 that includes a management and monitoring plan in the southern area of the Gulf of Morrosquillo, having the support of the Colombian Government and the local community. Our plan is to propose an area of special management for this species in this area of Colombia and in this way to initiate the protection of the coastal marine ecosystems in this country.

Many thanks for the funding received by: CVS (Colombia), Cetacean Society International, Conservación Internacional (Colombia), Chicago Zoological Society's Chicago Board of Trade Endangered Species Fund, Iniciativa de Especies Amenazadas "Programa de Becas Jorge Ignacio Hernández-Camacho" (Colombia) and private funds.

Marine mammal conservation and research in Guatemala

By Ester Quintana-Rizzo, PhD,
Fundación Defensores de la Naturaleza

Research studies that focus on cetaceans are rare in Guatemala. In a country with many economic problems, it is difficult to do research and conservation on resources that are not used by regular people. Yet, marine mammals, especially cetaceans, have gained the attention of groups interested in doing whale watching. This activity is seen as a potential source of income for local fishermen. However, education has to be done before people can understand and appreciate the importance of conducting whale watching activities in a manner that is not detrimental to the animals.

Part of the education that is needed includes understanding the biodiversity of cetaceans found in the country. No studies examining cetacean biodiversity have been conducted by local researchers. This study represents the first effort to gain a better understanding of the resources available in the country. Since August 2008, photo-identification surveys have been conducted along the Pacific coast of Guatemala. Although financial constraints allow surveys along only half of the country's Pacific coast, preliminary results are very encouraging. Surveys conducted at 3- and 5-miles from shore indicate the presence of at least four

Ester Quintana conducting field research on cetaceans in the Pacific Coast of Guatemala.

cetacean species: bottlenose dolphins, spotted dolphins (*Stenella attenuata*), false killer whales (*Pseudorca crassidens*), and humpback whales (*Megaptera novaeangliae*). Of these, spotted dolphins and bottlenose dolphins have been the most commonly observed species. Spotted dolphins have been sighted in groups up to around 75 individuals. The first sighting of humpback whales occurred in the beginning of October, which coincides with the migration pattern of those whales from the Northeastern Pacific to Central America where they mate and have their calves. Most of the sightings of cetaceans have occurred in areas of depths of more than 35 m and animals have been involved in all kinds of activities. Photo-identification analysis has started and animals with distinctive fins have been observed, including bottlenose dolphins, spotted dolphins, and false killer whales. No re-sightings of those animals have been confirmed yet. Humpback whales are recognized by the color patterns on their flukes. It was not possible to take pictures of the flukes of the whales observed in the one sighting recorded so far, but I hope to photograph the flukes of whales in future sightings.

This project is an exciting opportunity because it is the first scientific effort of its kind at the national level and because most of the funding comes from the Guatemalan government through its National Commission for Science and Technology (CONCYT). Their interest and involvement is crucial for the conservation and management of marine resources. Additional support has been provided by the Chicago Board of Trade, PADI Foundation, and Idea Wild.

A group of very acrobatic spotted dolphins sighted in the beginning of October 2008. Photo by Ester Quintana.

INVOLVEMENT IN OTHER MARINE MAMMAL CONSERVATION AND RESEARCH ACTIVITIES

Tracking spotted dolphins in the Eastern Tropical Pacific

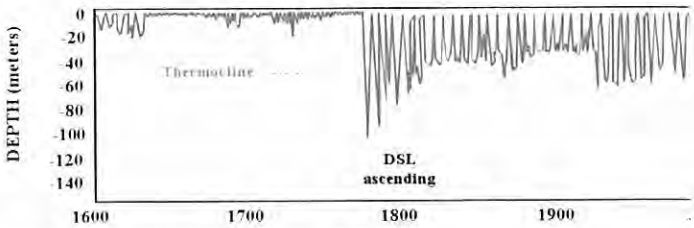
By Michael Scott, PhD,
InterAmerican Tropical Tuna Commission

I first joined Blair Irvine and Randy Wells in 1974 in their pioneering study of dolphin tagging and radio tracking in Sarasota Bay. In addition to my involvement in the Sarasota Dolphin Research Program, I study spotted and spinner dolphins and yellowfin tuna that are the center of the tuna-dolphin controversy in the eastern tropical Pacific Ocean (ETP). Purse-seine fishermen have used the tuna-dolphin association to help them find and catch the tuna since the late 1950s, but at a cost of a high incidental mortality of dolphins in the early years of the fishery. Since then, research, techniques for releasing dolphins from the nets, and international agreements that put observers on every boat of the international fleet have brought the mortality down to a tiny, sustainable fraction of what it was, but we still know very little about these dolphins that spend their lives far out at sea. Capturing dolphins at sea, radio-tagging and releasing them safely, and then tracking them is difficult, risky, and expensive, but that was what I and my co-author Susan Chivers (another Sarasota Bay capture-release veteran), along with many colleagues, attempted to do to learn more about their movements, diving behavior, and association with tuna.

Before heading to sea, many of our dolphin-handling and tagging techniques were tested in Sarasota Bay, and many of our team gained experience in capture-release there. However, some things just can't be simulated in a shallow Florida bay. In the open ocean, dolphins were captured by a 200 ft-long tuna purse-seiner that set a 500-ft deep, mile-long net that encircled up to 500 dolphins at a time. Swimmers then grabbed the dolphins while inside the net, put them into a small raft, and tagged them and released them with the rest of the herd.

Over the years, we have radio-tracked at sea 20 spotted dolphins (*Stenella attenuata*) for up to 6 days. Nine of the dolphins also carried time-depth recorders that provided 477 hours of dive data. The movement data suggested that the dolphins sought out areas with higher biological productivity, such as along the continental slope or along areas where the thermocline abruptly shallows. By tracking and tagging multiple dolphins we found that the dolphin herds were dynamic, changing in size and membership throughout the course of a day. The diving data revealed that spotted dolphins are nocturnal feeders, diving deeper and longer at night as they track the daily vertical migration of fishes and squids, while daytime was primarily spent traveling (see graph below). We also found that the association with tuna was not a permanent one, suggesting the possibility of catching large yellowfin tuna without the presence of dolphins.

The study was funded by NOAA's Fisheries Service, the Inter-American Tropical Tuna Commission, with publication support from Dolphin Biology Research Institute and is being published in *Marine Mammal Science*.



Dive pattern of tagged spotted dolphin.

Spotted dolphins in tuna purse seine net.

Assessment and management of dolphins around islands

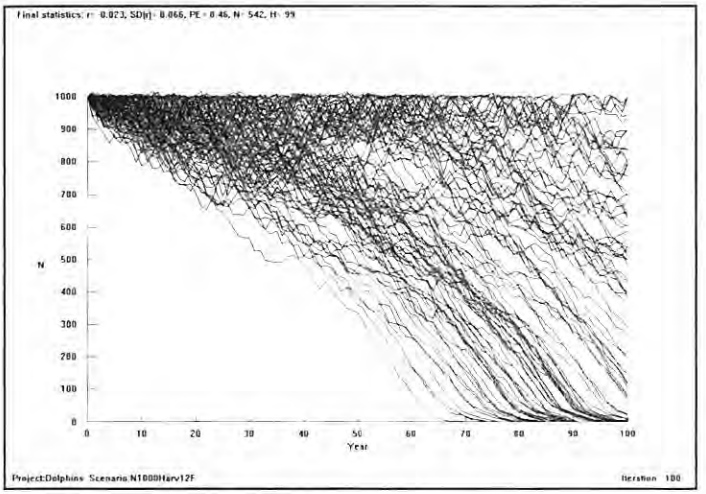
By Randall Wells, PhD

In August 2008 a workshop was convened in Apia, Samoa by the IUCN Cetacean Specialist Group to develop protocols for assessing populations of dolphins around islands, with a focus on Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in the Solomon Islands. Since 2003, bottlenose dolphins in the Solomon Islands have been collected and exported to Mexico, Dubai, and Singapore, leading to concern about the potential conservation implications of such removals in the apparent absence of adequate assessment of populations prior to collection. The IUCN Global Plan of Action for the Conservation of Cetaceans considers it a general principle that small cetaceans should not be captured or removed from a wild population unless that specific population has been assessed, and it has been determined that a certain level of removals can be allowed without reducing the population's long-term viability and without compromising its role in the ecosystem. A principal goal of the workshop in Samoa was to elaborate on the elements of an assessment that would meet such a standard. The meeting focused on scientific and technical issues relating to the conservation of populations of small cetaceans, especially Indo-Pacific bottlenose dolphins, with the expectation that the assessment framework developed by the workshop would be useful not just for the case of Indo-Pacific bottlenose dolphins in the Solomon Islands, but also for other populations of small cetaceans elsewhere.

In preparation for the workshop, CZS conservation biologist and head of the IUCN Conservation Breeding Specialist Group Bob Lacy and I performed analyses of the potential consequences of removals from bottlenose dolphin populations, using the computer simulation program Vortex, developed by Dr. Lacy. We

examined scenarios for Sarasota Bay dolphins, for which much of the requisite data on population dynamics and life history is well known. We then incorporated data from Indo-Pacific bottlenose dolphins, replacing parameters with data from this less-well-known species when possible. The results of our population viability analyses suggested that, in general, populations need to be more than 50-65 times as large as the number of animals that will be removed. Given information presented at the workshop, such a risk-averse approach likely would not have permitted removals on the scale of those that have been done to date, or which are planned.

A report from the workshop is expected to be released in early 2009, and will be available through the IUCN.



Vortex simulation for a population of 1,000 bottlenose dolphins, with an initial population growth rate of 2.4%, comparable to Sarasota Bay dolphins with current rates of human interaction plus a removal rate of 12 females/year. Most scenarios among the 100 iterations resulted in population decline, with an average potential population growth rate of -0.023.

Entanglement Working Group update

By Kim Bassos-Hull, MS

The FEWG (Florida Entanglement Working Group) focuses on marine wildlife entanglement issues and ways to reduce marine debris in the environment in Florida state waters. One of the primary programs supported by the FEWG is the Monofilament Recovery and Recycling Program (MRRP) which is a statewide effort to educate the public on the problems caused by monofilament line left in the environment, to encourage recycling through a network of line recycling bins and drop-off locations, and to conduct volunteer monofilament line cleanup events (see www.fishinglinerecycling.org). In addition, the group is actively involved in derelict crab trap recovery and clean-up efforts around the state.

The Sarasota Dolphin Research Program (SDRP) has been a contributing member of this group since 2005. During recent years there has been an alarming increase in the number of dolphins getting entangled in, or ingesting, fishing gear. Therefore the SDRP is working with other FEWG members studying manatees and sea turtles by using recorded data to identify "hot spots" of entanglement in Florida. Such information will help counties and management agencies to promote education, recycling, and cleanup efforts. The FEWG and several collaborating organizations, including the Ocean Conservancy and NOAA's Fisheries Service, secured two grants (NOAA Marine Debris Prevention and Removal Grant and National Fish and Wildlife Federation Grant) to perform clean-up and education projects at several sites around the state (see South Sunshine Skyway Fishing Pier article above).

