

NICKS 'N' NOTCHES



Chicago Zoological Society

Annual Summary of the Activities and Findings of the
Dolphin Research and Conservation Institute

• January 2010 •

www.sarasotadolphin.org

The Dolphin Research and Conservation Institute – recognizing four decades of growth and evolution of the Sarasota Dolphin Research Program

By Stuart Strahl, PhD, President, Chicago Zoological Society



In October 2010, our long-term dolphin research program based in Sarasota Bay, Florida, will celebrate its 40th anniversary. While it remains the world's longest-running study of a dolphin population, over the past four decades this program has become much more than a long-term research initiative. In addition to pioneering research efforts, we provide unique education and training opportunities to colleagues from around the world, graduate students, and undergraduate students. We also provide guidance and assistance to help establish dolphin conservation research programs in other countries. Our dedicated staff members make themselves available around the clock to rescue dolphins that have suffered from human interactions such as entanglement in fishing gear, or in the notable case of "Scrappy," a misplaced bathing suit. The name "Sarasota Dolphin Research Program," while accurately identifying where the work has been done that has led to the international reputation of the program, does not adequately describe this expanded mission. To acknowledge its broader role and geographical scope, including its non-research components, we have changed this program's name to the Dolphin Research and Conservation Institute (DRCI). We hope that this new identity will facilitate our efforts to promote the Institute nationally and internationally and bring to it the support that we require.

We at the Chicago Zoological Society, along with colleagues from around the world, recognize that there is much more to this program than its name. The name embodies the scientific reputation of the program, built on decades of high quality research and unparalleled long-term datasets. These datasets, developed through continuous collection of data over many years, are being recognized internationally for their unique relevance

to emerging environmental issues such as global climate change, where long time series of high-resolution, consistently-collected data are necessary for detecting trends. In 2009, the value of the DRCI databases for addressing these issues was highlighted at workshops and scientific conferences in Italy, Turkey, Quebec, and Cuba.

The Institute's reputation results from more than its scientific papers and datasets. The heart and soul of the program are the people that work with the DRCI – the dedicated staff and students, long-term partnerships, and collaborators from around the world that produce the science, training opportunities, and conservation action. To maintain the basic operations of the DRCI for this work to continue requires a significant ongoing commitment of support. We were fortunate to receive federal support during 2001-2009 for maintaining and enhancing DRCI operations, but these funds have now come to an end. CZS is now seeking assistance from the private sector and hopes that you will join us in trying to ensure that we can continue the operations of this flagship conservation initiative through its 40th anniversary and beyond.





Staff members (left to right) Gene Stover, Jason Allen, Katie McHugh Aaron Barleycorn, and Elizabeth Berens McCabe, at Brookfield Zoo in September for the roll-out of the Dolphin Research and Conservation Institute. Photo by Jim Schulz, CZS.



Dolphin "Speck" immediately prior to release during 2009 health assessment. Release team includes program founders Michael Scott (white shirt to the left in the boat), Randall Wells (red shirt hanging from boat), and Blair Irvine (white hat to his left). Dolphin's namesake, "Speck" Wells, is in the green shirt above.

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 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 "Dolphin Research and Conservation Institute" (DRCI), previously referred to as the Sarasota Dolphin Research Program. 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 institute has been operated by the Chicago Zoological Society (CZS) since 1989 and is administered through the Conservation, Education, and Training Group. 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 institute maintains academic connections including graduate student opportunities primarily through the University of California at Santa Cruz, the University of North Carolina at Wilmington, Duke University, 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.

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HUMAN INTERACTIONS AND IMPACTS

Dolphins interacting with humans and recreational fishing gear: Avenues to mitigation

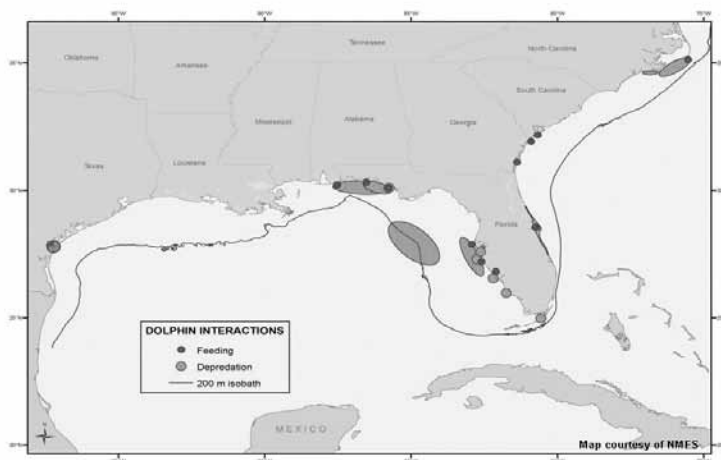
By Jessica Powell, MS, NOAA Fisheries Service

In 2006, when Sarasota Bay lost 2% of its dolphin population as a result of interactions with recreational fishing gear, dolphin depredation (taking bait or catch from anglers' lines) became an even more pressing research concern for the Dolphin Research and Conservation Institute. Through a number of different methods including data mining, acoustic monitoring, focal animal behavioral follows, and surveys at fishing piers, this graduate research provided significant findings that are helping scientists and managers better understand recreational fishing depredation and manage dolphin behaviors associated with human interactions.

Since 2004 and 2005, there has been an increase in the number of incidents and number of dolphins engaging in human interaction behaviors within Sarasota Bay. Interactions between humans and dolphins include depredation, illegal feeding by humans (provisioning), begging, patrolling (dolphin "stalking" fishing pier or boat), and scavenging (dolphin feeding on anglers' throwbacks). From 2000 to 2007, the month of March and the months following the end of a severe red tide bloom were found to have the greatest number of dolphin-human interactions. This is likely due to depletion of prey fish and increased numbers of anglers and boaters on the water. Dolphins that incorporated unnatural foraging habits (e.g., begging, scavenging, and patrolling) into their feeding strategies were found to shift away from natural activity patterns, suggesting that human interaction behaviors are not just opportunistic but rather a more permanent change in activity patterns. In addition, adult male dolphins were more likely to engage in human interaction behaviors than were other sex or age classes. Most concerning was that nearly 60% of human interactions in 2007 and 2008 involved people illegally feeding wild dolphins. However, preliminary results suggest that targeted outreach and education can reduce illegal feeding. For example, illegal feeding of the notorious begging dolphin (Beggar) in Sarasota Bay was reduced by 30% after distribution of the "Dolphin Friendly Fishing and Viewing Tips" cards (see page 31 and 42-43).

Management of dolphin depredation is a concern for the Southeast Regional Office of NOAA Fisheries because of the broad management concerns and the proliferation of these behaviors. Depredation has now been reported along the coasts of Florida, Georgia, South Carolina, North Carolina, Texas, and Alabama (see map). We, at the agency, rely heavily on current research to identify management priorities and assess the effectiveness of current strategies. The research from Sarasota Bay is currently the only literature available about dolphin interactions with recreational fishing gear. With guidance from this research, we are utilizing a number of different methods to help reduce serious injuries and mortalities to dolphins as a result of interactions with recreational fishing gear as well as to educate people about the harms of interacting with wild dolphins. A tool which has been invaluable for education is the Don't Feed Wild Dolphins public service announcement created in part by the Chicago Zoological Society and NOAA Fisheries. We are also planning to expand Dolphin SMART, a voluntary recognition and educational program for commercial wild dolphin viewing tours that follow program criteria and educate their customers about the importance of responsible viewing and conservation of wild dolphins. In summary, partnerships between NOAA Fisheries and researchers, such as DRCI, are essential to mitigate the various management challenges associated with dolphin-human interactions.

Graduate research was supported by the Disney Wildlife Conservation Fund, Fish Florida, and an assistantship from the University of South Florida, College of Marine Science.



Locations of reported human-dolphin interactions in the Southeast Region.

Florida Entanglement Working Group update

By Kim Bassos-Hull, MS, and Jessica Powell, MS

DRCI has been an active member of the Florida Entanglement Working Group (FEWG) since 2005. This group focuses on marine wildlife entanglement issues and ways to reduce marine debris in the environment around the state of Florida. Within FEWG, a smaller working group was formed to examine dolphin, manatee, and sea turtle stranding data from 1997-2007 for entanglements in fishing gear, leading to a manuscript that highlights areas of Florida that appear to be entanglement hotspots. This information will be useful for targeting outreach, fishing line recycling, and cleanup efforts. During 1997-2000, up to 4% of total yearly strandings involved fishing gear entanglements. This number jumped to as much as 9% during some subsequent years through 2007. Preliminary indications are that the central east and west coasts are the hotspots of entanglement for dolphins, and the next step is to combine with the manatee and sea turtle data sets to examine entanglements at the multi-species level.

One of the primary programs supported by the FEWG is the Monofilament Recovery & 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). DRCI has been actively promoting the MRRP program through the development and distribution of personal-sized fishing line recycling bins to anglers and kayakers filled with MRRP brochures, Dolphin Friendly Fishing Cards, and a NOAA "Help Prevent Entanglement" brochure. Sean Russell, a Mote High School Intern and Florida 4-H Club president, has expanded the "mini-bin" program around the state through 4-H clubs and other educational institutions through his "Stow it don't throw it" project (www.stowitdontthrowit.blogspot.com).

HUMAN INTERACTIONS AND IMPACTS

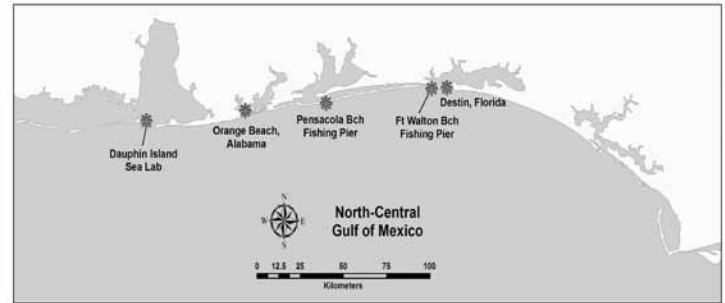
Assessment of interactions between bottlenose dolphins and sport fishing in northwest Florida and Alabama

By Steve Shippee, PhD Candidate, University of Central Florida

Sport anglers in the North Central Gulf Coast frequently complain to fisheries managers that interactions with bottlenose dolphins are on the rise. Charter operators and private anglers regularly report negative encounters with aggressive dolphins during deep-sea fishing trips. Gulf pier fishermen also commonly report problems with dolphins taking their catch. Fisheries interactions consist of three types: depredation (dolphin removes catch from fishing gear); scavenging (dolphin takes fish that have been discarded by an angler); and incidental encounters (dolphin becomes snared due to proximity to fishing activity). To better understand these issues, last summer I began to observe deep-sea and pier fishing over a two-year period. The primary study locations are the sport fishing ports of Destin, FL and Orange Beach, AL, plus shore fishing piers at Fort Walton Beach and Pensacola, FL (see map). This work also ties together with long-term dolphin photographic identification projects underway in both areas. The project goals are: 1) to assess the frequency and characteristics of these fishery interactions; 2) to estimate the size of the subpopulations of dolphins involved; 3) to identify dolphin movement patterns around the region and between sites; 4) to investigate methods to mitigate adverse interactions; and 5) to conduct outreach aimed at public education about this problem. I am using photo-identification to develop a catalog of individual dolphins in the areas to compare to those seen on fishing observations.

Since summer of 2008, I have observed over 48 deep-sea fishing trips and made over 64 visits to piers. Dolphins have been observed nearby on 55% of deep-sea trips and 48% of pier visits, and fishery interactions have been observed 35% and 16% of the time, respectively. The preliminary findings show that most incidences of depredation on deep-sea fishing trips are in conjunction with scavenging of discarded fish. Because fisheries management regulations require anglers to release numerous species of regulated sport fish, there is a steady supply of discards for dolphins to scavenge. Although many dolphins seen interacting on deep-sea trips appeared to only engage in scavenging, I occasionally observed animals that aggressively stripped caught fish off lines. This happens at less than half the rate of scavenging but is a more worrisome behavior due to the potential for injury to the dolphin. In addition, there have been several dolphins identified so far that were observed on more than one deep-sea trip, one of which was identified at reef sites 60 km apart. At the piers, most interactions involve depredation since pier anglers typically do not discard many fish. Most of the dolphins identified at the fishing piers are known residents of the nearby bays, and many have been seen repeatedly at each pier. Several dolphins have been seen at both fishing piers, which are 53 km apart, and at least two have been seen in both Pensacola and Choctawhatchee Bays, which are 70 km apart. It is not yet possible to tell if the inshore dolphins also frequent the offshore reefs, as the analysis is incomplete.

I am working with several sport charter operators to explore means of reducing dolphin depredation of fishing lines and ways to effectively release fish so that dolphins are less likely to scavenge them. This includes modifying fishing tackle using tickler wires and use of fish release devices such as descender weights and baskets. We will continue to explore the practicality of these ideas in the coming year. I have also engaged local community organizations to conduct public education at outdoor events, seminars, and schools in order to bring attention to the potential harm to dolphins and other marine wildlife from entanglement, incidental human provisioning, and aggressive encounters with anglers. The eventual result of this project will be to foster an appreciation of dolphin-friendly sport fishing practices that also conserve fish and wildlife. This project is funded by the Mississippi-Alabama Sea Grant Consortium under the U.S. Department of Commerce's National Oceanic and Atmospheric Administration.



Study site map.



Dolphin scavenging on discarded fish.



Dolphin alongside deep-sea fishing boat.

SOCIAL STRUCTURE, BEHAVIOR, AND COMMUNICATION

Dolphin communication studies

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

The Sarasota dolphin whistle database is a unique resource of dolphin whistles, containing signature and other whistles of 232 individuals that have been recorded during brief capture-release events over the last 35 years. It contains multiple recordings of individuals that cover time spans of up to 34 years, with up to 16 recordings of each individual. There is no other dataset like it in the world, and it allows us (and others) to ask scientific questions that are otherwise not possible to address. Much of our effort goes into updating, digitizing, and making this dataset available to other researchers. Over the last few years, we have used it to address many novel questions. Most recently we investigated the temporal structure of multi-loop whistles, how dolphins recognize each other individually, and whether whistles may serve as indicators of stress. We also used the catalogue to develop a method to identify signature whistles in free-swimming dolphins, which does not require capture-release (described in the last issue of Nicks'n'Notches). We are now using this method to compare dolphin dialects all over the world. The study uses recordings from all continents to describe different dialects and to compare how genetic similarity influences whistle similarity across populations. Starting from Sarasota Bay, this will allow us to produce a world view of bottlenose dolphin communication.

During capture-release sessions we collected the last necessary data for our study on “addressing” in bottlenose dolphins. Here we compared reactions of dolphins to their own signature whistle with those they show to whistles of their relatives. A first analysis shows that they react by replying with their own whistle if they are addressed in this way, while they try to approach the speaker if they hear the whistle of a relative. Just like in previous years, we only used synthetic whistles for this study. This way we can be sure that the reaction is based on the frequency modulation patterns that the dolphin invented rather than on the voice features that every animal has due to the unique shape of its vocal tract. We have observed whistle copying interactions in wild dolphins and know that they use copying regularly. The results from our experiments in Sarasota Bay show that copying a signature whistle provides an effective way of addressing dolphins.

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.



Setting up for a playback experiment during the 2009 health assessment.

Juvenile dolphin behavioral development

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

The juvenile period is important for young animals learning to navigate complex social and ecological environments once independent of their mothers. While bottlenose dolphins are well-studied, little work has focused on understanding behavioral development between the periods of weaning and sexual maturity, or determining factors influencing survivorship of independent juveniles. Because of the wealth of long-term research conducted by DRCI, the “natural laboratory” of Sarasota Bay has provided a unique opportunity to address these issues in my graduate research.

The main objectives of my dissertation project have been to develop a better understanding of social and behavioral development of juvenile bottlenose dolphins as well as to explore the major influences on survival of free-ranging juvenile dolphins. I have been investigating these questions over the past four years 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 ran from 2005 through 2008, resulting in nearly 600 hours of focal follow behavioral data on 27 individuals (14 females and 13 males) in the Sarasota Bay community ranging in age from 2 to 13 years. While a few of these animals died, went missing, or matured and had calves of their own, most were observed in each of my six seasons, and it has been extremely interesting to watch their behavior and relationships change over time, especially as several males began forming alliances and some females got closer to becoming first-time mothers.

For the past year, I have been working on analyzing both long-term and focal follow data and writing up my results. One of the main areas I explored early on was the effect 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 when severe red tides occurred in Sarasota Bay. When I compared the behavior patterns of juveniles during red tide and non-disturbance periods, I found that sociality, activity budgets, and ranging patterns were substantially altered during red tides, potentially as a consequence of underlying changes in relative prey availability and distribution. This analysis is currently being written up for publication. Additionally, this year



Socializing juveniles in Sarasota Bay.

SOCIAL STRUCTURE, BEHAVIOR, AND COMMUNICATION

I have completed many of the major analyses for my dissertation, using focal follow data to explore individual variation and sex, seasonal, and age-related differences in juvenile behavior. For example, I've found that sex differences are already emerging in activity budgets and association patterns, with males showing a particular propensity for social interaction and exploration during the juvenile period. Also, seasonal differences are evident in most behavioral parameters, and sociality and ranging patterns change as juveniles mature. Finally, I've also drawn on long-term data to investigate factors influencing age at independence for dolphin calves, continued maternal influence on sociality and ranging patterns post-independence, 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 provides 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.



Lizzie (F113) being chased by Petal (F187) during a juvenile socializing bout.

Genetic analyses of social structure: Paternity and relatedness in Sarasota Bay

By Debbie Duffield, PhD, Portland State University

This project represents 25 years of genetic work on the Sarasota Bay bottlenose 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. To date, we have developed DNA microsatellite panels from blood samples taken during capture-release efforts for 238 bottlenose dolphins of the Sarasota Bay community; 129 females and 109 males. Of the 238 dolphins sampled, 102 of these were calves born in the community to known mothers. Over the past two years we have also added 73 biopsy samples from dolphins sampled independent of the capture-release operations.

We are in the process of completing paternity exclusions for all the calves. Analyses have been completed for 71 of the calves and yield the following preliminary conclusions:

- 1) 51 calves were sired by a male in the community.
- 2) Four males sired from 3-5 calves each; five males sired at least two calves each.
- 3) The most successful males were FB60, FB10, then FB46 and FB76.
- 4) 20 calves (28%) were not sired by males in the community – as we have reported previously, the Sarasota Bay dolphin community is not a genetically-isolated population.

We are currently engaged in finishing the paternity exclusions for the rest of the calves and completing the integration of the biopsy samples. In addition to helping us define the breeding structure of this community, these paternity assignments will allow us to correlate presence, behavior, morphology and health with breeding success.

To complete our understanding of the genetic and group structure of the Sarasota dolphin community, we are also particularly interested in defining the role of relatedness in observed social patterns. These data taken together with the paternity data will 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 the entire community over five generations with both genetic analyses and long-term behavioral observations.



Petey (FB10), one of Sarasota's most successful sires.

Potential climate change effects on dolphins

By Randall Wells, PhD

Because of the unique long-term datasets developed and maintained by the DRCI, Randall Wells was an invited participant to the International Whaling Commission's Second Workshop on Climate Change and Cetaceans, held 21-25 February 2009 in Siena, Italy. While it is widely recognized that Arctic and Antarctic marine mammals are expected to exhibit the strongest climate-related signals, at least initially, large scale changes are also likely to affect small cetaceans inhabiting shallow, inshore habitats, including estuaries and rivers.

Bottlenose dolphins, which occur along many coastlines in temperate and warm waters, may serve as one sentinel of climate change effects as they exhibit a wide range of behavioral and physiological plasticity that may provide the basis for detectable responses to environmental changes. This species has been the subject of numerous research projects, providing potential baseline data for evaluation of changes at a number of sites. At the northern extent of the species' range on both the east and west coasts of the United States, bottlenose dolphins have demonstrated the capacity to dramatically alter spatial or temporal aspects of their ranging patterns in apparent response to changing environmental conditions. Many coastal bottlenose dolphin populations live well away from their range limits, within a matrix of established, long-term resident communities. Under these circumstances, large-scale range shifts into waters already inhabited by other bottlenose dolphins may not be an option – these dolphins may live in an “ecological cul-de-sac”. The datasets developed beginning in 1970 through our long-term study of resident bottlenose dolphins on the central west coast of Florida, including sightings, reproductive histories, health and body condition, strandings, behavioral observations, and prey distribution and abundance, provide a time series of data for examination of possible climate change signals and effects for resident populations of small cetaceans in inshore waters.

Sea surface temperature increase is likely to be one of the first climate change experiences for small cetaceans in shallow, coastal, non-polar waters. The resident dolphins have remained in the Sarasota Bay area for decades, at least, and through large scale environmental perturbations such as severe red tides and hurricanes. Existing data suggest that as these animals remain in warming waters, they may face increasing health problems, through increases in harmful algal bloom exposure or thermoregulatory issues. High summer metabolic rates and mortality rates suggest current thermal challenges, as water temperature approaches body temperature; this situation may be exacerbated through climate change. Thermal stresses may combine with toxicological stresses to increase mortality under warm water conditions. Lipids released from thinning blubber as waters warm can transport associated toxic environmental contaminants (e.g., PCBs, DDT and metabolites) to target organs or to organs where biotransformation can modify toxicity, leading to compromised immune function. Warmer waters are likely to support a variety of old and new pathogens,

reduce dolphin host resistance, and/or increase the duration of exposure. Transfer of contaminants via lactation has been suggested as one cause of the increased mortality documented for first-born calves in the area. Taken together, these factors suggest that seasonal warming appears to lead to health challenges for Sarasota Bay bottlenose dolphins, perhaps approaching a tipping point, potentially leading to cascading declines in individual health. Information is needed to identify and detect signals of climate change, predict where and how impacts on dolphins and their habitat are likely to occur, and prioritize pre-emptive management actions for providing these animals with as much capacity as possible to respond to climate change.

Sarasota Bay dolphin health assessment 2009

By Randall Wells, PhD

The long-term health records compiled for Sarasota Bay dolphins not only provide indications of the condition of the local dolphin population, but they serve as reference values for comparison with health assessments performed at other sites where the animals may face specific threats to their health. These situations of interest to the NOAA Fisheries Service Marine Mammal Health and Stranding Response Program and the NOAA Center for Excellence for Oceans and Human Health at the Hollings Marine Laboratory include locations where Unusual Mortality Events have occurred, such as the Florida panhandle, or where pollution has occurred at levels that lead to EPA superfund site designation, such as off the coast of Brunswick, Georgia (see next article). A dolphin health assessment project was conducted in Sarasota Bay during 4-8 May, with 86 participants from around the world (including 6 from Argentina). Researchers participating in the project conducted more than 25 projects with each dolphin handled. Fourteen dolphins were sampled during the 5-day project; half of these were high-priority, first-time samplings.



Randall Wells measures, and Dr. Andy Stamper examines a dolphin during the 2009 health assessment.

HEALTH AND PHYSIOLOGY

Collaborative field effort to assess dolphin health near Brunswick, Georgia and Sapelo Island National Estuarine Research Reserve

By Lori Schwacke, PhD, National Ocean Service

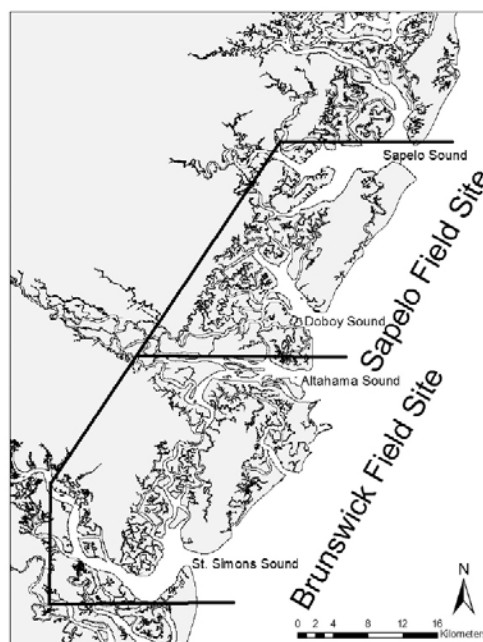
During the first two weeks of August, 2009, health assessments were successfully conducted for 29 dolphins along the Georgia coast to examine health endpoints in relation to exposure to high levels of polychlorinated biphenyls, mercury and other legacy and emerging contaminants. The health assessments, conducted by researchers from the NOAA Center for Excellence for Oceans and Human Health at the Hollings Marine Laboratory, NOAA Fisheries Marine Mammal Health and Stranding Response Program, Chicago Zoological Society, Georgia Department of Natural Resources, and other partners involved a veterinary examination and medical sampling to measure chemical contaminants and examine related health effects. Dolphins were also fitted with radio transmitters to allow for follow-up monitoring and tracking of movements to better understand contaminant exposure sources.

The health study was prompted by findings of previous efforts which found high polychlorinated biphenyl (PCB) concentrations in blubber samples obtained during biopsy darting of dolphins from the Brunswick, Georgia area, as well from dolphins near the Sapelo Island Estuarine Research Reserve, a federally protected area some 50 kilometers northeast of Brunswick. The Brunswick area is home to 4 National Priority List (NPL) sites which are designated by the Environmental Protection Agency as sites with known or threatened releases of hazardous substances. PCBs are a contaminant of concern for one of the sites, Linden Chemical and Plastics (LCP), which borders the Turtle River near Brunswick. Impacts of the PCBs and other contaminants are the focus of on-going assessments being conducted by state and federal agencies in conjunction with several of the responsible parties. The data being collected as part of the dolphin health assessments will be provided to NOAA's Assessment and Restoration Division to use with other information and data relevant for the cooperative natural resource damage assessment being conducted for the LCP site.

PCBs are known to produce adverse immunological and reproductive effects, so tests were administered to the dolphins to specifically assess these endpoints. Protocols and laboratories for the health assessment were coordinated to follow those previously established by the Dolphin Research and Conservation Institute so that results from the Georgia dolphins can be compared with prior Sarasota Bay dolphin health assessments. This underscores the value of the health data being collected as part of the long-term monitoring in Sarasota Bay. The Sarasota Bay study has not only established and field-tested effective capture-release sampling methods that have been adopted by other studies, but it is also helping to establish baseline measurements for dolphin health that aid in interpretation of data from other populations of concern.



Permit # 932-1489-10
Researchers examine a dolphin during the Georgia health assessment, August 2009.



Study sites in Georgia.

A geographical perspective on bottlenose dolphin contamination

By John Kucklick, PhD and Jennifer Yordy, PhD, The National Institute of Standards and Technology

Pollution is a by-product of human civilization and arises from many sources including agriculture, industry and from chemicals used in our homes and offices. Persistent organic pollutants (POPs) are one class of contaminants that break down very slowly and remain in the environment decades after their release. POPs encompass a large number of chemicals, including “legacy” contaminants such as polychlorinated biphenyls (PCBs) and pesticides (i.e., DDT and chlordane), which were heavily used in the past but were banned in the U.S. beginning in the 1970s and 1980s. Some POPs are still in active use, such as a mixture of brominated compounds called “PBDEs” that is added to products to reduce flammability. Many legacy- and current-use POPs accumulate in wildlife that feed at the top of aquatic food webs, such as bottlenose dolphins, and have been linked to effects on the immune system, altered hormone regulation, learning deficiency, altered development, and cancer.

The occurrence of POPs in Sarasota Bay dolphins has been well described through a variety of studies. We know, for instance, that POPs in juvenile dolphins occur at concentrations believed to cause a variety of toxic effects and that exposure may impair reproduction. But, how do POP levels in Sarasota Bay dolphins compare to dolphin populations from other locations along the Gulf of Mexico and U.S. East coasts? We do know that the contamination of marine mammals by POPs is widespread, but is the contamination the same everywhere or are there populations of bottlenose dolphins at greater at risk from POP exposure?

To help address this question, many groups have been actively involved in the collection of blubber samples for the determination of POP concentrations. Blubber samples have been collected over the last decade from in-water health assessments and with the use of remote darts. The National Institute of Standards and Technology (NIST) has analyzed POPs in blubber biopsies from 480 bottlenose dolphins sampled at 14 Atlantic and Gulf of Mexico locations (see figure). The sites included rural and urban estuaries, a location (Brunswick, GA) with a known PCB dump site, and dolphins living near Bermuda. Blubber samples were analyzed for legacy POPs including PCBs, pesticides (DDTs, chlordanes, dieldrin and mirex), and the industrial chemical hexachlorobenzene. The current-use brominated flame retardants (PBDEs) were also measured. The data from each location were combined and statistically analyzed. We only compared male dolphins among sites because mature female dolphins transfer most of their POPs to their calves and can thereby alter their concentrations.

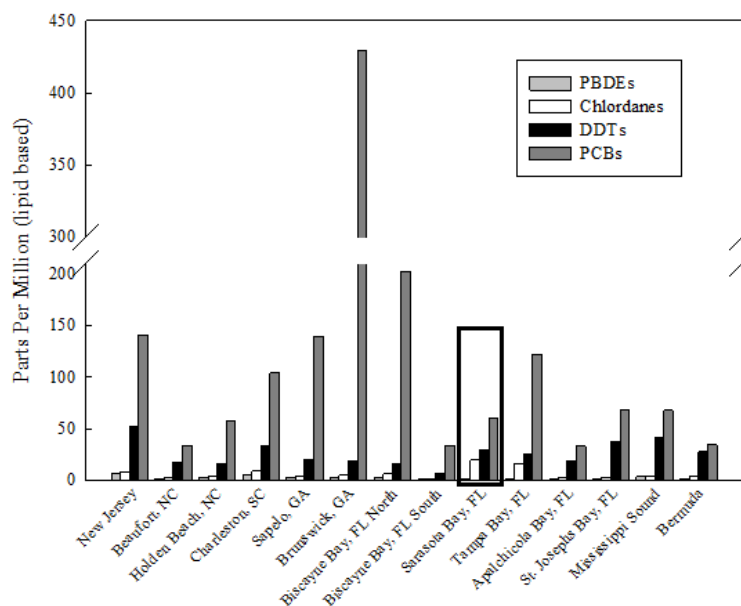
The levels of POPs in bottlenose dolphins vary from place to place. PCBs, for instance reached an astounding 430 parts per million (ppm) median concentration in dolphins sampled near Brunswick, GA. Fat in the blubber of one Brunswick area dolphin was nearly 0.3% PCBs! The pattern of PCB compounds in Brunswick dolphins was unique compared to other locations but was also readily detectable in dolphins sampled 40 km away near Sapelo Island, GA. By comparison, average concentrations of PCBs in Sarasota dolphins were near the median value (68 ppm) of the 14 sites. Dolphins sampled from Apalachicola Bay, FL, southern Biscayne Bay, FL, Beaufort, NC, and Bermuda had the lowest PCB concentrations. Concentrations of DDT, a

pesticide that was used extensively in the US at one time, were less influenced by location, although dolphins from Mississippi Sound had significantly higher concentrations. Because DDT was banned about 35 years ago, the residual DDT is likely more evenly distributed in the environment explaining why levels did not vary widely among dolphin sampling sites. In contrast, PBDE levels in Sarasota Bay dolphins were only about 60% of the median concentration of all sites. This may be due to the Sarasota Bay watershed generally having older homes and few sewage outfalls that enter directly into Sarasota Bay. Flame retardants are generally associated with newer homes, offices as well as sewage outfalls.

Sarasota Bay dolphins did show a significantly higher proportion of chlordane relative to other locations except northern Biscayne Bay and Tampa Bay. Homes built prior to the mid-1980s had their foundations treated with chlordane to prevent termite infestation. The Florida cities, Miami, Sarasota, and Tampa, have a large number of older homes that were treated with chlordane, thus explaining the high proportion of this pesticide in dolphin blubber.

Work continues on defining geographic trends of POPs in bottlenose dolphins. In August of 2009, a dolphin health assessment was conducted in Brunswick, GA mainly to assess the impact of PCB exposure on the health of the local dolphin population. In addition, dart biopsy samples from Choctawhatchee Bay on the Florida Panhandle and from dolphins offshore of the Florida Panhandle are currently being analyzed by NIST to expand our understanding of how dolphin POP concentrations vary with location.

We acknowledge the many contributors to this work in particular those involved in sampling and investigations of dolphin habitat use.



Concentrations (ppm) of POPs in bottlenose dolphins sampled at different locations along the Gulf of Mexico and U.S. East coasts.

HEALTH AND PHYSIOLOGY

Study focuses on disease known only from dolphins and humans: Lacaziosis project summary

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

Lacaziosis (*Lacazia loboi*) is a chronic and slowly progressive, fungal skin disease occurring naturally only in humans and dolphins (Figure 1). The disease has been reported among three species of dolphins from various regions of the world. The first reported case of lacaziosis in a dolphin was from a bottlenose dolphin that died in Sarasota Bay in 1970 and was recovered and necropsied by Blair Irvine and Randy Wells. Although lacaziosis, previously known as lobomycosis, has occurred in this region for more than three decades, the extent of the disease and aggression of the pathogen has been poorly understood. This year, my dissertation research goals were to use health assessment data to derive a prevalence estimate for lacaziosis occurrence in the Sarasota Bay dolphin community, as well as model and compare the progression of lacaziosis lesions among four cases using long-term photographic data.

Skin assessment records, photographs, and pathology reports were examined for all dolphins captured and released in the following time periods: 1) 1994; 2) 2001; 3) 1993-1995 and 2000-2002; 4) 1980-1989; and 5) 1990-1999. These time periods were chosen because the number of animals captured and released was sufficient to provide an 80% probability of detecting a lacaziosis prevalence equivalent to other published estimates. Results from the prevalence study revealed a lacaziosis prevalence of approximately 3%, and although lacaziosis is a rare disease among dolphins in Sarasota, the occurrence is comparable to other sites where it has been measured.