In February I had the opportunity to participate on a derelict crab trap clean-up in Matalacha Pass in Charlotte Harbor near Fort Myers (Figure 1). Derelict crab traps cause a large problem with marine wildlife entanglement and continue to ghost fish after they have been abandoned. They are also a navigational hazard so it is important to get them out of the water. Overall, more than 50 people from many local, state, and federal agencies participated in this cleanup and 95 derelict traps were removed from the estuary.

The SDRP has had increased interest from state, county, school and 4H groups to put together personal-sized fishing line recycling bins ("mini bins"), a product that was piloted last year, and distribute to anglers and kayakers. These "mini-bins" are built from recycled tennis ball cans with Velcro© strips that allow attachment on personal docks, tackle boxes, boats, kayaks etc. and are a temporary receptacle to hold fishing line until the angler (or collector) can get to a MRRP bin or box at a pier, dock, tackle shop, or marina. Working with the Sea Grant agent from Collier County we obtained a small grant to distribute 1,000 of these to anglers and boaters around the Marco and Naples areas (see Fish Florida Grant article below). Within these "mini-bins" we include other educational materials such as a MRRP brochure, Dolphin-Friendly Fishing Tips Cards, and a NOAA "Help Prevent Entanglement" brochure. Our goal is to eventually get these "mini-bins" with educational information into the hands of many anglers and kayakers around the state with hopes of reducing impacts from entanglement and fisheries interactions and having these stakeholders be part of the solution.

Figure 1. Christy Hudak (FWC) and Kim Bassos-Hull (SDRP) remove a derelict crab trap near Matalacha Pass Bridge.

EDUCATION, OUTREACH AND TRAINING

Education continues to be a major component of SDRP activities, directed toward the general public, students, colleagues in the United States and abroad, and wildlife management agencies.

Public Education and Outreach: We work to educate the general public regarding bottlenose dolphins and conservation issues through public presentations at the Chicago Zoological Society's Brookfield Zoo, Mote Marine Laboratory and Aquarium, and elsewhere, articles and interviews, and through volunteering opportunities. We also produce books for the general public and students. One of these, "*Dolphins, Whales, and Manatees of Florida: A Guide to Sharing Their Waters*," by John Reynolds and Randall Wells, was published in 2003 to fill a niche for teaching people about how to better appreciate and treat marine mammals in their environment. Another, "*Dolphin Man: Exploring the World of Dolphins*," by Laurence Pringle and Randall Wells, was published in 2002 to provide middle school students with an opportunity to learn about Sarasota Bay's dolphins and about one pathway for becoming a marine biologist engaged in dolphin biology, research, and conservation.

An Immersion Cinema interactive program, "*Dolphin Bay*," loosely based on our long-term dolphin research and conservation program in Sarasota Bay, is aired during multiple daily showings at Mote Marine Laboratory's 165-seat theater. Participants are able to investigate realistic threats to bottlenose dolphins in the imaginary bay, and attempt to resolve the threats for the animals by applying field research techniques and performing rescues. The program is designed to entertain as well as educate young people, especially, about the threats faced by coastal dolphins, and about the means available to them for making a positive difference in the dolphins' lives. It tries to present a balanced selection of realistic alternatives. The consequences of the choices made by the participants are shown through modeling of the Dolphin Bay population using the program "*Vortex*" (developed by the Chicago Zoological Society's Dr. Robert Lacy), indicating the population size 50 years hence.

Immersion Cinema: Dolphin Bay

Sharing Scientific Findings and Participation on International and Government Panels: Our efforts to provide information to our colleagues and wildlife management agencies continues, through publication of numerous peer-reviewed scientific articles, invited presentations at various scientific conferences, and participation in national/international panels such as the Atlantic Scientific Review Group, the Bottlenose Dolphin Take Reduction Team, the Working Group on Marine Mammal Unusual Mortality Events, the IUCN Cetacean Specialist Group, and the IUCN Reintroduction Specialist Group.

International Training Opportunities: The SDRP is a component of the Chicago Zoological Society's Conservation, Education, and Training Group (CET). As part of the CET program, we provide training opportunities for scientists and students from outside of the United States. These sponsored training opportunities allow foreign scientists to participate in SDRP field and laboratory research activities, and discuss with staff how such activities might be applied to their own situations at home. Standardized research methodologies facilitate comparisons across research sites. During 2008, we hosted two people: Dr. Sunil Choudhary of India and Ignacio (Nacho) Bruno, part of the Aquamarina franciscana dolphin research team, from Argentina. Each of the 2008 participants describe their experiences below. Support for this program was provided by Fulbright, Dolphin Quest and private donations.

Graduate Students: As described throughout this newsletter, graduate students from a variety of institutions, especially the University of California-Santa Cruz, the University of South Florida, and the University of North Carolina-Wilmington, utilize the resources of the SDRP as they conduct their thesis or dissertation research. To date, 24 doctoral dissertation and 30 master's thesis projects have benefited from association with our program, through field research opportunities or access to data, samples, or guidance. During 2008, one master's student (Rene Tyson, FSU) and one doctoral student (Erin (Meagher) Fougeres, UNCW) involved with our program successfully defended their thesis or dissertation. Currently, ten doctoral students and one master's student are making use of resources provided by our program.

Undergraduate College Internships and Other Volunteers: At the college level, we are fortunate to have access through Mote Marine Laboratory to high quality, dedicated undergraduate student interns who volunteer with our program for at least 2-3 months periods (for more information on internships, please contact Jason Allen, SDRP Lab Manager, at: allenjb@mote.org). In addition, eight non-students, including local Sarasota residents, volunteered their time to the program. During 2008, 32 interns and out-of-town volunteers worked with us, providing 12,720 hours of assistance to the program. In addition to the international training program participants listed above, we were joined by interns and volunteers from Brazil, Colombia, Denmark, Bermuda, Japan, South Africa, Germany, Switzerland, and England.

Of the 148 former interns for whom we have current email addresses, 72 (49%) responded to a request to provide information about their careers following involvement with the SDRP. Of these, 32 (44%) and 13 (18%) are in the process of obtaining or have completed a Masters and PhD, respectively (with some falling into both categories). They have produced 97 papers, reports, and articles that are published, in press or in review and have made 115 presentations. Some of their comments regarding the value of their experience with the SDRP are presented below.

High School Programs: We offer both formal and informal educational opportunities for high school students. A formal curriculum, "The Secret Life of Dolphins," was developed by the Chicago Zoological Society in collaboration with Mote Marine Laboratory, and focuses on high interest dolphin research ongoing at the two institutions. The formal curriculum models a set of technology-based educational components, enabling students and teachers to work with real dolphin data from Sarasota Bay and Brookfield Zoo dolphins, using interactive data analysis software. It has been designed to offer teachers and students a dynamic array of experiences and scientific inquiry tools that, used together or independently, center on an overall theme of understanding the nature of science and the role of research in conservation. The curriculum immerses students in scientific investigation. They can manipulate and analyze real dolphin data, while gaining an appreciation for the uncertainty of science. The downloadable curriculum unit (approximately 4 weeks long) includes background information for the teachers and classroom-based activities and lesson plans related to: 1) basic content on dolphin research, 2) computer software, and 3) a field trip to either Mote Aquarium or the Chicago Zoological Society's Brookfield Zoo. The materials are available as downloads at no cost at www.sarasotadolphin.org.

High school students communicating solutions

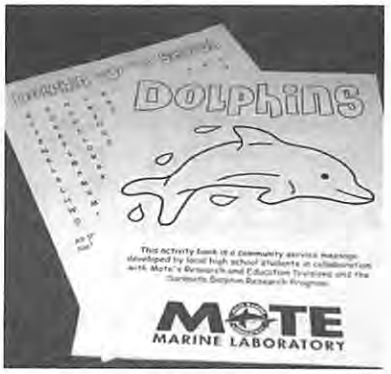
By Kim Bassos-Hull, MS

In the latest SDRP collaboration with Mote's Education Program, we worked with local area high school students on some innovative ways to communicate conservation messages to the public. "Communicating Solutions" gave 16 high school students in Mote's High School Intern Program the opportunity to work side by side with SDRP staff member Kim Bassos-Hull and Mote VP of Education Jim Wharton to collect, analyze, and present real research data. The research project involved monitoring dolphin behavior in high boat traffic areas of Sarasota Bay in response to increasing concerns about dolphin interactions with anglers and boats. Research questions included: 1) how often are dolphins observed within 100 m of recreational boats, 2) how do dolphin dive patterns change in the presence of boat traffic, 3) are there identifiable "hot spots" of human-dolphin interaction? Students rotated and spent two weekend days a month on the water collecting data from October 2007 through March 2008. After learning how to analyze data back in the lab, students then prepared their findings for public presentation. Some of the findings included: 1) dolphins are exposed to more boat traffic in the afternoon compared to morning and more boat traffic in channels compared to open bay, 2) dolphins dove longer when the number of boats within 100 meters increased, and 3) dolphin activity budgets varied amongst individuals but more data is needed to make statistical comparisons.

The second part of the project involved the students communicating their findings through conservation messages to the public. Students were divided into four "Krewes" to develop CAPs (community awareness plans) to different target audiences. The four CAPs included: 1) a coloring book for elementary aged children, 2) a tent card for local area hotels and restaurants, 3) a tide chart with information on the back informing boat rental customers to not feed wild dolphins, and 4) a student presentation to local youth groups such as 4-H. The students also had the opportunity to present their findings at the Florida Marine Science Educators Association conference in May 2008. Our pilot year one program was both fun and rewarding while accomplishing some of the SDRP goals of research, conservation, and education. So with a generous donation from the Emily and Roland Abraham Marine Science Education Fund we will be continuing this program for another year and the students will get the experience of creating short video public service announcements to show to different target audiences. The first year program was enabled by a grant provided by The Association of Zoo's and Aquariums (AZA) through their Conservation Endowment Fund, and the Chicago Zoological Society.

Mote VP of Education Jim Wharton calls out boat data as high school intern Jillian Mayer records the data.

Mote high school intern Stephanie Altenbernd photographs "FB 199" near the Siesta Bridge.



Example of one of the Community Awareness Projects (CAPs) created by the high school interns: a coloring book for elementary school children.