Long-term photographic studies of the dolphins in Sarasota Bay have revealed a sequential documentation of lacaziosis lesion spread. Methods to quantify the progression of lacaziosis and lesion growth rates were developed using image analysis tools in the latest version of Adobe Photoshop® and longitudinal photographic data from a bottlenose dolphin with a 16-year case history (Figure 2). These methods were applied to four male lacaziosis cases from Sarasota Bay (FB28, FB98, FB96, and FB40) (Figures 1, 3-4), and the progression of lesions over time was modeled using nonlinear growth modeling methods. Model comparisons revealed individual variability in disease progression and lesion growth among the infected dolphins, including statistically different growth rates between members of a male alliance (FB98 and FB96). Although individual variability in lacaziosis lesion progression is evident, the reason for the variation at this point is unknown.

This study has demonstrated that health assessment and long-term photographic data can be used as retrospective tools for epidemiologic studies of disease in a wild population. Furthermore, a mathematical framework (i.e. the growth models) has been established for future exploration of the influence of genetic, social, and environmental factors that may affect disease progression. To date, the pathogen responsible for lacaziosis has not been successfully cultured in vitro, and no long-term studies have documented the progression of disease in humans or other animals. Dolphins, with a documented and long-term case history, may serve as an ideal animal model to enhance our understanding of lacaziosis occurrence and pathogen aggression.

Funding for this project was provided by NOAA's Center of Excellence for Oceans and Human Health at the Hollings Marine Laboratory.



Figure 1: Lacaziosis lesions observed on FB28 in 2008.

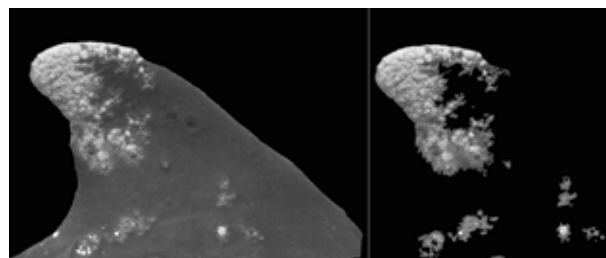


Figure 2: Photo manipulation using image analysis tools in Adobe Photoshop®.

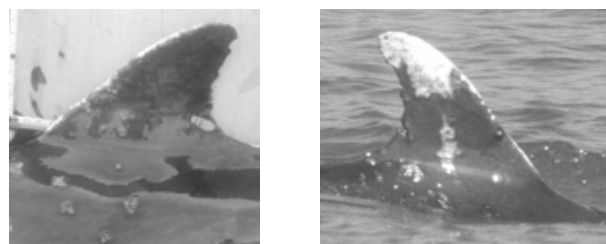


Figure 3: FB40 (left) with lacaziosis-like lesions observed during a 1984 health assessment and FB98 (right) with lesions observed in 1992.

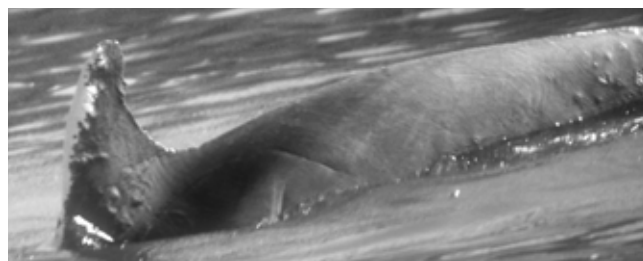


Figure 4: FB96 with lacaziosis lesions observed in 1999.

Hearing abilities of bottlenose dolphins in Sarasota Bay

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

Bottlenose dolphins can hear from about 75 Hertz (Hz) to over 150 kiloHertz (kHz). (For reference, most humans can hear from 20 Hz to 20 kHz.) Because they are exposed to a wide variety of noise in their environment, both naturally-occurring and man-made (anthropogenic), there is concern that these noises may have negative effects on their hearing. Hearing losses in these animals can be especially damaging because dolphins rely primarily on acoustics to navigate, forage, and communicate with each other, especially in murky estuarine habitats such as Sarasota Bay.

We measured the hearing abilities 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), which takes advantage of the lower-jaw sound conduction pathway in these animals. 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.

Data were collected from 10 bottlenose dolphins (5 females and 5 males, ages 2-23 years) during May 2009 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 extensive data available on the lives of these dolphins.



F197 showing placement of the jawphone on the lower left jaw and AEP sensors on the animal's dorsal surface. A recording hydrophone is located on the melon of the animal. All of these sensors are attached by non-invasive suction cups.

Impact of viral diseases on bottlenose dolphins

By Hendrik Nollens, DVM, PhD, Marine Animal Disease Lab, University of Florida

Much information has been collected on health problems of bottlenose dolphins, but nevertheless, cetacean medicine is a relatively new science. In particular, the knowledge of viral diseases of dolphins is lagging behind those animals more commonly assessed in traditional veterinary medicine. The primary reasons for the failure to identify viral pathogens in dolphins are the lack of pre-existing knowledge about pathogens of marine mammals, the lack of rapid, specialized virus detection techniques, and the lack of state-of-the-art resources to detect previously unrecognized marine mammal viruses. As such, knowledge regarding the impact of viral infections in bottlenose dolphins is limited to morbilliviruses. It is assumed, however, that other viral pathogens play a role in population health as well.

The limitations of viral diagnostic tests triggered a research project funded by the Office of Naval Research that aimed to develop state-of-the-art molecular tools for virus detection and conduct impact assessments of viruses on marine mammals. As part of this project, The Marine Animal Disease Lab was established at the College of Veterinary Medicine of the University of Florida. The lab also has facilities at the Hubbs-SeaWorld Research Institute in San Diego, CA. We work in close collaboration with the Dolphin Research and Conservation Institute, SeaWorld Adventure Parks, the U.S. Navy Marine Mammal Program and the National Marine Fisheries Service. During the first three years of this effort, 11 viruses, including 8 previously unidentified virus species and 2 previously unidentified virus families, were detected in dolphin samples. In comparison, prior to 2003, only 11 virus species had been reported in all marine mammal species combined.

Pathogen discovery efforts go beyond the simple cataloging of these agents. Instead, the veterinary relevance of newly discovered viruses is explored via extensive disease investigations. The Dolphin Research and Conservation Institute contributes invaluable samples representing a clinically healthy, free-ranging bottlenose dolphin population. This information is then used to provide the science needed to generate guidelines for disease outbreak management and prevention strategies. Recent pathogen assessments include, but are not limited to poxviruses of dolphins, dolphin parainfluenzavirus type 1, herpesviruses of dolphins, and dolphin enteroviruses. Impact assessments of selected viruses indicated that exposure to viruses of free-ranging dolphins and dolphins under human care can be frequent. Some of these viruses do have the potential to impact animal health. Others appear to be indigenous and relatively harmless to the animals.

Lungworms in dolphins: New findings about a common threat

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

Parasitism of the respiratory system is a relatively common finding in stranded cetaceans, however, no systematic investigations regarding the severity, distribution, and clinical consequences of these infections in bottlenose dolphins have been conducted previously. This study determined the prevalence of lungworm infections in dead stranded ($n=22$) and live bottlenose dolphins ($n=44$) from southwest Florida during 2003-2005. Dead stranded bottlenose dolphins were necropsied, and lungs were examined visually, by palpation, and histologically for lesions consistent with verminous pneumonia. When present, nematodes were counted, measured, and identified to species based upon their morphology. Dolphin feces and blowhole swabs were collected and examined for nematode larvae. Lungworm prevalence was 77% in dead animals ($n=22$). The lesions in most cases were mild, chronic, and not the primary cause of death. Only 13% of dead animals examined had patent infections with larvae present in blowhole and fecal cytology, and only 18% of animals had intact worms present at necropsy with a geometric mean intensity of infection of 22.6 worms/animal. Intact worms were identified as either *Halocercus lagenorhynchi* or *Skrjabinalius cryptocephalus*. The highest prevalence of active infections was found in neonates and calves, including one stillborn calf. For free-ranging animals, all blowhole swabs ($n=44$) were negative, and fecal cytology ($n=22$) showed a 3% prevalence of patent infection. Findings from this study support the theory that bottlenose dolphins can be infected transplacentally by lungworms. The impact that such infections may have on neonatal survival is unknown; however, these infections could increase neonatal mortality.

This project was funded by a grant awarded from Harbor Branch Oceanographic Institution's "Protect Wild Dolphins" program.



Veterinarian Deb Fauquier takes a blowhole swab from F151 during health assessment procedures in May 2009.



Halocercus lagenorhynchi larvae from tracheal swab (MML 0331; 40X).

ECOLOGY, POPULATION STRUCTURE AND DYNAMICS

Sarasota Bay dolphin community monitoring program 2008-2009

By Jason Allen, BS

We have been able to continue our year-round monthly monitoring of the Sarasota dolphin community thanks largely to support from NOAA Fisheries Service and Disney's Animal Programs. The Sarasota bottlenose dolphin community is the most thoroughly studied free-ranging dolphin community 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.

Photographic-identification surveys were conducted on 126 days from November 2008 through October 2009 with the assistance of dedicated volunteers and undergraduate interns. We had 1,065 group sightings that totaled 3,135 dolphins (including resighted animals). Monthly values varied, but overall we averaged about 8.5 sightings and 25 dolphins per day. These values have remained fairly consistent over the past several years; though we were able to survey on more days this year than in any of the previous ten years. We had a high of 18 dolphin groups sighted on September 4th and October 28th. The most dolphins seen during one day was 81 on May 13th. Not surprisingly, this day also had the largest single group of Sarasota Bay community members. The 18 dolphins in this group included FB44, Bark, Scrappy, Thrasher, Boxer and calf, Annie and calf, C835 and others.

We documented the births of eight new calves to resident mothers during the summer of 2009. F215 was determined by ultrasound to be pregnant during health assessments and had her first calf later in the summer. Allison also had her first calf, while Hair had her third and Pumpkin her sixth. Sadly, the carcass of Allison's calf was recovered, and the other two new calves have not been observed recently and are presumed dead. Other mothers with new calves in 2009 include FB25, Killer, FB93, and Murphy Brown. Their young are still alive and appear to be doing well.

We accounted for most of the expected long-term residents of Sarasota Bay. Unfortunately, we confirmed the deaths of four long-term community members this year. Two of these were a couple of our longest-known individuals; FB05 (a 46-year-old female observed since 1971) and FB13 (a 50-year-old female observed since 1975). We also lost Pumpkin, the 1984 calf of Ms. Mayhem, along with her newborn. Finally, we recovered the 2006 calf of Scooter (1091) who likely died of overeating. Necropsy results showed that she had eaten so many fish that she literally could not swallow another and choked to death. The carcass of a 33-year-old male (FB68) known from waters north of Sarasota Bay was recovered by the state's Marine Mammal Pathobiology Lab, with recreational fishing gear deeply embedded in his upper jaw.



F256 (foreground) and Annie (background) shortly after their health assessment in May 2009. F256 is the great-great grand calf of FB43, and he was the first known 5th generation dolphin to be briefly handled and studied by our researchers.



Killer and her new calf surfacing along the Anna Maria Island coastline, 10 August 2009.



Long-term volunteer John Hamilton helps take identification photos during a sighting in Palma Sola Bay, 10 October 2009.

ECOLOGY, POPULATION STRUCTURE AND DYNAMICS

Seasonal residency and abundance trends of bottlenose dolphins in Charlotte Harbor and Pine Island Sound

By Kim Bassos-Hull, MS

Last year we reported on long-term site fidelity patterns of dolphins in the Charlotte Harbor and Pine Island Sound (CHPIS) study area from a dataset that spanned 1982-2007. We found that out of 1,157 individuals identified in the study area, 604 individuals were observed over 5 years or more (343 of these individuals were seen over 10 years or more). Prior to 2001, multi-week surveys were done only in summer during 1990-1994 and in 1996 in the CHPIS region. Between 2001 and 2006 we conducted multi-week surveys in both summer and winter months (summer 2001-2004 and 2006, winter 2002-2004) to determine abundance trends and seasonal residency in the study area. In Sarasota Bay, just to the north of CHPIS, five generations have been observed year-round. Therefore we were interested to know if the animals were also present in the CHPIS study area year-round. We identified 828 individuals that met our analysis criteria, and 479 (58%) of these were observed in both a winter and a summer field season. Two hundred and fifty three (31%) were observed only in summer, while 95 (11%) were observed only in winter. If we exclude dolphins seen only once, and therefore likely not residents, (127 summer/67 winter) the percentage of year-round residents increases to 76%. These findings indicate that the waters of Charlotte Harbor and Pine Island Sound are important to bottlenose dolphins both long-term and year-round. These year-round residency findings track well with what we have observed with abundance estimates. Preliminary estimates show that dolphin abundance in the CHPIS study area is consistent from summer to winter and even after a Category 4 hurricane struck the area in August 2004.

Funding sources that contributed 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, Dolphin Biology Research Institute, and Earthwatch Institute.



"Captain Hook" was initially observed in Charlotte Harbor in 2001 and has been re-sighted in each summer and winter field season.

Eckerd College Dolphin Project update

By Shannon Gowans, PhD

The Eckerd College Dolphin Project (ECDP) began in 1993 under Dr. John Reynolds. From its start it has served two purposes: one to train undergraduate students in field and lab techniques to study wild dolphins and two to collect and analyze biological data relating to the dolphins in the Boca Ciega Bay area (see Figure 1) just to the north of Sarasota Bay. ECDP has been very successful in both of its objectives. Over 100 undergraduate students, including CZS-DRCI staff members Jason Allen and Aaron Barleycorn, have participated in the project, many of whom have continued to do dolphin research after leaving Eckerd. Additionally we have identified over 700 different dolphins during the 17 years of the project. Some of these dolphins are clearly resident, having been photographed over 100 times, however many dolphins have been photographed only once or twice.

To assist in the process of matching the thousands of photographs taken each year, faculty and students at Eckerd College have developed a computer assisted matching program (DARWIN). This software has been very helpful in matching our photographs, especially as almost all the work on this project is conducted by undergraduate students. The ECDP catalog is routinely compared with CZS Dolphin Research and Conservation Institute's catalog, and 45% of the dolphins identified by ECDP have also been identified by CZS Dolphin Research and Conservation Institute.

Some of the highlights from this year's research include: identifying FB68 ("Manatee Man") the day before he was found stranded with embedded fishing gear on Fort Desoto Beach, observations and acoustic recordings of two highly social groups which were likely mating, and identifying 181 different dolphins over the summer. Eckerd College's Natural Sciences Summer Research Program funded the field work this summer.

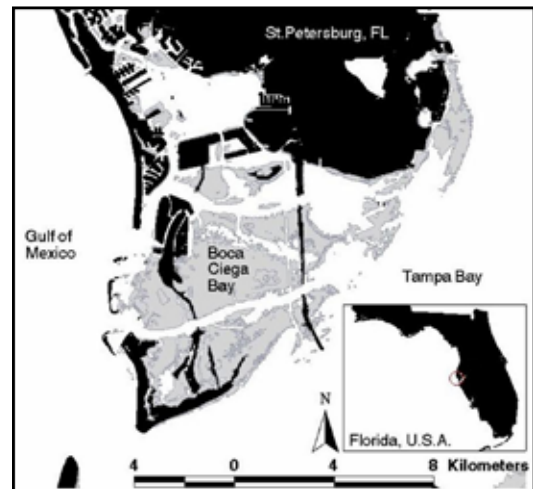


Figure 1: Boca Ciega Bay Map.



Figure 2: FB68 ("Manatee Man") sighted by the ECDP just before his death from fishing gear interactions.

ECOLOGY, POPULATION STRUCTURE AND DYNAMICS

Autonomous acoustic recordings of dolphins on the West Florida Shelf: Preliminary results and current research

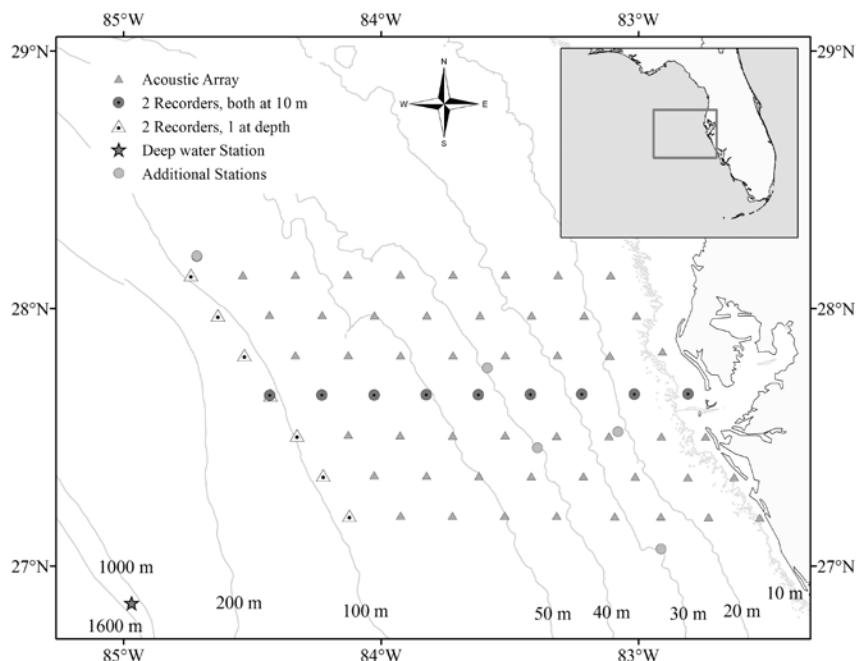
By Peter Simard, PhD Student, Carrie Wall, MS, PhD Student, and David Mann, PhD, University of South Florida

In 2008, a small array of prototype autonomous acoustic recorders was deployed in the Gulf of Mexico offshore between Sarasota and Tampa Bay in 5 to 30 m depth. Nineteen of these recorders, developed by researchers and engineers at the University of South Florida, collected acoustic recordings for approximately three months. Fifteen recorders were recovered in late 2008 (four were lost), each containing hundreds of hours of recordings. One long-term goal of this research is to identify species through differences in frequency content of echolocation clicks, and peak frequency and bandwidth (among other parameters) of whistles. Through our own visual surveys and previous studies, we know that bottlenose dolphins and, to a lesser degree, Atlantic spotted dolphins are common in the area, and other cetacean species are very rare. Therefore, the results presented here are likely for both of these common species combined.

Preliminary analyses have been conducted for five recorders. Three recorders were located to the north of Tampa Bay; two were located south of Sarasota Bay. There was no significant relationship between whistles in the recordings and time of day. However, echolocation occurred significantly more often in daylight hours, suggesting that foraging in offshore areas tends to occur during the day. One potential explanation is that dolphins generally rest and socialize at night. Alternatively, many fish are more acoustically active at night, and passive listening may be used as a foraging technique by these dolphins at night, reducing the need for echolocation. Spatial patterns were also identified. Both echolocation and whistles were recorded more frequently by two recorders north of Tampa Bay than by the two recorders south of Sarasota Bay. In shallower water (~15m), whistles made up a lower proportion of recorded sounds than echolocation (< 25%

of recordings were whistles). However, in deeper water (~30m), whistles were far more common (40% - 100% of recordings were whistles).

Since the initial 2008 deployment, a new generation of acoustic recorders were designed and constructed, and over 80 recorders at over 60 locations on the West Florida Shelf were deployed in June 2009. This array, the largest civilian hydrophone array in the world, extends from Tarpon Springs to Charlotte Harbor in near shore waters to the shelf break (~100m, with an additional station in 1500m depth), and will operate for a full year. With the development of automatic detection algorithms, we will soon be able to analyze the full data set from this deployment as well as the 2008 deployment, allowing a complete analysis of the spatial and temporal patterns of dolphin distribution based on sound production. Visual survey data conducted in the study area will also be used to determine distribution patterns, and photographic identification data will be compared with the Chicago Zoological Society Dolphin Research and Conservation Institute catalog of Sarasota Bay dolphins to determine the distribution and habitat use of specific individuals. A goal is to explain these patterns in the context of oceanographic fronts identified from satellite ocean color data coupled with 3-dimensional physical oceanographic models. Understanding dolphin distribution on a large spatial and temporal scale in relation to easily identified oceanographic features will have a large impact on dolphin conservation on the West Florida Shelf. This is particularly important given the recent interest in petrochemical exploration in these waters. Funding for this project was provided by the National Oceanographic Partnership Program. Peter Simard conducted this work as part of his dissertation research; R. Wells serves on his graduate committee.



DEVO hydrophone array deployed in June 2009.

ECOLOGY, POPULATION STRUCTURE AND DYNAMICS

Characterizing the bottlenose dolphin community near the Sapelo Island National Estuarine Research Reserve and comparison with a community in an adjacent polluted site near Brunswick, Georgia

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

Extremely high concentrations of persistent organochlorine contaminants (POCs or POPs) have been measured in bottlenose dolphins from the Georgia coast, particularly in dolphins sampled from the Turtle/Brunswick River Estuary (TBRE) in Glynn County, Georgia. Potential sources for the contamination include four National Priority List sites located in Brunswick, Georgia. The high contaminant levels have raised concerns for the health of this protected species in this region and have prompted questions as to the movement of the POCs through the food web and adjacent estuaries. Dolphins sampled over 40 km northeast of the Brunswick area in the Sapelo Island National Estuarine Research Reserve (SINERR) were found to have POC concentrations that exceeded levels previously measured from any other area of the U.S. coast. While the measures of dolphin contaminant concentrations will provide important information on bioavailable contaminants in the food web, understanding site fidelity and movement patterns of dolphins between the two areas is critical for accurate interpretation of data.

Therefore, in February 2008 a photo-identification study was initiated to characterize the bottlenose dolphin communities near SINERR and within TBRE. The objectives of the photo-identification study were to estimate dolphin abundance, identify site fidelity indices for individual dolphins in each area, quantify movements between locales, and classify habitat utilization at each site. Photo-identification surveys were conducted each season during 2008 and 2009. Preliminary abundance estimates in 2008 were highest in both SINERR and TBRE during spring and summer and lowest in fall and winter. Individuals sighted in spring and summer also had lower site fidelity indices than other seasons. These preliminary results may suggest overlapping stocks (coastal and estuarine) of bottlenose dolphins in both regions.

In addition to the photo-identification study, a capture-release health assessment of bottlenose dolphins was conducted

in August 2009 to examine potential health impacts from POC exposures. Aside from assessing health endpoints, an objective of this project was to identify fine scale movement patterns of individual dolphins to allow for correlation of measured POC concentrations with potential exposure sources. With the help of DRCI staff, 28 dolphins were tagged with small VHF radio transmitters. The 28 radio-tagged dolphins were monitored daily through vessel-based tracking for the transmission duration of the radio tags. Vessel-based tracking is effective in obtaining single locations for individual animals daily. However, this technique is labor intensive, the geographic range of tracking coverage is limited, and it is logistically infeasible to perform 24 hours a day. Fourteen experimental remote receivers were positioned along 90 kilometers of coastline in the area to offset the limitations of vessel-based tracking. The benefits of these receivers included: increased number of daily locations, the ability to alert the field team to animals' locations based on real-time notifications, and an extended geographic tracking coverage.

Three radio-tagged individuals were also instrumented with prototype, satellite-linked transmitters. The goals of this new design were to maximize transmission duration while minimizing long-term effects on the tagged animal. Each satellite-linked tag transmitted location data for over 58 days. The single-pin attachment coupled with relatively small (40g) tags resulted in minimal long-term impacts on tagged individuals. The use of these new and innovative tools in conjunction with conventional radio tracking techniques increases our ability to assess fine scale spatial distribution of marine mammals.

This research would not be possible without the commitment of Brian Balmer's time by the Chicago Zoological Society, and funding from NOAA Fisheries and the Georgia Department of Natural Resources.



Radio-tagged dolphin (Z16) travelling past Front River remote receiver.

ECOLOGY, POPULATION STRUCTURE AND DYNAMICS

Stable isotope values as indicators of bottlenose dolphin foraging habits

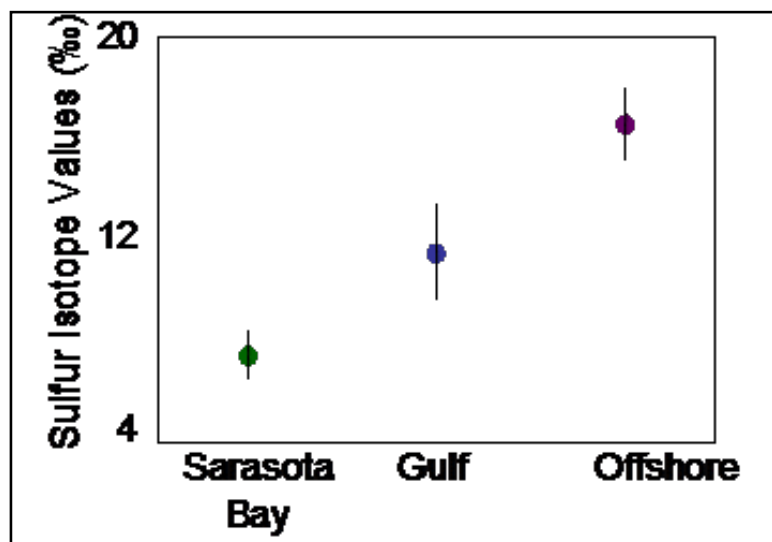
By Peggy Ostrom PhD, Michigan State University, Nélio Barros PhD, Mote Marine Laboratory and Portland State University, Craig Stricker, PhD, USGS, Sam Rossman, PhD student, Michigan State University, and Randall Wells, PhD

Stable isotope analysis offers a means to explore the foraging habits (foraging location and trophic level) of bottlenose dolphins that compliments other methods used by the Chicago Zoological Society's Dolphin Research and Conservation Institute (DRCI). Stable isotopes act as natural tracers that allow us to understand the origin of organisms and materials in the environment. Different reservoirs of carbon and sulfur have unique isotope ratios and these are transferred to and permeate through the food web. For example, primary producers (e.g. seagrass and phytoplankton) have unique stable carbon isotope values. This enables us to distinguish dolphins that depend on seagrass habitats from those that rely on a phytoplankton based food web. We have been able to quantify the amount of carbon that individual dolphins derive from seagrass. Thus, these data allow us to link observational data on habitat use collected by the DRCI directly to foraging. Terrestrial and marine sulfur isotope values differ, allowing us to differentiate between near shore and offshore organisms. Nitrogen isotope values increase by a very specific amount with each trophic level in the food web and enable us to ask questions about trophic level variation. For example, as part of a marine mammal commission grant we are interested to know if trophic level changes in response to the 1995 net fishing ban or extreme red tide events such as the one that occurred in 2005.

Using stable isotope values, we hope to make several unique contributions to understanding the ecology of bottlenose dolphins. Because it is often difficult to determine the origin of stranded individuals, we investigated the ability of stable isotopes to distinguish individuals from three different population units: Sarasota Bay, the nearshore Gulf of Mexico (Gulf) and offshore Gulf of Mexico. While dolphins from Sarasota Bay were of known history, those from the Gulf and offshore were of unknown history. Sulfur isotope data on tooth collagen differentiate the three groups. Because teeth are readily available from carcasses, this approach

will be helpful for determining the origin of stranded individuals in west central Florida, and this would be a particularly important contribution to understanding unusual mortality events or in identifying the origin of museum species used for retrospective analysis.

This year, Sam Rossman, has joined our team as a PhD student from the Department of Zoology, Michigan State University. Prior to starting his PhD, Sam had already won several awards that supported his work on bottlenose dolphins (e.g., Department of Zoology, Hensley Endowed Fellowship). As part of his project, Sam will be investigating annuli from Sarasota Bay dolphin teeth to look at changes in foraging habits over the lifetime of an individual. The hope is that nitrogen isotope values will assist in defining time of weaning. Because nursing offspring essentially feed at a higher trophic level than their mother, time of weaning will be indicated when $\delta^{15}\text{N}$ values reach post-weaning baseline. Although calves exhibit signs of foraging within a few months after birth, they typically associate with their mother for three to six years. We do not know when weaning ceases and the extent to which the calf is nutritionally dependent on its mother. Thus, this approach will offer new insights into mother-calf relationships. The percent contribution of mother's milk to calf diet can be quantified using a mixing model with the $\delta^{15}\text{N}$ of the first annuli as the nursing endmember and that of the baseline as the post-weaning endmember. Ultimately, we would like to know if there is a relationship between mother's age and nutritional investment in a calf and if some calves assimilate more milk than others. This will be the first time that stable isotope analysis will be applied to individual annuli of bottlenose dolphin teeth. Because all individuals in a population are not equivalent in their foraging behavior, and foraging behavior may contribute to survivorship, we hope these data contribute to the understanding of the population viability of Sarasota Bay bottlenose dolphins.



Sulfur isotope values of teeth from bottlenose dolphins from Sarasota Bay, the nearshore Gulf of Mexico (Gulf) and the offshore Gulf of Mexico (Offshore).

Prey selection by resident bottlenose dolphins

By Elizabeth Berens McCabe, MS

Understanding how organisms interact, such as in predator-prey systems, is central to the study of animal ecology. In 2004, we initiated a multispecies fish monitoring survey to measure fish abundance, distribution, and species composition in Sarasota Bay using a small purse seine. This work has allowed us to investigate bottlenose dolphin foraging ecology and their role as predators in the ecosystem. Bottlenose dolphins of Sarasota Bay tend to be exclusively piscivorous, foraging alone and feeding on individual fish rather than schools of fish, and they commonly consume prey associated with seagrass habitat. It has been hypothesized that coastal bottlenose dolphins use passive listening to locate noise-producing (i.e., soniferous) prey, however this has never been tested. The purpose of this study was to quantify prey selection for wild, resident bottlenose dolphins in the Sarasota Bay region. This study represents the first attempt to analyze prey selection using the stomach contents of individual cetaceans with known home ranges combined with a robust assessment of the structure of the fish community.

We compared the relative abundances of prey available to estimates of prey use at closely matching spatial and temporal scales. Stomach content analyses by Nélío Barros of 15 dolphins from 1996 to 2006 with extensive sighting histories and well-documented distributions were used to determine prey use. Prey availability in the study area was assessed by a concurrent purse seine survey of the fish community. In total from all five habitats, 477 purse-seine sets were made during the summer months of 2004 through 2007. In total, 208,762 individual fishes, comprising 56 families and 120 species, were documented. We tested for prey selection using three approaches: (1) G-tests, (2) Manly's index of standardized forage ratios, and (3) Bonferroni simultaneous confidence intervals. Prey selection was determined at the species and family levels, and for soniferous (i.e., noise-making) versus non-soniferous species. While comprising only 6.3% of the total available prey, soniferous fishes accounted for 51.9% of the total prey consumed. G-tests determined that dolphins in this study significantly selected for prey at the species, family, and soniferous/non-soniferous prey levels. Manly's standardized forage ratios and 95% Bonferroni confidence intervals determined significant positive selection for soniferous prey and significant negative selection against non-soniferous prey. Dolphins selected against several fish families, including Gerridae, Clupeidae, and Sparidae, as well as against all the species within those families.

These data indicate that at the population level resident bottlenose dolphins of Sarasota Bay select soniferous prey. These results lend further support to the hypothesis that bottlenose dolphins use passive listening to locate sound-producing fishes. Passive listening may increase the capture efficiencies of energetically rich prey, as many soniferous fish species increase the frequency and intensity of calls during spawning periods. In addition, this study shows that resident coastal dolphins in Sarasota Bay, on the west coast of Florida, are selective feeders and should not be considered an opportunistic predator. This may be true for coastal bottlenose dolphins throughout the Southeastern United States, in areas with similar habitats and fish communities (i.e.,



F159 tossing a pompano in January 2009

soniferous fishes). Most importantly, prey use by bottlenose dolphins does not necessarily reflect their feeding preferences. Species commonly seen in the diet, such as pinfish, were not selected in proportion to their availability. Likewise, mullet, and mojarras (Gerreidae) are often considered to be important prey, however, our analysis provides no evidence for their selection. The species that were selected by the dolphins in this study occupy a variety of estuarine habitats including seagrass beds, mangrove fringes, sandflats, and the deeper waters of the open bay. Selection data for many of the prey types in this study were associated with high standard errors. These likely resulted from the low sample size of dolphin stomachs analyzed and perhaps from individual variation in feeding strategies and habitat selection. The extent to which individual prey selection in dolphins occurs is unknown, however it is possible that detection and capture of certain species, such as those associated with structures (e.g., gulf toadfish), require learning and experience, and therefore only a subset of the resident dolphins might be able to exploit such prey resources successfully. Future work on variation in prey selection related to season, demography, reproductive condition, and genetic matriline is needed.

While bottlenose dolphins are federally protected from all forms of harassment, capture, and harvest, various threats still exist. Habitat degradation, overfishing, and harmful algal blooms (i.e., red tide *Karenia brevis*) may deplete the abundance of soniferous fishes. Anthropogenic noise, such as that caused by power boats, marine construction or demolition, may mask soniferous fish calls and under extreme circumstances could damage dolphin hearing. Each of these threats has the potential to limit the ability of dolphins to locate their preferred prey through passive listening, which may increase the energetic costs of foraging.

This work would not be possible without the help of many dedicated interns and volunteers who have donated their time and effort to this project. We would like to thank NOAA's Fisheries Service for the primary funding for this project. Harbor Branch Oceanographic Institution's Protect Wild Dolphins Program and Florida's State Wildlife Grants Program provided additional funding.

ECOLOGY, POPULATION STRUCTURE AND DYNAMICS

Sarasota dolphins: Now with 50% more HAB!

By Spencer Fire, PhD,
NOAA Marine Biotoxins Program

Harmful algal blooms (HABs) and their associated toxins are the most common cause of marine mammal unusual mortality events (UMEs) in U.S. coastal waters, especially in the Gulf of Mexico. More UMEs occur in this region than in any other region of the U.S. HABs such as Florida's well-known *Karenia brevis* red tides can produce large amounts of brevetoxins which compromise bottlenose dolphin health and contaminate their food webs. Although it is clear that *K. brevis* blooms and brevetoxins have negative impacts on these animals, it is becoming apparent that HABs formed by other marine algae also affect Florida dolphin populations. *Pseudo-nitzschia* spp. is a group of marine algae that produce the neurotoxin domoic acid and has caused several Pacific coast UMEs, but has not been a concern in Florida waters until recently. During the May 2008 Sarasota dolphin health assessment, a novel bloom of *Pseudo-nitzschia* was reported, and domoic acid was detected in the majority of dolphins sampled and in five species of prey fish. During the May 2009 health assessment, domoic acid was again detected in dolphins and prey fish, however, no *Pseudo-nitzschia* bloom had been reported since the previous year. Analysis of archived DRCI dolphin health assessment samples has detected the presence of both toxins in live dolphins dating back to 2000. Although the levels detected are very low in comparison to UME levels, the effects of long-term exposure to multiple HAB toxins are unknown. We thank DRCI staff and associates for their continued enthusiastic support of our research efforts.