"Don't Feed Wild Dolphins" PSA to be released

By Randall Wells, PhD

Human feeding of wild dolphins is an increasing problem in the southeastern United States, and is likely contributing to the increase in dolphin deaths from ingestion of, and entanglement in, recreational fishing gear. We worked with NOAA's Fisheries Service, the Dolphin Research Center, Tinsley Advertising of Miami, and Wit Animation of Venice, CA, to develop a 30-second high-definition public service announcement (PSA) that will hopefully discourage the public from feeding wild dolphins. The spot depicts a computer-animated dolphin in a dependency rehab setting, along with an assortment of other wild animals that get food from humans: another dolphin, a bear, raccoons, and a seagull. The dolphin describes how it began taking food from people, the risks it faces as a result, and how it needs people to stop feeding it in order to overcome its addiction. Release of the PSA is scheduled for February 2009, and distribution will include broadcast networks, in-house programming for hotels, cruise ships, and other businesses, schools, conservation groups, etc. In addition, a website associated with the PSA is now active, providing access to the PSA as well as supplemental materials and downloads, at www.dontfeedwilddolphins.org. Support for production and distribution of the PSA was provided by Harbor Branch Oceanographic Institution's Protect Wild Dolphins Program, NOAA's Fisheries Service, Disney, Sea World-Busch Gardens Conservation Fund, Dolphin Quest, Dolphin Connection, Marineland, Gulf World, and the U.S. Marine Mammal Commission.

PSA endframe

"Dolphin-Friendly Fishing and Viewing Tips" cards

By Robin Perrtree, BS, Jessica Powell, MS student, Kim Bassos-Hull, MS, and Randall Wells, PhD

In response to the increase in dolphins taking bait and catch from anglers, we worked with NOAA's Fisheries Service, Hubbs-Sea World Research Institute, fishing guides and anglers to develop a set of 10 tips that can improve the experience of the angler or boater while enhancing protection for dolphins. By making these cards available to boaters, anglers, and the general public, we hope that more individuals will become aware of the risks and legal issues involved when interacting with wild dolphins. Once aware of these issues, we expect that more people will choose to engage in responsible viewing and fishing practices when dolphins are present. The 3"x5" laminated folding card, intended to fit in pockets and tackle boxes, was initially developed through the support of the Disney Wildlife Conservation Fund. More than 197,000 cards have been distributed since January 2008. Distribution through Florida and the southeastern United States has been coordinated by Robin Perrtree, with Jessica Powell delivering them to local (Sarasota and Manatee county) businesses, and Gene Stover helping with Venice area distribution. Funding for subsequent re-printings has been provided by Marineland: Dolphin Conservation Center, Disney Worldwide Conservation Fund, Harbor Branch Oceanographic Institution, and Fish Florida.

Please contact our website (www.sarasotadolphin.org) if you have any further questions or would like to help distribute the cards. We will continue to make them available at no cost to those who can effectively distribute them to people likely to come into contact with wild dolphins. The cards, pictured inside the back cover, are available in English and Spanish as downloads at: www.sarasotadolphin.org.

Fish Florida grant helps get the message out to anglers and recreational boaters in southwest Florida

By Kim Bassos-Hull, MS

According to the Florida Fish and Wildlife Conservation Commission, more than 6.6 million recreational anglers took more than 29.3 million saltwater fishing trips statewide in Florida during 2006. The area to the south of Sarasota Bay along the west coast of Florida is known for its exceptional fishing and is also prime dolphin habitat. These waters include Charlotte Harbor, Pine Island Sound, Estero Bay (near Fort Myers), Rookery Bay (near Naples and Marco Island), and the Ten Thousand Islands (Charlotte, Lee, and Collier county areas). In recent years, the SDRP has documented through direct observation and opportunistic reporting from anglers, an increase in angler/dolphin interactions and dolphin entanglements in southwest Florida. In 2003 and 2004, two dolphins, Placida and Toro, were rescued after they were found entangled in fishing line in Charlotte Harbor. In 2007 we began to get reports from Bryan Fluech, the Collier County Sea Grant agent, and Sea Excursions, an ecotour group based on Marco Island, about the increased problem of dolphins stalking fishing boats or anglers fishing from local piers. The dolphins were stealing the bait or catch off the line or just after the angler released it, frustrating anglers. Both Bryan and Sea Excursions had learned of the research and outreach that the SDRP was doing in Tampa Bay, Sarasota Bay, and Charlotte Harbor and requested that we jointly initiate an education campaign in Collier County.

In 2008, Collier Sea Grant and the SDRP applied for and were rewarded with a grant from Fish Florida to embark on an outreach campaign in Charlotte, Lee, and Collier counties. This campaign includes involving the Sea Grant agents from these three counties as well as local fishing guides and ecotour operators as avenues to get information to anglers and others that might be recreating in coastal waters and come into contact with dolphins. The goals and products of the outreach program will be to: (1) create a Powerpoint presentation on dolphin behavior and depredation issues as well as dolphin-friendly fishing practices available for distribution to Sea Grant agents and interested educators, (2) speak to local ecotour providers, fishing clubs, and boating clubs on dolphin research in southwest Florida highlighting conservation and human impact issues, (3) create 1,000 personal-sized fishing line recycling bins filled with educational materials and distribute to local anglers, (4) reprint 16,000 "Dolphin-Friendly Fishing and Viewing Tips" cards that that will be handed out to anglers at piers, docks, fishing clubs, tournaments, and outreach events, (5) create three retractable educational display banners that can be used in conjunction with the dolphin presentations, or as stand alone displays at public events to help raise awareness on the issues of recycling fishing line and incorporating responsible dolphin-friendly fishing practices. We hope to get feedback from stakeholders to evaluate the success of the program and to determine the possibility of expanding the program state-wide.

Collier County 4H Club produced 1000 personal-sized monofilament recycling bins for distribution to anglers in the Collier, Lee, and Charlotte County areas. These bins contained the "Dolphin-Friendly Fishing and Viewing Tips" cards, and brochures on how to prevent wildlife entanglements and recycle fishing line.

Kim Bassos-Hull (Sarasota Dolphin Research Program), Captain Will Geraghty, and Bryan Fluech (Collier Sea Grant) in September 2008 return to port after observing angler-dolphin interactions in Naples, Florida area.

Volunteer Perspectives

In response to a recent request made of previous SDRP interns, we received a number of comments about the impact of the program on their lives. A sampling of the comments is presented below, followed by articles from volunteers participating with the program during 2008:

"The SDRP has had a profoundly positive impact on me. I was first exposed to the incredible and important work of the SDRP when I was an undergraduate and the experience inspired me to pursue a career in marine mammal conservation. It has been a great privilege to assist and work with the SDRP and I am grateful for the kindness, support and opportunities that the SDRP team has provided me over the years." *Trevor Spradlin (1991), MS – Currently working with the Marine Mammal Health and Stranding Response Program of NOAA's Fisheries Service, Silver Spring, MD*

"My internship definitely taught me how to design, conduct and fund scientific research. Although my current jobs aren't in marine science, I use the same methods/procedures I learned from the SDRP. The knowledge and experience I gained at SDRP has translated nicely into several scientific arenas and I think the SDRP internship was an invaluable experience." *Tristen Moors (1994), MS*

"For any student struggling to find direction in the scientific community, a hands-on internship provides vital experience in what it really means to do research. Interns see what it takes to not only gather the data they need, but also all of the behind-the-scenes work needed to process those data. In the case of SDRP, interns are entering the sometimes glamorized field of marine mammal research and will gain much needed understanding of the real scientific dedication involved in running these programs. Participating in this internship is a major stepping stone to making the connections and gaining the experience and perspective they will need to pursue a career in this or any other related field." *Kristi Fazioli (1995), MS*

"I gained valuable experience during my months interning for SDRP including data management organization, boat driving skills, and field method protocols. I participated in great research opportunities, working with some interesting people, which broadened by perspective, challenged me and helped me realize what I did, and did not, want to do with my future." *Leigh Torres (1998), PhD*

"My experience at SDRP was invaluable to my scientific career. It was during my time as a SDRP intern that I discovered a true interest in scientific research and conservation. Without this initial experience, I doubt I would have chosen to go to graduate school and stay in the field of scientific research. For any young academic who is considering a career in marine science or conservation, I would strongly recommend an internship at SDRP." *Anna Sellas (1999), MS*

"The field work from the internship gave me the 'previous experience' necessary to obtain research and job opportunities. The contacts I made that summer opened doors later on during my research, career, and graduate school pursuits. The type of research I participated in that summer helped narrow and focus my own research interests." *Leslie Burdett (2000), MS, PhD in progress*

"My internship with SDRP taught me so much about studying cetaceans and how a professional project is run. I liked how I was treated as a proper member of the team rather than just an extra and was really encouraged to get involved with as many parts of the project as possible." *Eleanor Stone (2003), MS*

"Being able to interact and question people at every stage of academia gave me a much better picture of what it means to be a lifelong scientist. /.../ I came to Mote with an interest in graduate school, but without a clear understanding of what it really means to be a graduate student and formulate a dissertation project. I didn't know about the various options available to people at each particular stage of education. Working as a research assistant for a doctoral student was excellent in this regard: I discussed with her how she designed her project, what graduate school was like, and how she overcame some of the obstacles she had faced. We discussed grant applications, comprehensive exams, choosing a program, and many other topics I had not previously considered thoroughly enough." *Leslie Curren (2005), PhD in progress*

"Participating in an internship at SDRP was a great way to learn about research processes, network within the marine mammal field, and help me find out what career path was right for me. I would probably not be in the same place in my career path if it wasn't for my internship at SDRP. /.../ By interning at one of the longer running dolphin research programs, I was exposed to techniques which have proven to be successful and efficient throughout the years. I have been able to take ideas and techniques seen at SDRP and implement them during my work at other facilities. I would strongly recommend anyone interested in pursing a career in marine mammal research to participate in the SDRP internship program. The experience was not only very educational and professional but it was also a lot of fun!" *Vanessa Greenwood (2007), BS*

"The SDRP gave me my first research opportunity to work with marine mammals. Thanks to this program, I was a competitive graduate student applicant, and was given the opportunity to continue doing research in the highly competitive field of marine mammalogy. The hands-on experience also made me more comfortable with working on boats, and I subsequently was a competent boat operator while working on sea otter research in Prince William Sound, Alaska. The skills I gained while looking at dolphin behavior and photo ID was also helpful when I had to plan my own Master's research thesis." *Olivia Lee (2005), MS in progress*

A bit more than fins

By Laura Howes, 2008 intern

I came to the SDRP during the 2008 winter of my junior year in college with the goal of getting more field experience. I had spent a little time on boats and a little time observing the great whales of the Gulf of Maine. I felt Mote Marine Lab would be a wonderful opportunity to get some more field experience, or at least give me a chance to dip my feet in the research world.

I ended up spending my winter months not only working on a boat, but also getting to help with a graduate student's PhD research on juvenile dolphins. I spent about three days a week on the 22-foot motorboat, *Nai'a*, helping locate and keep track of focal individuals and frantically writing down data. Sometimes I got lucky enough to get my hands on the camera and try to get

some photo-ID shots. I even got a bit of time at the helm learning to steer during sightings. I was amazed at first at how quickly my supervisor could identify individuals by a glance at their dorsal fin 50 meters away. I had thought that it would take years of seeing these dolphins everyday to be able to know them so well, but it was one of my proudest moments after the end of my three months when I could actually ID some dolphins on my own (and not just "Riptorn"). I learned not only about dolphin behavior and group dynamics, but I also learned about the study of animal behavior as a whole. I found it fascinating how so much information could be learned about each individual dolphin.