Spencer Fire, now working with NOAA, returns to the site of his academic roots, collecting water samples to look for organisms associated with harmful algal blooms.

Genetic susceptibility to red tides

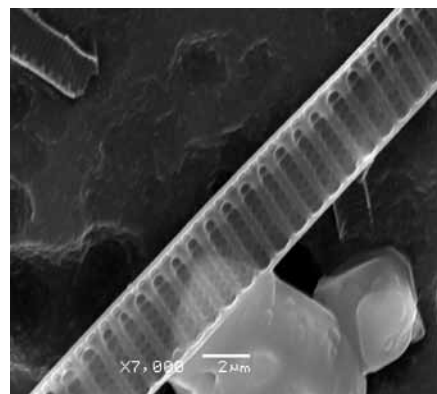
By Kristina Cammen, PhD student, Duke University

Red tides, which are a common occurrence in the Gulf of Mexico, can have drastic negative impacts on many marine species. In the past decade, four Unusual Mortality Events (UMEs) of bottlenose dolphins have been attributed to *Karenia brevis*, the red tide algal species that produces neurotoxic brevetoxins. Three of the UMEs occurred in the Florida Panhandle in 1999-2000, 2004, and 2005-2006 resulting in a total of over 300 dolphin mortalities. One UME occurred in central-west Florida in 2005-2006, killing at least 79 dolphins. Bottlenose dolphins from these two regions appear to differ significantly in their susceptibility to red tides. Central-west Florida experiences red tides almost annually, but only one dolphin UME has occurred. In contrast, only a few red tides have been reported in the Panhandle, and these red tides often result in dolphin mortalities. We are currently investigating the hypothesis that this difference in susceptibility is due to genetic differences between populations.

Historical exposure to red tides could have resulted in differential selection at certain genes related to brevetoxins. Adaptation to a common threat can result in resistance in an exposed population and susceptibility in a naïve population. Specifically, we are evaluating genetic variation at detoxification enzymes such as cytochrome P450 and glutathione, as well as immune system genes such as the MHC. Additionally, we are studying genes that code for the voltage-gated sodium channel in neurons, the primary target for brevetoxins.

We plan to compare genetic variation at these genes among dolphins from the Panhandle and Sarasota Bay. Samples from live healthy animals, collected during health assessment capture-release operations, will be compared to samples collected and archived from dead animals that stranded during red tides. We hope to identify genetic variation that is found more commonly in either live or dead animals and associate this variation with susceptibility to red tides. We can then evaluate if the Panhandle population contains more individuals with genes associated with susceptibility. Additionally, we may be able to apply these concepts to other dolphin populations in the Gulf of Mexico to determine which populations are more likely to experience mortality events in the future when red tides occur.

Our research is supported by funding from the Duke University Marine Lab, and samples were provided by DRCI and NMFS SEFSC Marine Mammal Molecular Genetics Laboratory.



SEM image of a *Pseudo-nitzschia* frustule.
Photo Credit: Steve Morton (NOAA Marine Biotoxins Program).

ECOLOGY, POPULATION STRUCTURE AND DYNAMICS

Status of fish populations in Sarasota Bay post-red-tide

By Elizabeth Berens McCabe, MS

Since 2004 we have been measuring fish abundance, distribution, and species composition in Sarasota Bay. We regularly catch, measure, count, and release fish from June-September and January-March using our 183 m purse seine sampling gear. This work has allowed us to investigate fine-scale habitat selection and prey selection in bottlenose dolphins. In addition, we have been able to look at the effects of red tide on the estuarine fish community due to a severe and prolonged red tide event that occurred in 2005 and another severe but shorter red tide event in 2006.

Red tides are familiar to many Florida residents, including their impacts on the economy, wildlife, and human health. Red tides are a type of harmful algal bloom caused by the dinoflagellate *Karenia brevis*. This naturally occurring alga produces brevetoxin, a lethal neurotoxin which affects the respiratory system of vertebrates, including fish, manatees, turtles, dolphins, and seabirds. Severe red tides often result in extensive fish kills, and they can cause manatee, turtle, dolphin, and seabird mortality. Fish are exposed to brevetoxins by inhalation through their gills or by consuming food containing the toxin. For dolphins, exposure likely occurs through food consumption, however, strong indirect effects may include dramatic drops in prey abundance and/or shifts in species composition. Recently, brevetoxin has been demonstrated to accumulate in tissues of living specimens and has been detected in fish tissues more than a year following a red tide bloom.

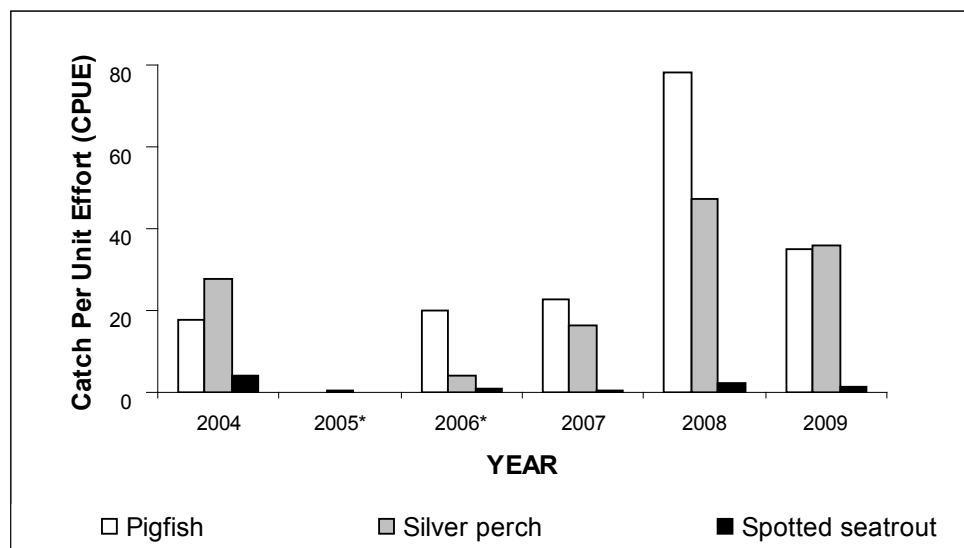
Since 1983, red tides have occurred along the west coast of Florida approximately every 3 years, with varying degrees of severity and longevity. Considering the frequency of red tides in the Sarasota Bay region, an important finding of our work is the speed at which the fish community apparently recovers from red tide disturbance. Analysis of our data from 2004-2007 showed that fish abundance and species richness in Sarasota Bay was significantly lower in all habitats during red tide periods (2005 and 2006) compared to non-red tide periods. Following the declines in fish abundance during the 2005 red tide, abundance in the seagrass habitat rebounded in 2006 (prior to the 2006 red tide, which began on August 10). Our highest fish densities in the seagrass habitat were recorded in summer 2008, after nearly a two-year absence of red tide. Statistical analysis did not detect significant annual differences in catch per unit effort (i.e. the number

of fish caught per net set, CPUE), except in 2005 where fish CPUE was significantly different from any other year. At the species level, many CPUEs were significantly lower in red tide periods compared to non-red tide periods, including the CPUEs of such important dolphin prey as pigfish, spotted seatrout, and silver perch. After the 2005 and 2006 red tides, catches of most species rebounded by 2008, however recovery varied by species (see chart). For example, post-red tide CPUE of pigfish was similar to or exceeded pre-red tide levels by 2006, i.e., CPUE did not significantly differ between 2004 and 2006. Spotted seatrout and silver perch did not reach levels similar to or exceeding pre-red tide abundances until 2008, i.e., CPUEs did not significantly differ between 2004 and 2008.

To date, we have completed 979 purse seine sets in 5 distinct habitats. We have sampled 132 different species and 382,562 individual fish. This past summer we again focused on the seagrass habitat because it is considered one of the most productive habitats in our study area. We completed 40 purse seine sets which were comprised of 59 different species and 22,645 individual fish. We averaged 566 fish and 16 species per set. Shannon-Weaver diversity indices measure biodiversity, taking both species richness (the number of species present) and evenness (how evenly individuals are distributed among the species present) into account. This summer, the Shannon-Weaver diversity index was calculated to be 1.91, nearly identical to last summer's high of 1.92.

While fish abundance in Sarasota Bay appears to have recovered from the severe red tide events in 2005 and 2006, important questions remain to be answered regarding (1) the importance of temporal and spatial scales of red tide blooms to the fish community's response, (2) the fitness consequences of red tide to individual fishes, (3) differences among species regarding their responses to red tide, and (4) economic and resource-management implications of red tide to fisheries. We hope to answer these questions in the future.

We thank the many interns and volunteers who worked on this project. This work would not be possible without them. NOAA's Fisheries Service, Harbor Branch Oceanographic Institution's Protect Wild Dolphins Program, and Florida's Fish and Wildlife Research Institute provided funding for this work.



Catch per unit effort (CPUE) of select dolphin prey species caught during the summer months in seagrass habitat from 2004-2009 in Sarasota Bay, Florida (*year in which a red tide occurred).

DOLPHIN RESCUES, RELEASES, AND FOLLOW-UP MONITORING

Rescue, rehab and follow-up monitoring of Ginger

By Aaron Barleycorn, BS

On 16 December 2008, a well known 3-year-old dolphin stranded on the north end of Siesta Beach. She was the newly independent first calf of the Sarasota resident dolphin F127. When she was brought into Mote for rehab, she was nicknamed “Ginger” (short for gingerbread) because she stranded so close to the holidays. Ginger was treated for pneumonia and dehydration, both of which are often problems caused when dolphins strand. While in rehab, she was fed nearly 4,000 live pinfish, a common prey species for Sarasota dolphins. Live, local fish were used in order to help Ginger have a more smooth transition back into the wild. Every effort was made for the fish to be provided to her without humans in sight, to keep Ginger from associating humans with food.

After two months of rehabilitation, Ginger was deemed healthy and ready for return to the wild. On 9 February she was released back into Sarasota Bay in front of a large crowd of well-wishers. She even wowed the crowd with a few leaps soon after release, an excellent sign that she had the strength to survive. She was outfitted with a small VHF radio tag so DRCI researchers could monitor her closely for the next few months.



Mote's High School Alumni Program students help with post-release radio tracking of Ginger, March 2009.

During follow-up monitoring, Ginger's respirations, body condition, associates, behavior, and location were recorded as well as a suite of environmental information. She was tracked nearly every day until the radio tag stopped transmitting on 9 April; during that time she was observed behaving normally. She was seen feeding several times and was even occasionally in groups with her mother and her mother's new calf. Since the end of radio tracking, Ginger has continued to be seen during regular surveys of Sarasota Bay. Her range appears to be increasing, and she has been observed interacting with other juvenile dolphins. Overall, Ginger has been seen 49 times since her release, most recently on 4 November. Ginger seems to be adapting quite well to her life in Sarasota Bay and will hopefully continue to be a member of the dolphin community for decades to come.

Follow-up on recent rescues: FB28 and Scrappy

By Aaron Barleycorn, BS

The Dolphin Research and Conservation Institute has participated in rescues of several injured dolphins in its history. We specifically target cases where animals are injured by humans. Two recent success stories of Sarasota resident dolphins rescued from human impacts are Scrappy and FB28. Both were “treated” in the wild and have been closely monitored since their rescues.

On 6 July 2006, Scrappy, an 8-year-old male, was observed entangled in a large men's Speedo bathing suit. His head had gone through the waist and one of the leg holes, and the suit had worked its way back to the leading edge of his pectoral fins, where it was cutting deeply through the skin. Scrappy was temporarily captured on 3 August 2006, the bathing suit was removed, he was treated by a veterinarian, and then released on site. Since his release, he has been seen 82 times, appropriately nude, most recently on 3 December 2009.



Scrappy's most recent sighting on December 3rd, 2009. He was seen traveling and socializing with other young male Sarasota resident dolphins.

On 22 June 2007, FB28, a 42-year-old male dolphin, was seen entangled with monofilament fishing line. The line was tightly wrapped three times from the dorsal fin to the fluke. On 6 July 2007, a DRCI rescue team was able to approach FB28 with a long handled cutting tool and cut the line from around the dorsal fin. The team was not able to clear all the line from the fluke, but at least the tension had been released. The line has since completely cleared from his fluke on its own. Since his initial disentanglement, FB28 has been seen 39 times. On some of those occasions, he was seen “fish-whacking,” a foraging strategy involving striking a fish with a quick movement of the fluke, an excellent sign that his fluke has not suffered lasting damage. FB28 was most recently seen on 2 October 2009. FB28 is one of two remaining dolphins tagged initially during the 1970-1971 pilot dolphin tagging project that led to the creation of the long-term research program in Sarasota Bay. He suffers from lacaziosis and is a major subject of the dissertation research of Leslie Burdett (see article in this issue).



FB28's most recent sighting on October 2nd, 2009. He was observed by himself in Terra Ceia Bay.

DOLPHIN RESCUES, RELEASES, AND FOLLOW-UP MONITORING

Manatee rescues

By Jason Allen, BS

This July, I helped the Florida Fish and Wildlife Conservation Commission (FWC) with two rescues of individual manatees that had been injured by motor boats. The first was on 10 July in Terra Ceia Bay, near the town of Palmetto and was much more of an ‘event’. By the time our small net boat had followed the injured manatee (later named “Lil’ Cuts”) out of the canal system where she was first observed and into the grass flats, we had drawn a great deal of media attention. Three other boats had news crews as passengers and two helicopters had begun to circle overhead! Though injured, Lil’ Cuts still had a lot of fight in her, kicking her powerful tail paddle back and forth (see photos). At one point, a couple of us even ended up in the water!

The second rescue was four days later in the canals and inland waterways at the north end of Pine Island in Charlotte Harbor. This animal (a male named “Bolee”) was much easier to handle and was quickly put onto the boat and taken back to the transport truck. Both Bolee and Lil’ Cuts were taken to the Lowry Park Zoo for rehabilitation. Lil’ Cuts was released back into Terra Ceia Bay on 8 September and has not been sighted since (though is presumed in good shape). Bolee is still undergoing rehabilitation, but will be released near his rescue site as soon as possible.



Jason Allen (white t-shirt) attempts to maintain his balance during the rescue of Lil’ Cuts. Photo Credit: Sarasota Herald Tribune/Thomas Bender.



Secured on the boat, Lil’ Cuts begins the trip to the hospital. Photo Credit: Sarasota Herald Tribune/Thomas Bender.

INVOLVEMENT IN OTHER MARINE MAMMAL CONSERVATION AND RESEARCH ACTIVITIES

Dolphin tag development

By Michael Scott, PhD, InterAmerican Tropical Tuna Commission

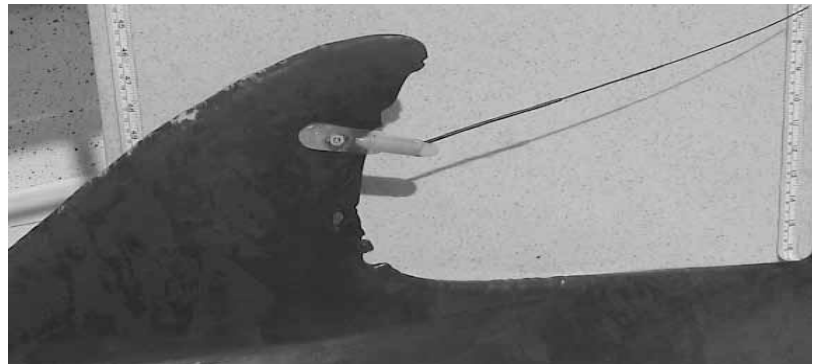
For almost 40 years the heart of the Dolphin Research and Conservation Institute's success in Sarasota has been the ability to identify individual dolphins and follow them as they engage in their daily behaviors. We have done this primarily by tagging and tracking dolphins. In 1970, we began attaching visual tags to tell them apart, and then in 1974 we began attaching radio transmitters to monitor their movements. Because of our ability to capture, tag, and safely release dolphins and because of our year-round surveys that allow us to monitor the fates of tags, Sarasota has proved to be the testing place for tagging methods and designs that are used in studies around the world.

When we first started, the radio transmitters available at the time were large, operated in the Citizen's Band range, and were attached to homemade saddles made of fiberglass thick enough to stand up to rough treatment by the dolphins. Over the years, transmitters became smaller and more sophisticated. In the early 1990's we developed the "roto-radio," a small VHF transmitter that was attached to a small cattle ear tag ("roto tag"). As tag size decreased, our attachment methods increased in sophistication as well. A long-time veterinarian associated with the project, Forrest Townsend, got to wondering how to improve the design of the radio packages we were attaching and began working with an expert in human prosthetics, Frank Deckert. Together they formed a company named Trac Pac and developed tags that were more hydrodynamic, had a more precise fit, and used materials adapted from the human prosthetics field to reduce the risk of injury to the dolphins. One Trac Pac product was the "bullet tag" which improved upon the roto-radio by placing the VHF transmitter in

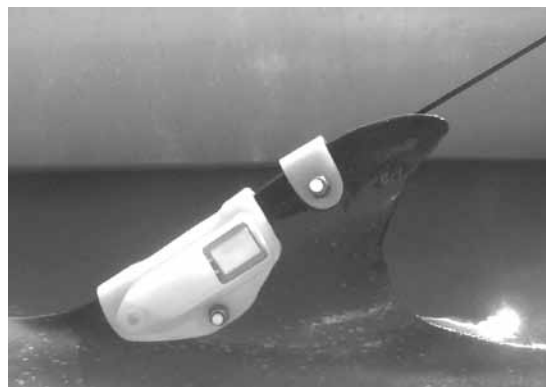
a prosthetic plastic housing. This is current the standard tag configuration for dolphin radio-tracking.

Despite the advances in tag design, we still are searching for methods that reliably allow tag attachments of several months or a year, yet have a very low risk of damage to the dorsal fin and the dolphin. Two recent workshops were convened to discuss ways to do this; one organized by the DRCI and sponsored by the Marine Mammal Commission, held in Sarasota in 2003 and another organized by the Office of Naval Research (ONR) held in Washington, D.C. in 2009. It was recognized at both of these workshops the importance of monitoring the status of the tags and the tagged dolphin in the weeks following release of the animal.

Funding has now become available from the ONR to develop and test new tag designs and the Dolphin Research and Conservation Institute has prepared a proposal in conjunction with colleagues at the University of North Carolina, Wilmington, and BelleQuant Engineering to examine the hydrodynamics of small satellite-linked radio tags, examine the practicality of a single-pin attachment to the rear edge of the dorsal fin, and to monitor the tagged dolphins afterwards. Sarasota is uniquely suited for such a study, given the long history in tag research and design, the capability to capture bottlenose dolphins to apply the tags, the year-round surveys that would allow the monitoring of tagged individuals, and the capability to recapture animals to remove any tags that appear to be failing or showing potential for fin damage.



Radio packages have gotten smaller over the decades. The Bicentennial Special (left) was put on a Sarasota Bay bottlenose dolphin for tracking her movements in 1976, while the much smaller "bullet tag" (right) accomplished the same thing 25 years later.



Radio transmitters are now used in combination with data loggers to collect more data than just movements. This package contains a radio transmitter (starboard side) and a datalogger (port side) that records the time and the depth of this spotted dolphin every second.

INVOLVEMENT IN OTHER MARINE MAMMAL CONSERVATION AND RESEARCH ACTIVITIES

Franciscana dolphin conservation program in Argentina: Efforts to reduce incidental captures in gillnets

By Pablo Bordino, MS, Fundacion Aquamarina and the Chicago Zoological Society

Several decades ago a number of artisanal fisheries in Argentina, Uruguay and Brazil began to use nylon gillnets. Since their introduction, incidental mortalities of Franciscana dolphins *Pontoporia blainvillei* have been recorded. Such incidental captures represent the greatest threat to the survival of this endemic dolphin, which is currently considered the most threatened cetacean species in the South Western Atlantic. As gillnet fisheries will continue to operate in areas inhabited by Franciscana dolphins, methods to reduce their incidental capture are urgently needed.

Since 2004, the DRCI has been collaborating with AquaMarina-CECIM to strengthen and develop new pragmatic approaches for the conservation of this species in Argentina. To date we have focused our effort on achieving two strongly linked main goals: a) to assess the movement, diving and social behaviour of the species, and b) to reduce the bycatch of dolphins in coastal gillnets.

By using satellite-linked tags we have obtained information on how these animals use the water column and specific features in their habitat, and we are now able to investigate the overlap between the home ranges of individual animals and those areas where there are high levels of fishing effort. This information will aid us in identifying ways in which interactions between dolphins and the artisanal fishery may be minimized. In addition, discussions with local artisanal fishermen may lead to the identification of alternative methods of fishing that would have a lower probability of entangling dolphins.

The potential of using gillnets modified with barium sulphate to reduce cetacean bycatch rates was recently investigated in Canada. The results of this field trial indicated that the modified nets could have considerable promise for mitigating the incidental mortality of the North West Atlantic harbor porpoise *Phocoena phocoena* in gillnet fisheries. Barium sulphate nets, also known as “reflective nets”, have been designed to have a greater target strength; this means that echolocating dolphins and porpoises should be able to detect these nets at greater distances than they would a standard nylon gillnet. In addition, they are stiffer than a normal net, and this may mean that the potential for animals to become entangled is lower.

However, it is clear that further investigation is needed, not only to assess the potential of these nets to mitigate the bycatch of other small cetaceans but also to try and understand the mechanism by which they reduce entanglement. For these reasons, two consecutive field trials have been conducted in Argentina to evaluate the effectiveness of reflective gillnets at reducing Franciscana dolphin bycatch, whilst maintaining fish catches. These studies were supported by Disney Wildlife Conservation Fund, WWF, CZS, Wildlife Trust and Pro Wildlife. The trials were conducted in Bahia Samborombon during January and February 2008, and November 2008 and

March 2009. The experiments were conducted in association with six artisanal fishermen. Analysis of the catch rates of the two main commercial species, striped weakfish *Cynoscion guatucupa*, and white croaker *Micropogonias furnieri* were similar for both the standard and reflective gillnet sets. A total of 26 and 15 dolphins were caught in standard and reflective gillnets, after 268 and 253 sets respectively. Therefore, the number of Franciscana dolphins incidentally entangled in reflective gillnets was approximately 50% of that observed in the standard nylon gillnets. However, multiple entanglements were recorded in both types of nets, and if the number of events rather than the number of entanglements is considered, then the overall bycatch rate is similar for both nets. As a result, it is now necessary to investigate whether such multiple entanglements can be treated as independent events prior to a final estimation of catch per unit effort for each net.

The six fishermen who participated in the field trial indicated that they were pleased with the performance of the reflective nets and would be interested in being involved in further field trials.

A new trial is currently underway with additional support from the Lenfest Ocean Program and the New England Aquarium. Our objective is to increase the number of observations of both types of nets and to evaluate potential variables such as multiple entanglements, in order to conduct more fine scale analyses.

If the results obtained from these trials were to indicate that reflective nets are effective at mitigating the bycatch of Franciscana dolphins, it will be useful to conduct experiments with these nets in other artisanal fisheries along the Argentinean coast where incidental mortalities of other small cetaceans have been recorded. These have included such species as Commerson's dolphin *Cephalorhynchus commersonii* and Burmeister's porpoise *Phocoena spinipinnis*. In addition, they may prove a practical mitigation strategy for other coastal fisheries around the world where reducing the accidental bycatch of cetaceans in gillnets remains a big challenge.



Multiple entanglement of Franciscana dolphins in Bahia Samborombon, Argentina.

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 patterns 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 addressing some of the environmental and ecological processes responsible for the observed genetic patterns in Franciscanas. The ultimate goal is to identify oceanographic drivers of population structure. This analysis uses cutting-edge genetic tools applied to a combination of nuclear and mitochondrial DNA, which allow an unparalleled level of accuracy in population identification and gene flow estimation. We developed a multidisciplinary framework combining genetic data with spatially explicit oceanographic information collected via remote sensing and in situ.

Our data combining mtDNA sequence and microsatellite information support the previous proposition of two Franciscana populations in Brazil, one along the Uruguayan coast, and suggest the existence of at least three previously unidentified populations in Argentina, to the south of the La Plata River estuary in Argentina. Individuals from the San Clemente and San Blas areas showed the highest levels of genetic isolation, which is in line with the suggested

residency patterns by Bordino and colleagues' data from satellite-linked tagging. Contrary to what is common for many cetacean species, Franciscana population structure does not show a pattern of isolation by distance, in which populations that are further apart are genetically more differentiated. Rather, our data shows a pattern of isolation by environmental distance, suggesting that ecological and environmental phenomena are responsible for the observed genetic patterns.

These genetic efforts are important elements of the current management strategies for Franciscanas, as they provide a reliable tool for the identification of demographically independent populations and population areas. Our multidisciplinary framework combining genetic and environmental data is providing a greater understanding of the ecology of this species and could potentially illuminate related issues in other coastal species.

This work would not be possible without the invaluable support of the entire AquaMarina staff and volunteers or without the collaboration of the local wildlife authorities. Funding for this project comes from Wildlife Trust, the Sackler Institute for Comparative Genomics at the AMNH, and the Ocean Giants Program at Wildlife Conservation Society.

Human-related problems affecting wild dolphin populations along the Pacific coast of Guatemala

By Ester Quintana-Rizzo, PhD,

Fundación Defensores de la Naturaleza, Guatemala and Universidad del Valle de Guatemala de Guatemala

Many cetacean species are found along coastal areas and thus are vulnerable to a variety of human activities. As part of a study examining the diversity, abundance, and distribution of coastal cetacean species along the Pacific coast of Guatemala, I have been able to identify two problems affecting small cetaceans' populations in the country: entanglement of dolphins in fishing nets and dolphin harpooning. Dolphins are harpooned to use their meat as shark bait. Interviews with fishermen indicate that the harpooning is a relatively common practice, which is used in two situations: 1) when fishermen do not have enough bait to catch sharks and 2) when sharks do not seem to like the non-dolphin bait provided by fishermen. Shark fishing, one of the main practices in some coastal towns, uses a technique called "cimbra", a pelagic longline that can be up to 10-15 km long and have a variable number of hooks. A cimbra can use a combination of bait. When only dolphin meat is used, this requires the killing of three dolphins. A cimbra that uses a combination of non-dolphin meat and dolphin meat requires killing one dolphin. Harpoons used to kill dolphins are long metal bars approximately 2 m long (see photo) with a detachable sharpened head. In 2005, 353 fishermen along approximately 255 km of coastline were registered to have at least one cimbra. It is estimated that approximately 468,735 pounds of sharks are caught annually.

Another problem faced by small cetaceans in Guatemala includes their incidental entanglement in fishing nets. In the spring of 2009, three dead dolphins were entangled in a ghost fishing net approximately 200 m long. According to the fisherman who works on the project, this type of net is used illegally to capture swordfish (*Istiophorus platypterus*) in offshore waters. The net probably floated with the currents close to shore as it was found at 3.5 nautical miles from the coast. Two of the dolphins, a male and a female, were in advanced stages of decomposition and were tentatively identified as bottlenose dolphins. Based on their size, they were probably adults. The third dolphin was a fresh carcass that probably got entangled

that day. A necropsy revealed that this dolphin was a juvenile female bottlenose dolphin in good health. A few days after the incident, a local fisherman reported to have seen at least 10 more dead dolphins in another location. Those animals were not entangled but were just floating in the water at approximately 10 miles from shore. The fisherman who saw them said that they were in an advanced stage of decomposition and thus, their identification was not possible. Since



Metal harpoon used to kill dolphins for shark bait along the Pacific coast of Guatemala (person is included for scale).

it is uncommon to see these high numbers of dead dolphins in an area, it seems likely that their death was human related. One fisherman reported that around 20 dolphins get entangled in his net on a monthly basis. Mortality rates due to entanglement or harpooning have not been quantified or even studied in the country. Thus, their effects on local cetacean populations are unknown, but these preliminary reports indicate that the problems are potentially serious and should be studied. The documentation of the problems can help to raise awareness because the government has not taken any actions to try to resolve them.

INVOLVEMENT IN OTHER MARINE MAMMAL CONSERVATION AND RESEARCH ACTIVITIES

In another development, I am pleased to report that our report “Primer estudio sobre la diversidad, distribución, y abundancia de cetáceos en la zona económica exclusiva del Océano Pacífico de Guatemala,” a first description of the diversity, abundance, and distribution of cetaceans along Guatemala’s Pacific coast, supported by a Chicago Board of Trade grant and based on data collected by NOAA, has now been distributed to all Guatemalan government agencies dealing with the protection and conservation of wildlife and marine resources. Copies of the report were also sent to the universities having Biology as a subject area and to conservation NGOs. The response to the report has been very positive. The main comment so far is that people are happy that the information is available and that the information is in Spanish. I received a letter from the National Commission of Protected Areas, which says that the information will be of great use to their agency.

Ecology and conservation of Guiana dolphins in the Colombian Caribbean Sea (2002-2010)

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

The Guiana dolphin is a small cetacean that is distributed along the Caribbean and Atlantic coastal waters of South America, from Nicaragua to southern Brazil. It inhabits estuarine shallow areas of bays and gulfs. Due to lack of information on its natural history, it is classified as Data Deficient by the IUCN. In Colombia, increasing anthropogenic pressure, especially in the coastal areas, has been putting many species and ecosystems at the limit of survival. In 2005 the Ministry of Environment and Territorial Development of Colombia decided to change the designation of the Guiana dolphin from Data Deficient to Vulnerable under the IUCN criteria. The main reason for the change of this species designation was the rapid and continued loss of suitable habitats for its long-term survival. This area of Colombia has been for over 30 years the most important area for permanent residency of Guiana dolphins. Unfortunately, this mangrove ecosystem, even being one of the most preserved of Colombia, has been going through drastic changes in the last decade or so. In order to better understand the status of this dolphin and its habitats in Colombia and to propose adequate conservation policies in the region, we were in need of basic knowledge about this species. Some of the questions we initially had when we started this project were: How many individuals are in the area? Where do they feed and breed? What are their residency patterns? What are the main threats for this species in the area and how can we mitigate them? Through the analysis of our results we aim to devise a possible way to preserve this species, in the context of a Colombian ecosystem with strong environmental and cultural conflicts. The main goal of this project is to advance knowledge of the ecology of Guiana dolphins in the southern area of 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. From November 2002 through September 2009, 254 boat-based habitat and sighting surveys were accomplished in the study area during the three climatic seasons: rainy, dry and semi-dry, covering approximately 8,300 km. Whenever dolphins were sighted, we collected environmental, photographic and behavioral data. If they were not sighted, environmental data were still collected at pre-determined stations.

We have learned many things about Guiana dolphin ecology through these years of research. We found, for example, that the

majority of the individuals are present year-round in the study area throughout the different climatic seasons. However, the dolphins’ usage of the area is not equal through the seasons. The social structure and size of the groups seem to be highly influenced by the distribution and abundance of their different types of prey. There are individuals that feed in the same “spots” the majority of the time, for example mother-calf pairs, while there are others that move more through the whole area. Likewise, not all the individuals are present all the time, as occurs in other Guiana dolphin study areas. Sometimes we don’t see the dolphins for weeks in the “common spots” where we usually sight them. We don’t know yet where they go. We reported in 2003 a decrease in the number of sightings in comparison with previous reports. Sightings decreased from 0.33 dolphins/km in 1994 to 0.18 dolphins/km in 2007. We reported as well a change in the distribution of the dolphin sightings. The dolphins were significantly less common in the zones closer to the river mouth. In 2001 a hydroelectric plant began operating in the upper waters of the river that gives this area its estuarine characteristics. We are currently exploring, with the help of data from other researchers, the possible impacts of this hydroelectric plant on the ecosystem and on the Guiana dolphins.

In contrast, during only two months of field work in 2009, we had almost half of the total number of the sightings that we have in all the previous years of our work! The possible reasons for this improvement are being investigated at the moment. We are also engaged in photo-identification, trying to determine the abundance of Guiana dolphins in the study area. Through the photo-identification process we have learned about the residence patterns of individuals, as well as the calving intervals of some females. In addition, we are currently working in conjunction with J.M. Avila, who studied this species in the same study area from 1993 to 1998. Also, in 2009, Dr. Carmen Bazúa-Durán from UNAM and Valeria Vergara from Vancouver Aquarium, volunteered to record the acoustic behavior of Guiana dolphins. Through this brief effort we learned about the high frequency nature of Guiana dolphin phonations. So, we know now that even though we cannot hear them, it seems that these dolphins are highly vocal while foraging and socializing.

We are going back to the field in 2010 while continuing with the analysis of the data. Once the analysis is finished, we aim to develop a Conservation Plan including a management plan and a monitoring plan for this species in the study area. With the support of the local community, we aim to present this Conservation Plan to the Ministry of Environment and Territorial Development of Colombia in 2011. We thank the following organizations for making this work possible over the years: Chicago Board of Trade Endangered Species Fund (USA), CVS (Colombia), SMRU University of St. Andrews (Scotland), Conservación Internacional (Colombia), Cetacean Society International (USA), Iniciativa de Especies Amenazadas “Programa de Becas Jorge Ignacio Hernández-Camacho”(Colombia) and private funds.