Laura Howes

In the lab, I got to see what happens to all the recorded field data and notes as they get processed. I was quite impressed with the organization of the lab, which taught me a lot about what an efficient data management process should be like. Working with data and photo-ID matching also allowed me to experience the tediousness and self-discipline needed to make it in the research field.

While I gained a lot of field and lab experience, I also learned a lot about my work ethic, which has made me feel more confident in my future potential in the work place. Working on a boat, any boat, builds character and work ethic. Data collection went more smoothly when there was overall good communication and equal effort. Learning the routine and then doing it before asked was the key to getting things done. With this in mind, I tried my best to always make sure every task got taken care of properly. In the long run, I think working on *Nai'a* allowed me to discover my true work ethic and become a more active rather than passive participant, which has helped me greatly in my recent research and academic endeavors. With great thanks for what I learned while at SDRP, I was able to get a summer internship with the Chicago Zoological Society at Brookfield Zoo, helping expand and design current animal behavior research projects. All in all, I would say I learned a bit more than fins during my time in Sarasota.

Intern perspective

By Brittany Martabano, BS, 2008 intern

I sit up in *Nai'a*'s tower with Katie McHugh, my skipper, on my final day working on her graduate research project studying juvenile dolphin behavior. Despite the less-than-ideal weather conditions, we continue our focal follow with Holly, an eight-year-old female, determined to collect as much data as possible before this fieldwork season comes to an end. We have Beaufort 3 to 4 seas with storms developing in nearly every direction, but fortunately Team Nai'a lives for the thrill of "narrowly escaping danger."

We watch Holly and another juvenile female, Petal, and two calves born to resident females at the beginning of my internship. I've learned from my experiences this summer that it is not uncommon for juvenile females to baby-sit other adults' young. Yet, while babysitting has been observed, the interaction marked Katie's first encounter with such intense socializing between juveniles and newborn calves (YOYs, or young-of-the-year). With us as captivated spectators, the dolphins squirm and whirl, exposing their excited, flushed bellies to dance around each other. We dub one of the behaviors a "YOY sandwich" as the juvenile females squish the little YOYs between them, bringing them out of the water and letting them rest on top of the juveniles.

As I sit in the tower with Katie, I realize how lucky I am to witness this playful scene firsthand. Prior to interning with the SDRP, I had limited knowledge of wild dolphin behavior and even less research experience. Now, after spending the summer with Katie on *Nai'a*, not only can I identify our focal animal, but also the rest of the dolphins in the group, a skill that has proven helpful in keeping track of everyone in this particularly eventful follow. We continue to follow Holly and the others until the thrill of "narrowly escaping danger" becomes a little too real. We say goodbye to the playful group, head out of Palma Sola Bay, under the Cortez Bridge, navigate the ICW, and finally cruise down the center of Sarasota Bay to return home safe and sound leaving the growing storms behind us.

The Sarasota Dolphin Research Program has given me and countless others the opportunity to experience dolphin research in an intimate and personal setting. I admire the program's vision for sharing cutting-edge research techniques and their willingness to provide people with limited experiences a chance to learn, observe, and absorb. I am eternally grateful to all of the fantastic, brilliant, and patient individuals with whom I had the opportunity to work and I hope to exemplify them as I pursue my own career in marine mammal science. As a student, a novice, and aspiring professional in the dolphin research arena, I extend this piece not only as a reflection of my rewarding summer, but also as a genuine thank-you to all the people who've made it so worthwhile.

Brittany Martabano

An Argentinean intern's experiences in Sarasota

By Ignacio (Nacho) Bruno, Aquamarina

I come from San Clemente del Tuyú, a small city situated in the southern point of Samborombón Bay, Argentina, just where the La Plata River waters join the sea. This is an estuarine area with muddy waters, part of the coastal waters of Buenos Aires Province that represent the southern limit of distribution of one of the smallest species of cetacean, and also the most endangered dolphin species in South America, the franciscana or La Plata River Dolphin. This species mainly inhabits coastal waters, where it is vulnerable to incidental captures in fishing gillnets, one of the main threats, however, the destruction of coastal environments and contamination are important factors for their survival.

Five years ago I became a member of Aquamarina, an Argentinean NGO directed by Pablo Bordino, who has been working in the conservation of marine biodiversity and the protection of coastal ecosystems through the sustainable use of resources for the past ten years.

Constant efforts are underway for the conservation of franciscana dolphins, working in cooperation with artisanal fishermen and coastal communities, trying to find solutions to mitigate mortality and ensure preservation of the species. Several research projects are being developed to collect valuable information about the species: abundance estimation, contaminant levels, photo identification, mortality estimation, educational work, and also constant monitoring of the beaches.

Aquamarina, in partnership with the SDRP and Disney, engaged in capture-release, tagging, and tracking involving radio and satellite-linked tags. This represents the first time this kind of research has been accomplished with franciscana dolphins, to collect data related to their habitat, range, diving and movement patterns, improving and increasing knowledge about ecological and physiological aspects, which allow to us to look for more effective measures for their conservation.

Ignacio (Nacho) Bruno

I was invited as a member of the Franciscana Dolphin Project to participate in the SDRP International Training Program for three months in Sarasota, working as an intern on different research projects. My first week I was involved in bottlenose dolphin capture-release efforts in Sarasota Bay as part of their Dolphin Health Assessment Project, which allowed me to gain skills to apply in similar work performed in Argentina. I gained experience in field work through several projects including a prey-based study (purse seining), biopsy darting, and dolphin behavior. I also trained in photo-identification techniques, data entry and different lab stuff at their Mote facilities. All of this was possible thanks to the hospitality, cooperation and professionalism of all of the staff members of the SDRP who were always accompanying me, teaching me, and explaining things to me during my stay. I am sure that many of these techniques I went through can be applied to the work we are performing in our own country, and in some cases they will be an important key to advance our knowledge and to apply it to the conservation of an endangered species such as the franciscana dolphin.

From River Ganga to Sarasota Bay

By Sunil Choudhary, PhD, 2008 Fulbright Fellow

I am from India, where River Ganga – the cultural, spiritual, and ecological symbol of India – provides habitat for the highly endangered freshwater Ganges River dolphin (*Platanista gangetica gangetica)*. The Ganges River dolphin is the flagship species and indicator of the health of River Ganga, the river on which millions of people depend for their livelihood.

I am the Principal Coordinator of Vikramshila Biodiversity Research & Education Center (VBREC) at T.M. Bhagalpur University, working for the last ten years in Vikramshila Gangetic Dolphin Sanctuary (VGDS) in India, the only designated protected area for this endangered river dolphin in Asia. The goals of VBREC are to advance the conservation prospects of river dolphins and other biodiversity, and to secure sustainable livelihood for local people depending on the aquatic and riparian resources of the Sanctuary. Since its inception in 1998, VBREC has conducted a variety of research and education programs in VGDS, which include a comprehensive assessment of dolphin populations, their habitat and the threats they face, and strengthening community outreach and awareness activities with mass meetings and street theatre performances on conserving river dolphins and protecting fishermen. As a result of our sustained conservation initiatives, the number of dolphins in VGDS has increased from 95 – 98 in 1998 to 175+ in 2008. In fact, Vikramshila Dolphin Research Project means the difference between life and death for local river dolphins and for the local fishing community. Not only that, but if we succeed in Vikramshila, this Sanctuary could act as a model for similar projects elsewhere in Asia.

Thanks to the Fulbright Commission, I was provided with an opportunity to enhance my capabilities in the field of dolphin research and conservation by collaborating with the Sarasota Dolphin Research Program (SDRP). I spent two months (18 August – 17 October 2008) at the Chicago Zoological Society's facilities

at Mote Marine Laboratory, and participated in various projects of SDRP. I was amazed to see Jason or Aaron identifying individual bottlenose dolphins by their names in a whisper of a second during dolphin surveys. I learned to take field data, to recognize the dolphin's activities, and to take digital pictures for photo-ID purposes in these surveys. I had my first true experience of purse seining on dolphin prey species surveys. With Katie, I learned how to observe the focal behaviors of juvenile dolphins. During my stay, a sick pygmy killer whale being treated in Mote's Dolphin and Whale Hospital died unfortunately, and that gave me an opportunity to observe various steps performed in necropsy. I believe that I can apply newly acquired skills from the SDRP for my dolphin research program at Vikramshila Reserve in India.

All the lab staff members were very nice to me right from the first day of my arrival. They work in a family atmosphere. I was impressed with their dedication to work and with their unique training methods. While leaving Mote, I am of the firm opinion that anyone, working in any part of the world on dolphins, must visit Mote Marine Lab and should participate in the SDRP projects, because SDRP opens windows for participants to become trained in the perfect manner and to become true future conservationists. Further, I hope my association with SDRP will continue in the future, and that will help our conservation efforts in India to protect the charismatic but endangered Ganges River dolphin. Remember, whatever divides us, it is the dolphin which connects us, and the Southern and Northern hemispheres, too.

Vikramshila Gangetic Dolphin Sanctuary

The Vikramshila Gangetic Dolphin Sanctuary (VGDS, 25°14' N—86°43'E) in Bihar, India, is a 60 km stretch of the Ganga River between the Sultanganj and Kahalgaon, in Bhagalpur district of Bihar and is the only protected area specifically created in 1991 for the protection of this species.

Professional Activity Summary

One accepted measure of the productivity of a research program is its record of achievement in providing information to the scientific community, wildlife management agencies, and the public. The following list includes our program's products since the publication of our last newsletter, including the relevant work of our collaborators from partner institutions. Copies of specific papers can be obtained upon request as electronic pdf files.

Peer-reviewed Journal Articles and Book Chapters

Clucas, B., K. McHugh, and T. Caro. 2008. Flagship species on covers of US conservation and nature magazines. Biodiversity and Conservation 17: 1517-1528.

Dunshea, G., N.B. Barros, R.S. Wells, N.J. Gales, M.A. Hindell and S.N. Jarman. 2008. Pseudogenes and DNA-based diet analyses: a cautionary tale from a relatively well sampled predator-prey system. Bulletin of Entomological Research. 10 pp.

Fire, S.E., L.J. Flewelling, Z. Wang, J. Naar, M.S. Henry, R. H. Pierce, and R. S. Wells. 2008. Florida red tide and brevetoxins: Association and exposure in live resident bottlenose dolphins (*Tursiops truncatus*) in the eastern Gulf of Mexico, USA. Marine Mammal Science 24:831-844.

Fire, S.E., L.J. Flewelling, J. Naar, M.S. Henry, R.H. Pierce, D. P. Gannon, Z. Wang, and R.S. Wells. 2008. Prevalence of brevetoxins in prey fish of bottlenose dolphins in Sarasota Bay, Florida. Marine Ecology Progress Series 368:283-294.

Gannon, D.P. 2008. Passive acoustic techniques in fisheries science: a review and prospectus. Transactions of the American Fisheries Society 137(2):638-656.

Harms, C.A., R.G. Maggi, E.B. Breitschwerdt, C.L. Clemons-Chevis, M. Solangi, D.S. Rotstein, P.A. Fair, L.J. Hansen, A.A. Hohn, G.N. Lovewell, W.A. McLellan, D.A. Pabst, T.K. Rowles, L.H. Schwacke, F.I. Townsend and R.S. Wells. 2008. *Bartonella* species detection in captive, stranded and free-ranging cetaceans. Veterinary Research. 39:59.

Meagher, E., W.A. McLellan, A.Westgate, R.S. Wells, J. Blum, and D.A. Pabst. 2008. Seasonal patterns of heat loss in wild bottlenose dolphins (*Tursiops truncatus*). Journal of Comparative Physiology B. 178:529-543.

Mendez, M., H. Rosenbaum and P. Bordino. 2008. Conservation genetics of the franciscana dolphin in Northern Argentina: population structure, by-catch impacts, and management implications. Conservation Genetics 9(2): 419-435.

Ruiz, C., H.H. Nollens, S. Venn-Watson, L.G. Green, R.S. Wells., M.T. Walsh, E. Chittick, J.F. McBain and E.R. Jacobson. 2008. Baseline circulating immunoglobulin G levels in managed collection and free-ranging bottlenose dolphins (*Tursiops truncatus*). Developmental and Comparative Immunology. doi:10.1016/j.dci.2008.09.002

Sergio, F., T. Caro, D. Brown, B. Clucas, J. Hunter, J. Ketchum, K. McHugh, and F. Hiraldo. 2008. Top predators as conservation tools: ecological rationale, assumptions, and efficacy. Annual Review of Ecology, Evolution, and Systematics 39: 1-19. doi:10.1146/annurev.ecolsys.39.110707.173545

Venn-Watson, S., R. Rivera, C.R. Smith, J.T. Saliki, S. Casteline, J. St. Leger, P. Yochem, R.S. Wells and H. Nollens. 2008. Exposure to novel parainfluenza virus and clinical relevance in two bottlenose dolphin (*Tursiops truncatus*) populations. Emerging Infectious Diseases 14:397-405.

Wells, R.S., J.B. Allen, S. Hofmann, K. Bassos-Hull, D.A. Fauquier, N.B. Barros, R.E. DeLynn, G. Hurst, V. Socha and M.D. Scott. 2008. Consequences of injuries on survival and reproduction of common bottlenose dolphins (*Tursiops truncatus*) along the west coast of Florida. Marine Mammal Science 24:774-794.

Woshner, V., K. Knott, R. Wells, C. Willetto, R. Swor and T. O'Hara. 2008. Mercury and selenium in blood and epidermis of bottlenose dolphins (*Tursiops truncatus*) from Sarasota Bay, Florida (USA): interaction and relevance to life history and hematologic parameters. EcoHealth. 5(1): 10.1007/s10393-008-0164-2

Manuscripts in Press, In Revision, or In Review

Balmer, B.C., R.S. Wells, S.M. Nowacek, D.P. Nowacek, L.H. Schwacke, W.A. McLellan, F.S. Scharf, T.K. Rowles, L.J. Hansen, T.R. Spradlin, and D.A. Pabst. In press. Seasonal abundance and distribution patterns of bottlenose dolphins *(Tursiops truncatus)* near St. Joseph Bay, Florida, USA. Journal of Cetacean Research and Management.

Barbieri, M.M., W.A. McLellan, R.S. Wells, J.A. Blum, S. Hofmann, J. Gannon, and D.A. Pabst. In review. Thermoregulatory responses of a resident community of bottlenose dolphins (*Tursiops truncatus*) to seasonal changes in environmental temperature in Sarasota Bay, FL, U.S.A..

Barros, N.B., P. Ostrom, C. Stricker and R.S. Wells. In review. Stable isotopes differentiate bottlenose dolphins off west central Florida. Marine Mammal Science.

Berens-McCabe, E., D.P. Gannon, N.B. Barros and R.S. Wells. In review. Prey selection in a resident common bottlenose dolphin (*Tursiops truncatus*) community in Sarasota Bay, Florida. Submitted to Marine Biology.

Buckstaff, K.C., R.S. Wells, J.G. Gannon, and D.P. Nowacek. In revision. Responses of bottlenose dolphins to construction and demolition of coastal marine structures. Aquatic Mammals.

Esch, H.C., L.S. Sayigh, J.E. Blum, and R.S. Wells. In press. Whistles as potential indicators of stress in bottlenose dolphins (*Tursiops truncatus*). Journal of Mammalogy.

Esch, C., L. Sayigh and R. Wells. In review. Quantification of parameters of signature whistles of bottlenose dolphins. Marine Mammal Science.

Fauquier, D.A., M.J. Kinsel, M.D. Dailey, G.E. Hurst, N.B. Barros, M.K. Stolen, R.S. Wells and F.M.D. Gulland. In review. Prevalence and pathology of lungworm (*Halocercus* sp.) infection in bottlenose dolphins in southwest Florida. Submitted to Diseases of Aquatic Organisms.

Gannon, D.P., E.J. Berens, S.A. Camilleri, J.G. Gannon, M.K. Brueggen, A. Barleycorn, V. Palubok, G.J. Kirkpatrick and R.S. Wells. In press. Effects of *Karenia brevis* harmful algal blooms on nearshore fish communities in southwest Florida. Marine Ecology Progress Series.

Gannon, J.G., R.S. Wells, J.B. Allen, D.P. Gannon, S. Hofmann, G.J. Kirkpatrick and V. Palubok. Accepted pending revision. Apparent sub-lethal effects of a harmful algal bloom on bottlenose dolphins in Sarasota Bay, Florida. Marine Ecology Progress Series.

Janik, V.M. In press. Vocal communication and cognition in cetaceans. *In*: Oxford Handbook of Language Evolution, ed. M. Tallerman and K. Gibson. Oxford University Press: Oxford.

Loughlin, T., R.S. Wells, L. Cunningham and N. Gales. In review. Marking and capturing. Chapter 2 *In:* I. Boyd, D. Bowen and S. Iverson (eds.), Marine Mammal Ecology and Conservation: A Handbook of Techniques. Oxford University Press.

Mancia, A., G.W. Warr, J. Almeida, A. Veloso, R.S. Wells and R.W. Chapman. In review. What can the transcriptome tell us about populations of free-ranging bottlenose dolphins, *Tursiops truncatus*? Molecular Ecology.

Noren, S.R. and R.S. Wells. In press. Postnatal blubber deposition in free-ranging common bottlenose dolphins (*Tursiops truncatus*) with considerations to buoyancy and cost of transport. Jounal of Mammalogy.

Quintana-Rizzo, E. and R.S. Wells. In press. Unusual behavior of an adult female bottlenose dolphin (*Tursiops truncatus*) toward a non-related dead neonate. Aquatic Mammals.

Quintana-Rizzo, E., R.S. Wells and J.J. Torres. In revision. Defining a group in species with fluid relationships. Animal Behaviour.

Quintana-Rizzo, E. and R.S. Wells. In revision. Social and ecological factors affecting group fission-fusion in wild female bottlenose dolphins (*Tursiops truncatus*). Animal Behaviour.

Quintana-Rizzo, E., R.S. Wells and D. Mann. In revision. Echolocation and whistle use during fission-fusion events in wild bottlenose dolphins (*Tursiops truncatus*). Canadian Journal of Zoology.

Sayigh, L.S. and V. M. Janik. In press. Signature whistles. *In:* W.F. Perrin, B. Würsig, and J.G.M. Thewissen, eds., Encyclopedia of Marine Mammals. Second Edition. Elsevier, Inc., San Diego, CA.

Schwacke, L.H., A.J. Hall, F.I. Townsend, R.S. Wells, L.J. Hansen, A.A. Hohn, G.D. Bossart, P.A. Fair and T.K. Rowles. In press. Hematology and clinical blood chemistry reference intervals for free-ranging common bottlenose dolphins (*Tursiops truncatus*) and variation related to geographic sampling site. American Journal of Veterinary Research.

Scott, M.D. and S.J. Chivers. In press. Movements and diving behavior of pelagic spotted dolphins. Marine Mammal Science.

Sih, A., K. McHugh and S. Hanser. In press. Social Network Theory – Applications to Animal Behavior. Behavioral Ecology and Sociobiology.

Urian, K.W., S. Hofmann, R.S. Wells and A.J. Read. In press. Fine-scale population structure of bottlenose dolphins, *Tursiops truncatus*, in Tampa Bay, Florida. Marine Mammal Science.

Professional Activity Summary *(continued)*

Wells, R.S. Accepted pending minor revisions. Learning from nature: Bottlenose dolphin care and husbandry. Zoo Biology.

Wells, R.S. In press. Dolphins and porpoises. *In:* J.H. Steele, S.A. Thorpe, and K. K. Turekian (eds.), Encyclopedia of Ocean Sciences. Oxford, UK: Elsevier.

Wells, R.S. In press. Identification methods. *In:* W.F. Perrin, B. Würsig, and J.G.M. Thewissen, eds., Encyclopedia of Marine Mammals. Second Edition. Elsevier, Inc., San Diego, CA.

Wells, R.S. and M.D. Scott. In press. Common bottlenose dolphins (*Tursiops truncatus*). *In:* W.F. Perrin, B. Würsig, and J.G.M. Thewissen, eds., Encyclopedia of Marine Mammals. Second Edition. Elsevier, Inc., San Diego, CA.

Wells, R.S., C.A. Manire, D. Smith, J.G. Gannon, D. Fauquier and K.D. Mullin. In press. Movements and dive patterns of a rehabilitated Risso's dolphin, *Grampus griseus*, in the Gulf of Mexico and Atlantic Ocean. Marine Mammal Science.

Contract and Other Reports

Wells, R.S. 2008. Center for Dolphin Biology, Health and Conservation Education. Final Report for Award No. NA16FL1355, NOAA Fisheries Service, Southeast Regional Office, St. Petersburg, FL. 73 pp. (Mote Technical Report No. 1308)

Wells, R.S. 2008. Consequences of injuries on survival of bottlenose dolphins in Sarasota Bay, Florida. Pp. 35-36 *In:* Andersen, M.S., K.A. Forney, T.V.N. Cole, T. Eagle, R. Angliss, K. Long, L. Barre, L. Van Atta, D. Borggaard, T. Rowles, B. Norberg, J. Whaley and L. Engleby (eds). Differentiating Serious and Non-Serious Injury of Marine Mammals: Report of the Serious Injury Technical Workshop, 10-13 September 2007, Seattle, Washington. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-39. 94 p.

Wells, R.S., C.A. Manire and J. Whaley. 2008. Travels with Betty: A Risso's dolphin tour of the Gulf of Mexico. Strandings: Newsletter of the Southeast United States Marine Mammal Health and Stranding Network. National Marine Fisheries Service Southeast Regional Office and Southeast Fisheries Science Center. Winter, Spring, Summer, Fall 2007: 1-4.