*Guiana dolphin in
estuarine waters
off Colombia.*

INVOLVEMENT IN OTHER MARINE MAMMAL CONSERVATION AND RESEARCH ACTIVITIES

Scientific representation on the Bottlenose Dolphin Take Reduction Team

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

The Bottlenose Dolphin Take Reduction Team (BDTRT) was established to limit the number of serious injuries and deaths of bottlenose dolphins along the east coast of the U.S. from incidental fishing practices. In 2002, the BDTRT submitted a report to the National Marine Fisheries Service with regulatory and non-regulatory recommendations for management of Western North Atlantic coastal bottlenose dolphins. The BDTRT has met several times since 2002 to review and discuss bottlenose dolphin stock structure in relation to fisheries interactions. In September 2009, I had the opportunity as Randy Wells' alternate to participate in the BDTRT meeting in Wilmington, North Carolina. The meeting consisted of approximately 40 participants including commercial fishermen, federal and state biologists, as well as researchers from academia and non-profit organizations.

The National Marine Fisheries Service (NMFS) has recently updated the Stock Assessment Report (SAR) for Western North Atlantic bottlenose dolphins, dividing the coastal and estuarine ecotypes into separate stocks. The primary goal of this year's BDTRT meeting was to identify the conservation measures necessary for the new stock divisions recently defined by NMFS. The meeting itself consisted of short presentations by various researchers, followed by round table discussions and small break-out groups for more in-depth consultation. After three days of meeting, several key points were clear:

- Data suggest multiple, resident estuarine bottlenose dolphin stocks from North Carolina to Florida.
- There is geographic overlap between coastal and estuarine stocks.
- Classifying an individual into a given stock requires a multi-faceted approach using photo-identification and genetic analyses; currently, if an individual dolphin is considered a fisheries' take, identifying the stock it is from is extremely difficult.

- Data suggest two estuarine stocks in North Carolina with relatively low abundance estimates; even a few fisheries' takes may result in exceeding potential biological removal (PBR) for the stocks.

- The majority of abundance estimates for Western North Atlantic bottlenose dolphin stocks are either out-of-date or non-existent. Mark-recapture, photo-identification studies are necessary to determine abundance for all newly defined estuarine stocks before any management recommendations can be identified.

For my first experience with a TRT, I was extremely impressed with the professionalism of all participating stakeholders. The issues being discussed affect the livelihoods of fishermen as well as the conservation of bottlenose dolphins along the east coast of the U.S. This meeting offered the opportunity for participants to be kept up to date on recent research in this field as well as express their own opinions on management decisions. The common theme that all participants repeatedly emphasized was the lack of data in understanding the population structure of bottlenose dolphins along the east coast of the U.S. This point illustrates how important the Sarasota Bay bottlenose dolphin community is to marine mammal research as a whole. It is easy to take for granted that the Sarasota Bay community has approximately 160 individuals, and over 96% of these individuals are seen on a regular basis. However, if not for the hard work of so many over the past 40 years, this would not be possible. Along the east coast of the U.S., there are regions where basic abundance estimates are still unknown; it makes you truly appreciate all of the research that has taken place in Sarasota Bay.

DRCI participation in international scientific conferences in 2009

By Randall Wells, PhD

Our program was highlighted through invited presentations at several international venues this year. In early March, Randall Wells made a keynote presentation to the European Cetacean Society during their annual meeting, held in Istanbul, Turkey. In October, Wells made a keynote presentation at the ColacMarCuba conference in Havana, attended by more than 1,200 marine scientists from 29 countries. In both cases, Wells described potential climate change impacts on inshore dolphins in non-polar regions.

DRCI staff and students were among the 1,700 professionals and students participating in the Society for Marine Mammalogy's

Biennial Conference on the Biology of Marine Mammals, held in Quebec City during 11-16 October 2009. This is the largest gathering in the world of marine mammal scientists. Twelve abstracts involving DRCI programs and projects were selected for spoken or poster presentations, comprising 3% of the total oral presentations for the conference. The titles of these presentations are listed in the "Professional Activity Summary" section of this newsletter. Staff also had the opportunity to study conference operations first-hand, which will facilitate their involvement in the SMM's 2011 biennial conference in Tampa, when Randall Wells will be President of the Society.

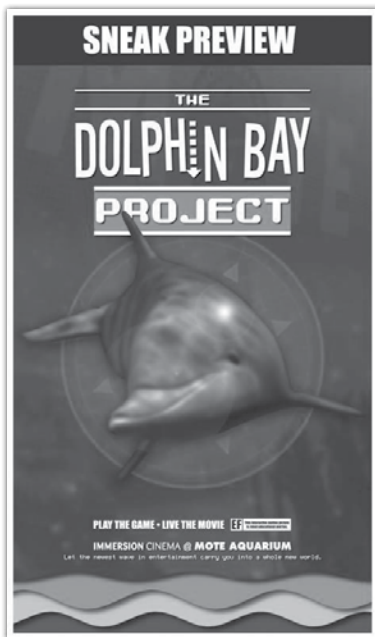
EDUCATION, OUTREACH AND TRAINING

Education continues to be a major component of DRCI 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 efforts 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.



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, through invited presentations at

various scientific conferences and through participation in national/international panels such as the Atlantic Scientific Review Group, Bottlenose Dolphin Take Reduction Team, the Working Group on Marine Mammal Unusual Mortality Events, the IUCN Cetacean Specialist Group, the IUCN Reintroduction Specialist Group, and the Board of Governors of the Society for Marine Mammalogy.

International Training Opportunities: The DRCI 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 DRCI 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 2009, we hosted two people: Dr. Supraja Dharini of India, and Natalia Asplanato, part of the Aquamarina franciscana dolphin research team from Argentina. Each of the 2009 participants describe their experiences below. Support for this program was provided through 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, the University of California-Davis, the Medical University of South Carolina, Michigan State University, Duke University, and the University of St. Andrews involve the resources of the DRCI as they conduct their thesis or dissertation research. To date, 25 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 2009, one master's student (Jessica Powell, USF) and one doctoral student (Jennifer Yordy, MUSC) involved with our program successfully defended their thesis or dissertation. Currently, nine doctoral students 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 at a time (for more information on internships, please contact Katie McHugh, DRCI Intern Coordinator, at: kmchugh@mote.org). In addition, ten non-students, including local Sarasota residents, volunteered their time to the program. During 2009, 21 interns and out-of-town volunteers worked with us, providing over 7,000 hours of assistance to the program. In addition to the international training program participants listed above, we were joined by interns and volunteers from Denmark, Bermuda, Singapore, Saudi Arabia, and Ireland. One of our former interns presents his comments regarding the value of his experience with the DRCI for his future career below.

EDUCATION, OUTREACH AND TRAINING

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 can be used together or

independently, centered 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.

“Don’t Feed Wild Dolphins” Public Service Announcement 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 got started taking food from people, the risks it faces as a result, and how it needs people to stop feeding it in order to get through its addiction. The PSA was released in March 2009, with distribution including 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 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. To view the full 30-second video visit dontfeedwilddolphins.org.

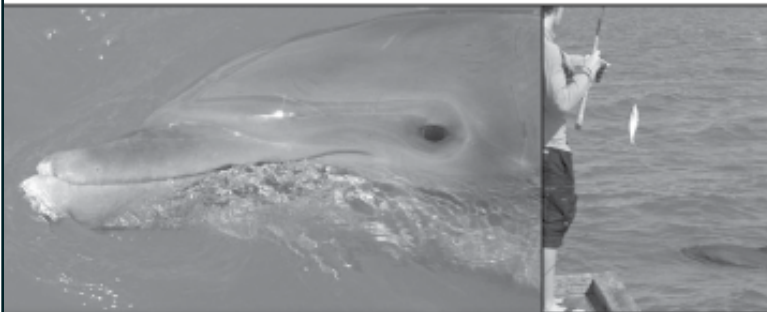
EDUCATION, OUTREACH AND TRAINING

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



Dolphin-Friendly Fishing & Viewing Tips

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.

"Dolphin-Friendly Fishing and Viewing Tips" cards

By Randall Wells, PhD and Kim Bassos-Hull, MS

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, and 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 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 209,350 cards have been distributed since January 2008. Distribution through Florida and the southeastern United States has been coordinated by the Dolphin Research and Conservation Institute. 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 us via our website 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 to the left, are available in English and Spanish as downloads at: www.sarasotadolphin.org.



Provisioning of wild dolphins increases the animals' risks of injury and illness and makes them more vulnerable to predation. In addition, feeding wild dolphins is a violation of the federal Marine Mammal Protection Act.

EDUCATION, OUTREACH AND TRAINING

How the DRCI prepared me for a career in marine mammal conservation and policy

By Trevor R. Spradlin, M.Res., Office of Protected Resources, NOAA/National Marine Fisheries Service

As the Sarasota Dolphin Research Program/Dolphin Research and Conservation Institute approaches its 40th anniversary and celebrates its unparalleled achievements in marine mammal research and conservation, it is a time of reflection for all of us who have been fortunate enough to participate in this remarkable program over the years. I had the privilege of first meeting Randy Wells more than 20 years ago back in 1988, when as a 19-year-old undergraduate student at Boston University I attended a lecture that Randy was giving at the New England Aquarium about the Sarasota Dolphin Research Program. Like so many others, I had been captivated by dolphins since childhood and wanted to learn more about them, and as I sat in the audience listening to Randy speak about the bottlenose dolphin research program he pioneered with Blair Irvine and Michael Scott, I was both moved and inspired to pursue marine mammal science and conservation as a career. Soon after, I began volunteering regularly for the Aquarium's marine mammal program as a husbandry assistant for the animal care staff and then signed up to participate in the SDRP's 1989 summer field work through the Earthwatch Institute program. Both of these opportunities set the stage for my future work, and I have been very lucky to have spent the past 20 years involved in the marine mammal community.

It was through the SDRP and the Aquarium that I met the scientists from the marine mammal lab at the Woods Hole Oceanographic Institution (WHOI) who were collaborating with both organizations on several cetacean behavior and acoustic research projects. My eagerness to assist with their work was kindly accepted, and I was invited back to Sarasota in 1990 to help the SDRP and WHOI graduate students with their field work for the summer. After graduating from college I was offered a research assistant position with WHOI and the Chicago Zoological Society (CZS) working with the scientists at the WHOI marine mammal lab on a variety of research projects investigating the behavior, life history and acoustic communication of marine mammals. In particular, I was involved in studies evaluating the impacts of human activities on marine mammals, such as noise disturbance, incidental take in fisheries, and tourism impacts, and these experiences fostered my keen interest to combine science and policy work to support conservation efforts for the animals.

Indeed, it was my early experiences with the SDRP that enlightened me about the conservation threats to dolphins stemming from human recreational and commercial activities. The long-term research and monitoring efforts by Randy and his team to document the impacts of human interactions with wild dolphins off the coast of west Florida had provided important information to government authorities and helped shape additional legal protections for marine mammals nationwide. I therefore jumped at the chance in 1992 to be part of the team contracted by NOAA's National Marine Fisheries Service (NOAA/NMFS) to conduct a behavioral study with CZS behaviorist Amy Samuels of "Swim-With-Dolphin" programs at public display facilities in order to help develop appropriate management strategies to safeguard both dolphin and human welfare. That experience led to my accepting a position in 1995 as a marine mammal biologist at NOAA/NMFS' Office of Protected Resources, where I have been working ever since on a suite of marine mammal issues implementing the U.S. Marine Mammal Protection Act and Endangered Species Act.



Trevor Spradlin next to the spinner dolphin conservation sign at Kealakekua Bay on the Big Island of Hawaii for the "Protect Dolphins" campaign, which was developed by NOAA Fisheries in partnership with Randy Wells and colleagues. The spinner dolphins that frequent Kealakekua Bay were the subjects of Randy's graduate research along with the bottlenose dolphins of Sarasota, Florida.

My duties at NOAA/NMFS to date have ranged from processing marine mammal research permits, developing policies and regulations for wildlife viewing practices to protect marine mammals from harassment, and assisting with administration of the Marine Mammal Health and Stranding Response Program (MMHSRP). The training I received from the SDRP, CZS, WHOI and Aquarium prepared me well with the solid scientific foundation necessary for all aspects of my work, including my recent graduate studies in Marine Mammal Science at the University of St. Andrews in Scotland where I got the chance to expand my horizons and work with researchers from the UK and Greece on a life history study of the critically endangered Mediterranean monk seal. Throughout my time at NMFS, I have had opportunities to continue collaborating with Randy and his colleagues on several projects, including conducting dolphin health assessments to investigate Unusual Mortality Events and other health concerns facing marine mammals and developing the "Protect Dolphins" campaign to educate the public about the harmful consequences of feeding and harassing wild dolphins.

It was particularly rewarding for me to be able to work with Randy several years ago on a pivotal law enforcement case that NOAA pursued against some individuals who had illegally released trained dolphins to the wild in the Florida Keys without adequate preparation or the necessary scientific research permits. The dolphins were injured during the release and had to be rescued, and Randy and I served as witnesses for the government during the subsequent trial -- Randy provided scientific expertise from his groundbreaking research with the "Misha and Echo" project, and I provided first-hand accounts of the rescue operation for the dolphins as a member of the rescue team. The case was successfully prosecuted and the defendants were fined the highest penalties under the MMPA at the time.

EDUCATION, OUTREACH AND TRAINING

I felt a similar sense of pride after we installed outreach signs in Kealahou Bay, Hawaii to educate the public about the harmful consequences of harassing Hawaiian spinner dolphins that enter the bay during the day to rest. Randy had studied that particular population of dolphins years before as part of his doctoral research with Ken Norris and had continued to raise awareness with his colleagues in Hawaii about the special sensitivities unique to spinner dolphins. Knowing the history and significance of that study site inspired me to work with colleagues to expand our “Protect Dolphins” campaign from the Southeastern U.S. to Hawaii, and I hope I was able to contribute in some small way to the conservation efforts that Randy and his colleagues had started earlier.

I have now reached my 20th year in the marine mammal field as the SDRP celebrates its 40th, and I am grateful for the opportunities and training that Randy, his colleagues and students afforded me throughout my career. One of the SDRP’s most enduring legacies has been the mentoring and nurturing of people of all ages and all nationalities to become marine mammal conservationists, and I feel so fortunate to be in such great company.

My perspectives as a DRCI intern from Argentina

By Natalia Asplanato, Fundacion Aquamarina

When I was asked to write an article about my experience as an intern I did not know where to start, how to summarize the many things I did and how to put in words the feelings and the memories this trip left me.

I am from Argentina, a country which is known by the Tango, Mate and Fernet. But what many people do not know (not even many Argentinean people) is that the coastal waters of this country have a great diversity of marine life, where many species are in danger. This is the case of Franciscana’s dolphin. Unlike the bottlenose dolphin, Franciscanas are very small dolphins with hundreds of teeth, and they are almost impossible to spot. Six years ago, I found Aquamarina, an NGO where biologists and biology students, directed by Pablo Bordino, were trying to reduce the mortality of this species. But what impressed me the most was that this group worked together with fishermen in the struggle to mitigate incidental bycatch.

Some years ago, we met some of the members of the DRCI, who helped us in a project of capture-release, tagging, and tracking of Franciscana dolphins involving radio and satellite-linked tags. As well as this, thanks to the DRCI, we were able to start the first photographic identification project on Franciscana.

In April of this year, Pablo told me that I had been invited as a member of the Franciscana Dolphin Project to participate in the DRCI International Training Program, working as an intern on different research projects. I always thought that this was going to be an amazing experience because it would allow me to try some equipment and technology that is very difficult to use in Argentina. But it gave me much more.

As soon as I arrived, I had the opportunity to be involved in bottlenose dolphin capture-release efforts in Sarasota Bay as part of their Dolphin Health Assessment Project. The second week,

the Photo ID training started. The first thing they taught us was how to identify different fins, to search for their differences and how to classify them. Every time we went out with the boats to do surveys, each of us had the opportunity to experiment with the camera and try to take some pictures of the dolphins. It sounds easy, but when you find yourself with a heavy camera, with the dolphins swimming fast, the boat moving and the waves trying to make you fall, you realize it is a bit more complicated. After a couple of days, we were able to predict the movements of the dolphins and took some decent pictures.

During my stay I also had the opportunity to help with the data we obtained in the Franciscana satellite tagging project. Even though I was not able to go out on the boats for some weeks, it was so interesting and rewarding to see the results of the effort we all put on the field.

This experience was so important to me in many different aspects. I met a lot of people from different places, who had other cultures, who had studied in different countries and also people who were not involved in marine mammal research. We were able to share experiences, doubts, ideas and opinions on our own work and helped us see things from different perspectives. This interaction made the results of this trip even better. I really have nothing more to say but to thank everyone who taught me and helped me through this incredible experience. THANK YOU!



Natalia Asplanato, Fundacion Aquamarina.

EDUCATION, OUTREACH AND TRAINING

My perspective on DRCI training as a scientist from India

By Supraja Dharini, PhD, TREE Foundation, India



The rampant destruction of ecosystems by coastal communities owing to illiteracy and poverty is a major problem for marine conservation in the South East coast of India. Coastal communities depend on marine natural resources for survival. As a result, important habitats and fauna such as reefs, sea grass beds, mangroves, estuaries and marine turtles are being destroyed. Hence the urgent need for their protection. TREE Foundation was founded in 2002 with the aim of protecting marine turtle populations and addressing the interrelatedness between coastal communities and the marine resources on which they depend for their survival. The solution lies in initiatives that combine conserving species and habitat while empowering local people through education programs, capacity building, economic development/poverty alleviation, human and animal health programs and networking with government bodies. TREE Foundation has initiated and trained fishermen as a Sea Turtle Protection Force (STPF) to patrol and conserve the nesting turtle populations and through them started recording observations of the Indo-Pacific Humpback Dolphins every time they were sighted along the near shore areas of the coast. The STPF also recorded strandings of the Indo-Pacific humpback, common, bottlenose, and Risso's dolphins.