Wells, R.S., G.A. Early, J.G. Gannon, R.G. Lingenfelser, and P. Sweeney. 2008. Tagging and tracking of rough-toothed dolphins (*Steno bredanensis*) from the March 2005 mass stranding in the Florida Keys. NOAA Technical Memorandum NMFS-SEFSC-574, 44 p.

Theses and Dissertations

Doctoral Dissertations

Meagher, E. 2008. Thermoregulation in bottlenose dolphins. PhD dissertation. University of North Carolina, Wilmington.

Master's Theses

Tyson, R. 2008. Abundance of bottlenose dolphins (*Tursiops truncatus)* in the Big Bend of Florida, St. Vincent Sound to Alligator Harbor. Florida State University.

Presentations at Professional Meetings

Balmer, B.C., R.S. Wells, S.M. Lane, L.H. Schwacke, T.R. Speakman, E.S. Zolman, W.A. McLellan, R.C. George and D.A. Pabst. 2008. A plan to monitor abundance, site-fidelity, and habitat utilization patterns of bottlenose dolphins *(Tursiops truncatus)* near a National Priority List (NPL) polluted site and an adjacent pristine reference site in Georgia. Southeast and Mid-Atlantic Marine Mammal Symposium, 28-30 March, Charleston, SC. (poster)

Burdett, L.G, D.S. Rotstein, T.K. Rowles, L.H. Schwacke, F.I. Townsend, R.S. Wells and D.G. Hoel. 2008. A visual assessment tool to evaluate skin diseases in wild bottlenose dolphin (*Tursiops truncatus*) populations: A proposed methodology. Southeast and Mid-Atlantic Marine Mammal Symposium, 28-30 March, Charleston, SC. (poster)

Camillero, S.A. 2008. Effects of red tide on the occurence of fish calling. American Fisheries Society, Florida Chapter Meeting, 19-21 February 2008, Altoona, FL.

Dussán-Duque, S., P.S. Hammond and R. S Wells. 2008. Estar o no estar?: Decisiones diarias de *Sotalia guianensis*, en el Sur del Golfo de Morrosquillo, Colombia. XIII Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur. 13-17 de Octubre 2008, Montevideo, Uruguay.

Harms, C.A., R.G. Maggi, E.B. Breitschwerdt, C.L. Clemons-Chevis, M. Solangi, P.A. Fair, L.J. Hansen, A.A. Hohn, G.G. Lovewell, W.A. McLellan, D.A. Pabst, T.K. Rowles, L.H. Schwacke, F.I. Townsend and R.S. Wells. 2008. *Bartonella* species detection in captive and stranded versus healthy free-ranging dolphins and porpoises in the southeastern United States. Southeast and Mid-Atlantic Marine Mammal Symposium, 28-30 March, Charleston, SC.

Janik, V.M. 2008. Studying dolphin communication. SMRU Acoustics Workshop, University of St. Andrews, UK, 21-22 January 2008.

Janik, V.M. 2008. Learning, reference and hierarchical structure in cetacean communication. Invited talk at the 3rd HOPE International Symposium on the origins of human evolution, Tokyo, Japan, 15-18 November 2008.

Kucklick, J., A. Guichard, J. Yordy, J. Litz, R. Wells, B. Balmer, A. Hohn, E. Zolman, L. Schwacke, T. Rowles, L. Hansen, C. Berry and P. Rosel. 2008. Concentrations and patterns of lipophilic pollutants in bottlenose dolphins (*Tursiops truncatus*) as a function of geographical scale and implications to dolphin health. Southeast and Mid-Atlantic Marine Mammal Symposium, 28-30 March, Charleston, SC. (poster)

Kucklick, J., A. Guichard, J. Yordy, J. Litz, R. Wells, B. Balmer, A. Hohn, E. Zolman, L. Schwacke, T. Rowles, L. Hansen, C. Berrie and P. Rosel. 2008. Concentrations and patterns of lipophilic pollutants in bottlenose dolphins (*Tursiops truncatus*) as a function of geographical scale and implications to dolphin health. 27th International Symposium on Halogenated Persistent Organic Pollutants, Tokyo, Japan

Mancia, A., G.W. Warr, J. Almeida, R.S. Wells, A. Veloso and R.W. Chapman. 2008. Location, location, location... or what can the transcriptome tell us about populations of free-ranging bottlenose dolphins, *Tursiops truncatus*? Southeast and Mid-Atlantic Marine Mammal Symposium, 28-30 March, Charleston, SC.

McHugh, K.A., S. Hofmann, J.B. Allen, M.D. Scott and R.S. Wells. 2008. Factors influencing variation in age at independence for free-ranging bottlenose dolphin calves in Sarasota Bay, Florida. Southeast and Mid-Atlantic Marine Mammal Symposium, 28-30 March, Charleston, SC.

Powell, J.R., R.S. Wells and D. Mann. 2008. Depredation and fishing interactions involving bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. Southeast and Mid-Atlantic Marine Mammal Symposium, 28-30 March, Charleston, SC.

Powell, J.R., D. Mann and R.S. Wells. 2008. Passive acoustics as a method for monitoring bottlenose dolphin (*Tursiops truncatus*) presence at a fishing pier. 2nd International Conference on Acoustic Communication by Animals, 12-15 August, Corvallis, Oregon.

Powell, J.R., R.S. Wells, R. Perrtree and K. Bassos-Hull. 2008. Outreach tools to minimize human impacts on wild bottlenose dolphins (*Tursiops truncatus*) in Florida. International Marine Animal Trainers' Association Conference, 10-14 November, Cancun, Mexico. (First place award for Conservation/ Education and first-time presenter)

Sayigh, L., V. Janik and R. Wells. 2008. Bottlenose dolphins do not use voice cues to recognize whistles of other dolphins. Spoken presentation at the 2nd International Conference on Acoustic Communication by Animals, Corvallis, Oregon, 12-15 August 2008.

Sayigh, L. 2008. Bottlenose dolphin signature whistles. SMRU Acoustics Workshop, University of St. Andrews, UK, 21-22 January 2008.

Shippee, S. 2008. High-flyers vs Low-riders: a performance analysis of radio tag attachments on bottlenose dolphins. SEAMAMMS Conference, Charleston SC, 28-30 Mar 2008. "Best PhD Poster" award.

Shippee, S. 2008. Assessment of depredation by bottlenose dolphins in the Northwest Florida and Alabama sport fishery. Poster Presentation at the MASGC Bays and Bayous Conference, Biloxi, MS, 28-29 Oct. 2008.

Wells, R.S., J.B. Allen, S. Hofmann, K. Bassos-Hull, D.A. Fauquier, N.B. Barros, R.E. DeLynn, G. Hurst, V. Socha and M.D. Scott. 2008. Re-capture history (fate) of bottlenose dolphins in Sarasota Bay post-injury. Joint Scientific Review Group Meeting, Monterey, CA, 8-9 January 2008.

Yordy, J., R.Wells, B. Balmer, L. Schwacke, T. Rowles and J. Kucklick. 2008. Distribution of organohalogen contaminants between blubber and blood in wild bottlenose dolphins: Implications for biomonitoring and health. Southeast and Mid-Atlantic Marine Mammal Symposium, 28-30 March, Charleston, SC. (Best PhD student presentation award)

Yordy, J., R. Wells, W.A. McLellan, D.A. Pabst, A. Guichard, B. Balmer, L. Schwacke, T. Rowles and J. Kucklick. 2008. Organohalogen contaminant exposure in wild bottlenose dolphins: Combined influences of bioaccumulation, life history and tissue distribution. 29th Annual meeting of the Society of Environmental Toxicology and Chemistry. Tampa, FL, November 16-21.

Professional Activity Summary *(continued)*

Invited Public and University Lectures

Balmer, B.C. 2008. Determining abundance, site-fidelity, and distribution patterns of bottlenose dolphins *(Tursiops truncatus)* along the Southeastern United States. Guest Speaker, The Dolphin Project, 19 July 2008.

Balmer, B.C. 2008. Assessing the effects of bottlenose dolphin populations from natural and artificial stressors. Guest Lecturer, BIO 358: Marine Mammals, University of North Carolina Wilmington, 25 November 2008.

Bassos-Hull, K. 2008. Dolphin encounters: the human interaction factor. Invited talk for the Lee County Ecotour Provider Series/Rookery Bay Coastal Training Program, Fort Myers, FL. 9 Sep 2008.

Bassos-Hull, K. 2008. Dolphin encounters: the human interaction factor. Invited talk for the Collier County Ecotour Provider Series/Rookery Bay Coastal Training Program, Naples, FL. 18 Sep 2008.

Camilleri, S.A. 2008. From HFCC to studying dolphin prey in Florida. Guest speaker, Henry Ford Community College, Dearborn, MI. 11 April 2008.

Camilleri, S.A. 2008. Ecological effects of Karenia brevis blooms on estuarine fish communities. Guest speaker, Wayne State University, Detroit, MI. 13 Oct 2008.

Shippee, S. 2008. Marine Mammal Biology, Ecology, and Health. Presentation to the Emerald Coast Wildlife Refuge Marine Mammal Stranding Program. Destin, FL, 6 Sep 2008.

Shippee, S. 2008. Dolphin-Fisheries Interactions. Dolphin SMART Workshop, Orange Beach, AL, 6 Oct. 2008.

Shippee, S. 2008. Watchable Wildlife and Dolphin-Fisheries Interactions. Watchable Wildlife Conference, Orange Beach, AL, 7-9 Oct. 2008.

Wells, R.S. 2008. A high school internship at a marine lab leads to 38 years of marine mammal research. Great American Teach-In, River Ridge High School, New Port Richey, FL (4 classes). 19 Nov 2008

Wells, R.S. 2008. The bottlenose dolphins of Sarasota Bay: Lessons from 38 years and 5 generations. Ecology, Evolutionary Biology, and Behavior Seminar, Michigan State University, E. Lansing, MI. 5 Nov 2008.

Wells, R.S. 2008. The world's longest-running study of a dolphin population: Lessons from 38 years and 5 generations. Mote Marine Laboratory Volunteer Class. 29 Oct 08.

Wells, R.S. 2008. Balancing human activities with protecting bottlenose dolphin on Florida's central west coast. National Watchable Wildlife 2008 Conference, Orange Beach, AL.. 8 Oct 2008.

Wells, R.S. 2008. Learning from 38 years with Sarasota Bay's bottlenose dolphins. High School Alumni Program. Mote Marine Laboratory. 2 Oct 2008.

Wells, R.S. 2008. The Chicago Zoological Society's Dolphin Research Program. All-Staff Meeting, Brookfield Zoo, Brookfield, IL. 30 Sep 2008.

Wells, R.S. 2008. Factors influencing the health and survivorship of bottlenose dolphins in Florida. SEAVET, Sarasota, FL. 24 Jun 2008.

Wells, R.S. 2008. "Learning from nature: CZS bottlenose dolphin care and husbandry." Nights in the Wild, Brookfield Zoo, Brookfield, IL. 20 Jun 08.

Wells, R.S. 2008. Factors influencing the health and survivorship of bottlenose dolphins in Florida. MARVET, Sarasota, FL. 3 Jun 2008.

Wells, R.S. 2008. Will the wonders never cease? Keynote address, Florida Marine Science Educators' Association Annual Meeting, Museum of Science and Industry, Tampa, FL. 26 Apr 2008.

Wells, R.S. 2008. Wild dolphin societies: Lessons from 37 years and 5 generations. The Propeller Club. Mote Marine Laboratory. 11 Apr 08.

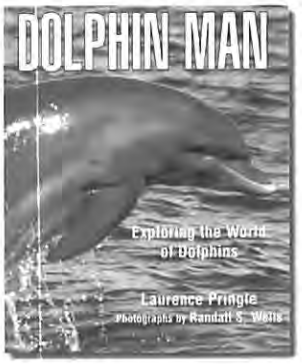
Wells, R.S. 2008. Wild dolphin societies: Lessons from 37 years and 5 generations. Mote Marine Laboratory Volunteer Class. 26 Mar 08.

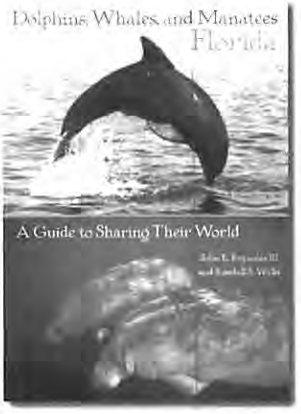
Wells, R.S. 2008. Five generations of wild dolphins in Sarasota Bay: Their biology and how humans impact them. Books with Bites, Mote Marine Laboratory. 16 Feb 2008.

Wells, R.S. 2008. The bottlenose dolphins of Sarasota Bay: lessons from 37 years and 5 generations. Keynote Address: Friends of Chassahowitzka Annual Meeting. Crystal River, FL. 27 Jan 2008.

WANT TO LEARN MORE?

The following books on dolphins and manatees, produced by our staff or by colleagues working closely with our program, are currently available. To purchase copies, please stop by the Brookfield Zoo or Mote Marine Lab gift shops, contact your local bookseller, or look for them on-line.





Reynolds, John E., III, and Randall S. Wells. 2003. Dolphins, Whales, and Manatees of Florida: A Guide to Sharing Their World. University Press of Florida, Gainesville, FL. 150 pp. ISBN 0-8130-2687-3

Pringle, Laurence and Randall S. Wells. 2002. Dolphin Man: Exploring the World of Dolphins. Boyds Mills Press, Honesdale, PA. 42 pp. ISBN 1-59078-004-3

Reynolds, John E., III, Randall S. Wells and Samantha D. Eide. 2000. The Bottlenose Dolphin: Biology and Conservation. University Press of Florida, Gainesville, FL. 289 pp. ISBN 0-8130-1775-0

Reynolds, John E., III and Sentiel A. Rommel, (eds.). 1999. Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC. 578 pp. ISBN 1-56098-375-2

Norris, Kenneth S., Bernd Würsig, Randall S. Wells and Melany Würsig. 1994. The Hawaiian Spinner Dolphin. University of California Press, Berkeley, CA. 435 pp. ISBN 0-520-08208-7

Howard, Carol J. 1995. Dolphin Chronicles. Bantam Books, New York, NY. 304 pp. ISBN 0-553-37778-7

PROGRAM OPERATIONS

Sarasota Dolphin Research Program Databases: 2008

By Randall Wells, PhD, Robin Perrtree, BS, and Janet Gannon, MSNR

The Sarasota Dolphin Research Program (SDRP), operated by the Chicago Zoological Society and based at Mote Marine Laboratory in Sarasota, Florida, conducts the world's longest-running study of a wild dolphin population. Research since 1970 has been based on compiling longitudinal records of individually-distinctive bottlenose dolphins from the central west coast of Florida. Identification efforts have occurred from Tampa Bay through Charlotte Harbor and Pine Island Sound and associated Gulf of Mexico waters. The most intensive efforts have focused on the long-term resident community of dolphins in Sarasota Bay, spanning at least five generations.

During 1970-1976, individual identifications were made primarily through tagging and resighting or tracking. Since the mid-1970s, photographic identification has been the primary tool for compiling individual records. Dolphins are identified from photos showing natural markings, tag scars, and from freeze-brands applied during capture-release activities for health assessment. Freeze-brands, applied to the dorsal fin and to the body below the dorsal fin, facilitate unambiguous identifications of dolphins through time, even if the identifying features on their dorsal fins change. Nearly 250 dolphins have been freeze-branded since the inception of the program in 1970.

More than 330,000 dolphin photographs from 1970 to the present are currently archived by the SDRP. They have been collected during more than 35,483 dolphin group sightings. Sighting data are maintained in an Access database. Our digital photographic identification catalog currently includes 6,024 images, including 3,781 distinctive individual dolphins (alive and dead) plus some of their calves (young animals are often not individually distinctive). The sighting database results from photographic records yielding more than 100,730 sightings of these identifiable individuals, over periods of more than 38 years. Some individuals have been identified more than 1,250 times.

The SDRP dolphin identification process involves comparing digital dorsal fin images to the digital identification catalog. Matches are confirmed by consensus of experienced staff members. If an animal is not immediately known to staff, then the image is subjected to a multi-stage, laborious, and time-consuming process. For the first cut, interns are asked to search through the most appropriate categories of fin features. If they do not find the animal, then a first staff check is performed that considers up to 4,290 images. If this does not produce a match, then a second check, by a different staff member, considers the same 4,290 images. If neither staff check results in a match, and the photo is of sufficient quality, then the fin is added to the catalog as a new animal. Search time to make one complete search of the catalog is about 2.5 hours.

Data are entered, checked, and double-checked before being appended to the database.

A "front end-back end" arrangement of the database allows us to maintain the integrity of our verified data on a server. Everyone in the lab then has access to the data through an interface on their own work station. In addition, the workstation interface contains several analysis tools, developed by Janet Gannon, to help analyze our data quickly and efficiently so we can focus on conservation and research.

Focal animal behavioral follow archive summary

By Katherine McHugh, PhD Candidate, University of California, Davis

Over the past year, the SDRP has started an initiative to compile and archive all behavioral data collected on the dolphins of Sarasota Bay over the years. So far, of the 16 past and current research projects known to have conducted focal animal behavioral observations (also known as 'follows') on Sarasota dolphins, we have received and archived complete data for 4 past projects and are in the process of incorporating data from our two current graduate student behavior projects. Many thanks to Danielle Waples, Kara (Buckstaff) Moore, Spencer Fire, and Chris Shepard who were the first to send in their complete data! While each project has had its own specific aim, many behavioral parameters have been collected fairly consistently across researchers, and once complete, this archive will provide a unique opportunity to follow the behavior of some individuals over time as well as supply important baseline and background behavioral data for future projects.

So far, with only these four complete projects included, the archive already contains over 300 focal follows conducted on 70 different individuals from 1992 to 2005 (and will soon include data on over 90 individuals through 2008). With these 70 dolphins, we have data on adult males, adult females both with and without calves, and juveniles of both sexes collected in all seasons of the year. Individual dolphins have been followed from 1 to 23 times, with 'Whitestripe' (FB36) having been followed the most frequently, and four females, 'Lightning' (FB07), 'Pumpkin' (FB09), 'Tramp' (FB65) and 'Claire' (F131), having been followed by three separate researchers over the years. As more projects contribute data, this archive will provide a unique resource to current and future research on the dolphins of Sarasota Bay and elsewhere.

Baby dolphin takes a peek at the research team

PROGRAM OPERATIONS

SDRP field and laboratory methods available on-line

By SDRP Staff and Students

Our program's "Manual for Field Research and Laboratory Activities" is available as a downloadable pdf file at our website, www.sarasotadolphin.org. This 62-page document provides detailed documentation of the protocols used for field operations and data processing. It includes chapters on: 1) Field survey protocols, 2) Post-survey lab protocols, 3) Photo-identification protocols, 4) Database entry, verification, and management, and 5) SDRP operations protocols. The accessibility of these protocols to colleagues and students promotes and facilitates standardization of methodologies across research sites, and provides incoming students and interns with background materials prior to their arrival. This is considered to be a "living document" that will be constantly evolving as we improve and refine our approaches.

F148 and yearling 1413 - note remoras on the yearling

SDRP personnel during 2008

Staff

Jason Allen, BS, Lab and Field Coordinator
Brian Balmer, MS, Research Associate
Aaron Barleycorn, BS, Research Assistant
Kim Bassos-Hull, MS, Research Associate
Elizabeth Berens, MS, Research Associate
Sandra Camilleri, BS, Research Assistant
Damon Gannon, PhD, Staff Scientist
Janet Gannon, MSNR, Senior Biologist
Blair Irvine, PhD, President, DBRI
Todd Musgrove BS, Technician
Stephanie Nowacek, MS, Research Associate
Robin Perrtree, BS, Research Assistant
Michael Scott, PhD, Vice-President and Secretary, DBRI
Gene Stover, BS, Operations Specialist
Randall Wells, PhD, Program Manager

Master's Students During 2008

Jessica Powell, University of South Florida
Rene Tyson, Florida State University

Doctoral Students During 2008

Brian Balmer, University of North Carolina-Wilmington
Leslie Burdett, Medical University of South Carolina
Kristina Cammen, Duke University
Glenn Dunshea, University of Tasmania
Salome Dussan-Duque, University of Saint Andrews
Deborah Fauquier, University of California-Santa Cruz
Katie McHugh, University of California-Davis
Erin (Meagher) Fougeres, University of North Carolina-Wilmington
Martin Mendez, Columbia University
Peter Simard, University of South Florida
Jennifer Yordy, Medical University of South Carolina

Interns and Other Visiting Volunteers During 2008

Amy Anderson
Juan Bacigalupi
Caroline Baumgartner (Switzerland)
Robin Bisel
Michelle Borsz
Ignacio Bruno (Argentina)
Rene Byrskov (Denmark)
Mauricio Cantor (Brazil)
Mauricio Carrasquilla (Colombia)
Dr. Sunil Choudhary (India)
Matt Clough (England)
Martha Divver
Kerry Foltzkorn
Ellie Glasser
Beth Hall
John Hamilton
Rebeccah Hazel
Laura Howes
Katrina Kerzner
Arlyn Kilduff
Jennifer Kinney
Carolyn Kovacs
Katrin Lohrengel (Germany)
Brittany Martabano
Mallory Mlynarek
Marion Rehwinkle (South Africa)
Meriel Riddle
Elly Roland
Bill Scott
Karen Van Wagner
Alexandra Workman
Shimpei Yamamoto (Japan)

Non-Intern Volunteer Research Assistants 2008

Jeff Hollway
Bill Kayser
Charlie Key
Cathy Marine
Norma Pennington
Sally Senger
Lorry Stover
James Thorson

PROGRAM OPERATIONS

Opportunities to Help Dolphin Research

We need your financial help to continue this important work. Continuity is the essence of a long-term research program. As the federal support that has sustained the program has come to an end, we must rely increasingly on competitive grants and contributions from donors to keep our program operating. Funding opportunities through competitive grant programs have declined in recent years, and competition for the few remaining grant programs is fierce. Our projected program budget for 2009 is about $700,000, including support for staff and graduate students, facility and administrative costs, boat operations, international training programs, dolphin rescues and follow-up monitoring, field research supplies, and travel to field sites and conferences. In addition to our operating costs for 2009, we are seeking to establish an endowment of **$2,000,000** to ensure the continuity of the most basic monitoring activities of the world's longest-running study of a dolphin population.

Examples of some of the expenses for which we are seeking assistance include:

Annual support for field research expenses for one graduate student = $10,000

Support for franciscana dolphin research in Argentina = $25,000

Replacement 4-stroke outboard engine = $8,000

Support for intern from Argentina to come to Sarasota for training = $5,000

Satellite-linked transmitter and 6 months of satellite data processing for follow-up monitoring of a rescued dolphin = $5,000

Dolphin health assessment research in Sarasota Bay = $36,000

If you can help, **contributions of funds** should be directed to your choice of the following:

The Batchelor Challenge

The Chicago Zoological Society is delighted to announce that The Batchelor Foundation of Miami, Florida has awarded us a $300,000 challenge grant for our Sarasota Dolphin Research Program. Right now, every dollar you give to the Sarasota Dolphin Research Program will be matched one-to-one, thereby doubling your support. This is a special opportunity to protect dolphins and the fragile ecosystems they inhabit. Please help us meet the Batchelor Challenge and provide the continuity that is essential for our long-term research and conservation program. For questions, please contact Steve Birkhauser, CZS Director of Major Gifts, at (708) 688-8316 (Steve.Birkhauser@czs.org). Please send your donation checks made out to "**Chicago Zoological Society**" with "Sarasota Dolphin Research Program" indicated in the memo line to:

Steve Birkhauser
Brookfield Zoo
3300 Golf Road
Brookfield, IL 60513

In addition, our Florida-based not-for-profit corporation "**Dolphin Biology Research Institute**" can accept donations of boats, vehicles, and other field equipment in good condition, as well as funds. DBRI is a Sarasota-based 501{c}3 not-for-profit corporation (IRS-EI#59:2288387); thus donations of funds and/or equipment are tax-deductible (Florida State Solicitations Registration No. SC-01172). Our current fleet of active research boats and trucks is composed largely of donated equipment. Cash realized from sales of such donations go entirely to offset research and education program expenses. During the most recent fiscal year, none of the funds received by DBRI were spent on fund-raising activities. No salaries are paid by DBRI to any of its Officers or Directors. For more information, please contact:

Dolphin Biology Research Institute
708 Tropical Circle
Sarasota, FL 34242
Tel: (941) 349-3259
randallswells@comcast.net

Special thanks to these contributors and funding organizations over the past year:

The Batchelor Foundation
Edward McCormick Blair, Jr.
Marge Brumis
Rene Bryskov
Cannons Marina
Mr. and Mrs. Robert J. Darnall
Disney's Animal Programs
Disney Wildlife Conservation Fund
Dolphin Quest
The Elizabeth Ordway Dunn Foundation
Rick Elfman and Terri Wareham
Ronnie and John Enander
Ken and Brigitte Fedesna
Don and Aleta Hamilton
Sunnie and Peter Hellman
NOAA's Fisheries Service
William and Sandra Scott
Laura Monaco Torelli
Kainz Family Foundation
Janet and Ralph Piland
Anthony and Chatka Ruggiero
Serbin Printing
Spotlight Graphics
Stuart and Melissa Strahl
William R. Tait
Mr. and Mrs. John W. Taylor III
Susan N. Wittmer
U.S. Marine Mammal Commission
Cindy and Bill Zeigler
ZIG USA LLC

Dolphins Need Your Help. Serious and even fatal dolphin injuries from interactions with recreational fishing gear and boats are on the rise. **You can prevent injuries to dolphins and other sea life - and have a better day on the water - by following a few tips designed to protect marine animals.** These "Best Practices" were developed by marine scientists and wildlife managers working with boaters, anglers, and fishing guides:

1) Never feed wild dolphins - it's harmful and illegal

- Feeding teaches dolphins to beg for food and draws them dangerously close to fishing gear and boat propellers.
- Feeding is illegal under the federal Marine Mammal Protection Act.

2) Reuse or share leftover bait

- Freeze leftover bait for later or give it to your fishing neighbor.
- Dumping leftover bait may attract dolphins to fishing areas to beg or steal bait and catch.

3) Reel in your line if dolphins appear

- Reel in and wait for dolphins to pass to avoid losing your bait or catch and prevent potential harm to dolphins.
- Never cast toward dolphins.

4) Change locations if dolphins show interest in bait or catch

- Move away from dolphins to avoid unintentionally hooking one and prevent damage to gear or catch.

5) Release catch quietly away from dolphins when and where it is possible to do so without violating any state or federal fishing regulations

- Feeding or attempting to feed a marine mammal in the wild is prohibited.

6) Check gear and terminal tackle

- Inspect your gear often to avoid unwanted line breaks - even small amounts of gear in the water can be harmful to wildlife if entangled or ingested.

7) Use circle and corrodible hooks

- Circle hooks may reduce injuries to fish, dolphins, and sea turtles.
- Corrodible hooks (any hook other than stainless steel) eventually dissolve.

8) Stay at least 50 yards away

- Stay a safe distance from wild dolphins to avoid causing potential harm.
- Maintaining a safe distance helps keep dolphins wild.

9) Prevent wildlife entanglements - recycle fishing line

- Place all broken or used fishing line in a Monofilament Fishing Line Recycling Bin.
- If no recycling bins are available, place broken or used fishing line that has been cut into pieces in a lidded trash can.

10) Stash your trash

- Littering is illegal and can be harmful to wildlife.
- Collect any trash you've left behind and place it in a lidded trash can.

To report feeding or harassment of wild dolphins,
call the **NOAA Fisheries Southeast Enforcement Division at: 1-800-853-1964**.

To report an injured or entangled dolphin, or other wildlife,
call the **Florida Fish and Wildlife Conservation Commission at: 1-888-404-FWCC (3922)**.

For more information on fishing line recycling and bin locations, please visit: **www.fishinglinerecycling.org**

For more information on dolphins and interactions with anglers, please visit:
www.mote.org or **www.sarasotadolphin.org**

MOTE MARINE LABORATORY

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

Chicago Zoological Society
Inspiring Conservation Leadership

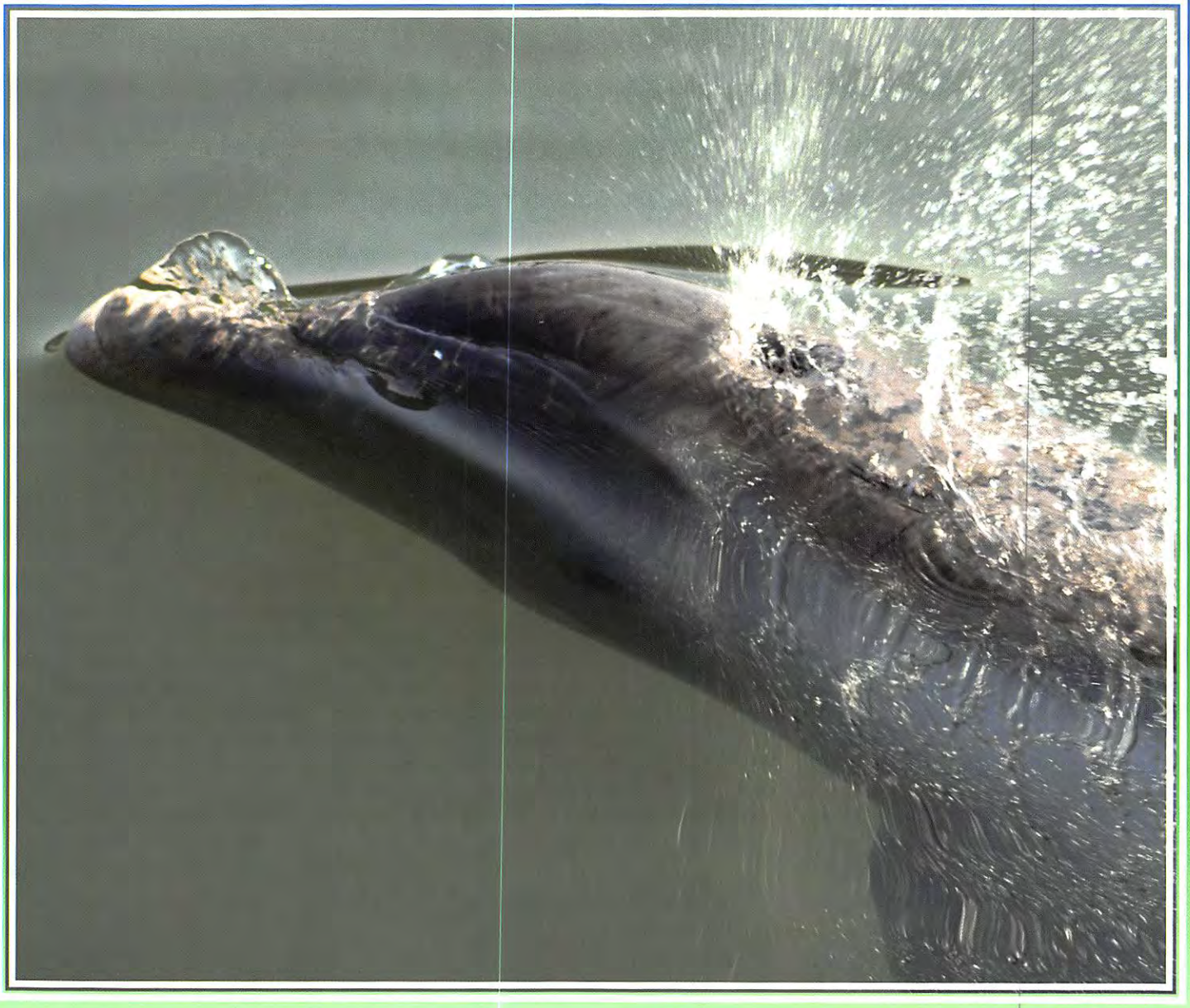
Dolphin Conservation Center Marinelands

Disney Worldwide Conservation Fund

Dolphin-Friendly Fishing & Viewing Tips

The Sarasota Dolphin Research Program is...

RESEARCH • CONSERVATION • EDUCATION



Learn more about us and how you can help!

www.sarasotadolphin.org

Sarasota Dolphin Research Program, 708 Tropical Circle, Sarasota, FL 34242