The invitation and training opportunity extended to me on behalf of TREE Foundation during 1 June to 1 August 2009 has been a great learning experience under the Dolphin Research and Conservation Institute (DRCI), based at Mote Marine Laboratory. I feel privileged to have been guided by Randall Wells, one of the world's most respected dolphin scientists and head of the Dolphin Research and Conservation Institute. Working with the staff of the CZS was indeed a learning experience. The photographic identification surveys, the biopsy-darting for genetic sampling as well as photo-analysis, data recording and processing at the lab has expanded my knowledge with respect to the study of dolphins. The training methodology in photographic identification was excellent and systematic. It taught me to be organized and file data and information carefully. This program was not just a lesson on dolphins but one that will be incorporated in my sea turtle and marine conservation program.

The boat surveys were a wonderful experience. I am grateful for the opportunity given to me. We went to every nook of Sarasota Bay and a couple of times into the Gulf of Mexico. Observing different habitats including the sea grass beds, sand bars and

mangrove islands as well as the changing hues of the sea humbled me. Not to forget the different birds we came across, pelicans, least terns, little blue heron, blue heron, ospreys, frigate and the common gulls. Besides watching manatees socializing and swimming, we also saw Loggerhead turtles on five occasions and a Kemps Ridley once. Jason our Lab Manager would patiently reel off names as we passed the birds and also explained how to identify individual manatees by their scar markings. He taught us how to take pictures of dolphins and the rules observed on the boat. Jason was a stern teacher but a patient one too. He answered all my questions making sure that I understood. We did alternate surveys with Jason and our second in command instructor Aaron Barleycorn. Aaron was a source of information on dolphins. At the end of the day, when we returned to the lab, both of them would show us the photographs taken, always having a word of encouragement for us. Of course, there were several pictures showing only a splash of water and the sky but our instructors never discouraged us. They inculcated the qualities of a good teacher in me.

As days went by we learned techniques of photo id, comparing photos and recognizing individual dorsal fins. During a sighting we would be alert. The salinity of the water and temperature had to be recorded with the YSI, the sighting data sheet had to be filled in fast while the dolphins were in sight and their activities keenly observed. Boat surveys were indeed a memorable learning experience for me, something I will cherish all my life. I think I can easily recognize the dolphins, Riptorn, FB55, F222, and I-BUMPS for sure.

Under Dr. Wells' guidance, I have worked out a methodology for a similar program in India. On the basis of his three decades and more years of experience in dolphin study, he advised me to first start a pilot study of the Indo-Pacific humpback dolphins



Indo-Pacific humpback dolphins off the coast of India.

along the Kancheepuram Coast. The Sea Turtle Protection Force members (drawn from the fishing community) can be trained as field assistants, to assist graduate students since they have been associated with the dolphin study program for the past 4 years. With Randy's and Jason's encouragement, a draft for the framework for the 'Pilot Study of the Indo-Pacific Humpback Dolphins along the Coramandel Coast' was prepared. Thus he and my instructors, Jason Allen and Aaron Barleycorn have laid the foundation for the above project in South East India. Hopefully, this will shed light on the population structure of dolphins along the coast and help in the conservation and management of the species. The program will be initiated as soon as funds for the boat surveys are available. This training program also gave me ideas and tools to involve graduate students in the study of marine

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mammals and sea turtles. They will have a wide range of subjects for study and research, in particular the Indo-Pacific humpback dolphins in the Coromandel Coast in both Tamil Nadu and Andhra Pradesh.

Since sea turtle community based conservation is our prime focus, learning the techniques of satellite tagging of sea turtles under Dr Tony Tucker, Manager of Mote's Sea Turtle Conservation and Research Program was valuable. We installed satellite-linked tags on four loggerhead turtles. On the first night he asked me to name a turtle, something that stood for good fortune in my language. I named her Chemem (meaning prosperous in Telugu language). The second time I went on a patrol we satellite tagged a big turtle. I was in awe of her size. And she was very beautiful. Dr. Tony again asked me for a name. I called her Vismaya (meaning astounding). This hands-on experience has boosted my confidence and will enable me to develop the satellite tagging program in December 2009 in Chennai for which TREE Foundation has acquired permission from the Wildlife Wing of the Forest Department Tamil Nadu. At a later stage it will also be done in Nellore.

Another area of knowledge that I gained at Mote Marine Stranding Investigation Program was in necropsy procedures and methods of archiving specimens in marine mammal study. On 7th October 2009 TREE Foundation was given permission to conduct necropsy on marine mammals and sea turtles as a joint program with the Tamil Nadu University of Veterinary Sciences. This is the first time in India that an NGO has been involved in this kind of work. Permission to undertake this work was issued after great deliberation and my training at CZS –Dolphin Research and Conservation Institute was a plus point. It is hoped that the information from genetic and stable isotopes studies will be tools for better management and conservation measures. I learned the importance of archiving from Ruth Delynn, Curator of Marine Mammal Specimens. She showed me the steps involved in recording data and maintaining marine mammal specimens.

Since TREE Foundation works closely with artisanal fishers, my meeting with Dr. Ken Leber on fisheries enhancement was important. He shared valuable information on useful publications and people working in the field. The work undertaken at his department has given an insight into the issues that can be useful for the artisanal fishers' workshop that TREE will be organizing jointly with the Department of Fisheries and Wildlife Wing of the Forest Department in November and December 2009. Such workshops are valuable in creating a good working atmosphere with the fishermen, which furthers the sustainable marine conservation program initiative.

The other staff Katie McHugh, Sandra Camilleri, Brian Balmer, my house mates Katie Anwiler, Natalia Asplanato, Lima Kayello, Rene Byrskov, and interns Julia Bartmess and Jessica Posey were very interactive and enthusiastic in giving practical suggestions to make my conservation programs in India effective and efficient.

Befriending Dr. Eugenie Clark (Shark Lady), my idol and the brain behind Mote Marine Lab has been an honor. At 87 years she is diving into the world's remotest coral reef to study adult convict fish, a little known species. Her advice to women was 'Dedication, Perseverance and Courage will never fail'.

High school students communicating solutions: Year Two

By Kim Bassos-Hull, MS

DRCI's second year of collaborating with Mote Marine Laboratory's Education Division and working with local area high school students built upon last year's project studying human impacts on dolphins. DRCI staff member Kim Bassos-Hull and Mote Educator Jim Wharton led 17 local high school students to study 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 300 m of recreational boats, 2) how do dolphin dive patterns change in the presence of boat traffic, and 3) are there identifiable "hot spots" of human-dolphin interaction? Students spent two weekend days a month on the water collecting data from October 2008 through April 2009. We also focused on videotaping dolphin behavior in various habitats and around boats and fishing activity. The students analyzed the data and videos and prepared their findings for presentation at the Florida Marine Science Educators Association conference in May 2009. With two years of data we were able to present the results of a larger data set. Dolphins dove longer and fed and socialized less in the presence of more boats. On average, a boat passed a dolphin within 300 m once every 4 minutes. The highest level of boat fishing activity occurred in the passes where we also observed the most dolphin patrolling behavior. The students used the field video and archived DRCI video and photos to create 60-second public service announcements about human/dolphin interaction issues such as fishing line entanglement, illegal dolphin feeding, and proper boating and fishing etiquette around dolphins. Both years have been fun and rewarding while engaging our youth to study wild dolphin behavior and promote conservation issues. The program this year was funded through a generous donation from the Emily and Roland Abraham Marine Science Education Fund and the Chicago Zoological Society.



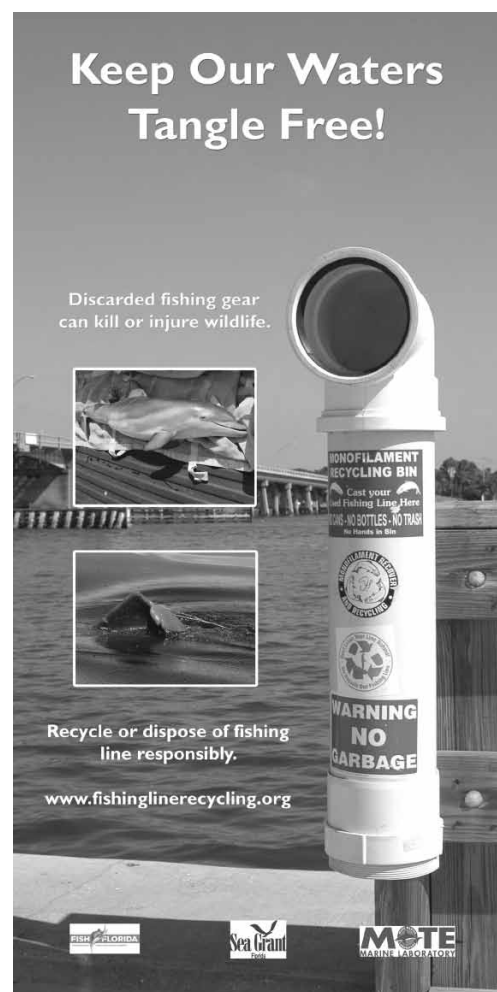
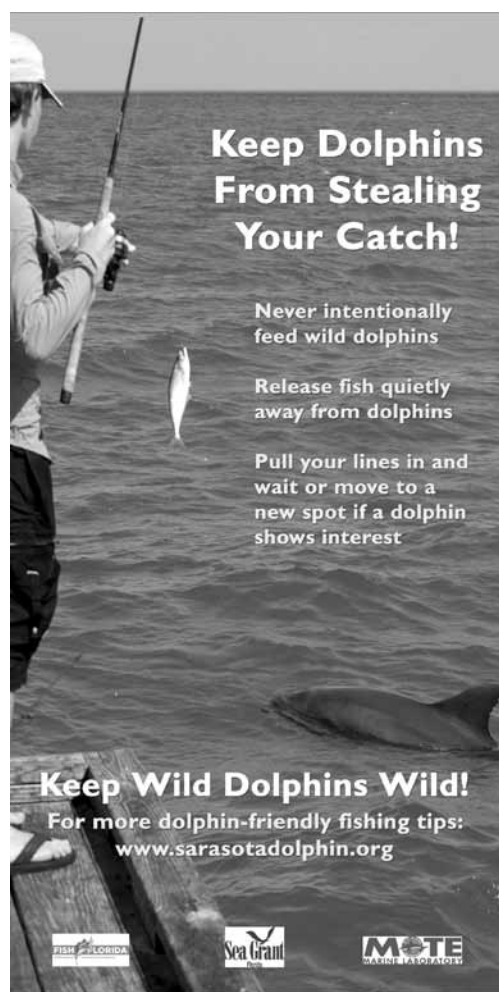
Dolphins surface near the research vessel as Mote High School Alumni Program students observe them.

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

By Kim Bassos-Hull, MS

Last year we reported on the implementation of an outreach campaign to anglers and boaters in Southwest Florida (Charlotte, Lee and Collier counties) after an increase in dolphins depredating from anglers and dolphin entanglements in this region. Fish Florida provided funds to Collier Sea Grant (Bryan Fluech) and the DRCI/Mote (Kim Bassos-Hull) to develop materials to support outreach in these counties. The accomplished goals and products of the outreach program included: (1) a powerpoint presentation on dolphin behavior and depredation issues as well as dolphin-friendly fishing practices that were distributed to Sea Grant agents and interested educators, (2) speaking to local ecotour providers, fishing clubs, and boating clubs on dolphin research in southwest Florida highlighting conservation and human impact issues, (3) creating 1,000 personal-sized fishing line recycling bins filled with educational materials and distributing them to local anglers, (4) reprinting of 16,000 “Dolphin-Friendly Fishing and Viewing Tips” cards that that were handed out to anglers at piers, docks, fishing clubs, tournaments, and outreach events, and (5) creating three retractable educational display banners that were used in conjunction with the dolphin presentations, or as standalone displays at public events to help raise awareness on the issues of recycling fishing line and incorporating responsible dolphin-friendly fishing practices. These banners currently stand in the entrance lobby to Mote Marine Lab’s public aquarium engaging visitors as they enter (see photos). An additional workshop was held at the Florida Marine Science Educators Association (FMSEA) conference in May 2009 teaching educators and park rangers how to make the personal-sized fishing line recycling bins and promote conservation issues associated with fishing line.



Educational banners created as part of the Fish Florida outreach campaign.

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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 by contacting info@sarasotadolphin.org.

Peer-reviewed Journal Articles and Book Chapters

- Esch, H.C., L.S. Sayigh, J.E. Blum, and R.S. Wells. 2009. Whistles as potential indicators of stress in bottlenose dolphins (*Tursiops truncatus*). *Journal of Mammalogy* 90:638-650.
- Esch, H.C., L.S. Sayigh and R.S. Wells. 2009. Quantifying parameters of bottlenose dolphin signature whistles. *Marine Mammal Science* 25:976-986.
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- Noren, S.R. and R.S. Wells. 2009. Postnatal blubber deposition in free-ranging common bottlenose dolphins (*Tursiops truncatus*) with considerations to buoyancy and cost of transport. *Journal of Mammalogy* 90:629-637.
- 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. 2009. Baseline circulating immunoglobulin G levels in managed collection and free-ranging bottlenose dolphins (*Tursiops truncatus*). *Developmental and Comparative Immunology* 33:449-455.
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- Sih, A., K. McHugh and S. Hanser. 2009. Social network theory: new insights and issues for behavioral ecologists. *Behavioral Ecology and Sociobiology* 63: 975-988.
- Urian, K.W., S. Hofmann, R.S. Wells, and A.J. Read. 2009. Fine-scale population structure of bottlenose dolphins, *Tursiops truncatus*, in Tampa Bay, Florida. *Marine Mammal Science* 25:619-638.
- Wells, R.S. 2009. Learning from nature: Bottlenose dolphin care and husbandry. *Zoo Biology* 28:1-17
- Wells, R. S. 2009. Dolphins and porpoises. Pp. 3635-3647 In: J.H. Steele, S.A. Thorpe, and K. K. Turekian (eds.), *Encyclopedia of Ocean Sciences*, Second Edition (First Online Update). Oxford, UK: Elsevier. <http://dx.doi.org/10.1016/B978-012374473-9.00682-2>.
- Wells, R.S. 2009. Identification methods. Pp. 593-599 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, L. Byrd, D.R. Smith, J.G. Gannon, D. Fauquier, and K.D. Mullin. 2009. Movements and dive patterns of a rehabilitated Risso's dolphin, *Grampus griseus*, in the Gulf of Mexico and Atlantic Ocean. *Marine Mammal Science* 25:420-429.
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- 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. *Marine Biology*.
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- 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 press. Prevalence and pathology of lungworm infection in bottlenose dolphins (*Tursiops truncatus*) from southwest Florida. *Diseases of Aquatic Organisms*.
- 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: OUP Handbook of Language Evolution, ed. M. Tallerman and K.R. Gibson. Oxford University Press.
- Loughlin, T., R.S. Wells, L. Cunningham, N. Gales and I. Boyd. 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.
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- Powell, J.R. and R.S. Wells. Accepted pending revision. Recreational fishing depredation and associated behaviors involving common bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. *Marine Mammal Science*.
- 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*.
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- Tornero, V., K. Taranjit, R.S. Wells and J. Singh. In review. Eco-toxicants: A growing global threat. Pp. xx-xx In: J. Yamagiwa and L. Karczmarski, eds., *Field Studies of Primates and Cetaceans: Understanding and Conserving Complex Mammalian Societies*. Springer.
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- Yordy, J.E., M.A.M. Mollenhauer, R.M. Wilson, R.S. Wells, A. Hohn, J. Sweeney, L.H. Schwacke, T.K. Rowles, J.R. Kucklick, and M.M. Peden-Adams. In review. Complex contaminant exposure in cetaceans: A comparative E-SCREEN analysis of bottlenose dolphin blubber and mixtures of four persistent organic pollutants. *Environmental Toxicology and Chemistry*.
- Yordy, J.E., D.A. Pabst, W.A. McLellan, R.S. Wells, T.K. Rowles, and J.R. Kucklick. In review. Toxicokinetics, tissue-specific distribution and whole body burden of persistent organic pollutants in the bottlenose dolphin (*Tursiops truncatus*). *Environmental Toxicology and Chemistry*.
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Manuscripts in Press, In Revision, or In Review

- Balmer, B.C., L.H. Schwacke and R.S. Wells. In review. Linking dive behavior to satellite-linked tag condition for a bottlenose dolphin (*Tursiops truncatus*) along Florida's northern Gulf of Mexico coast. *Aquatic Mammals*.
- Barbieri, M.M., W. A. McLellan, R. S. Wells, J. A. Blum, S. Hofmann, J. Gannon, and D. A. Pabst. In press. Thermoregulatory responses of a resident community of bottlenose dolphins (*Tursiops truncatus*) to seasonal changes in environmental temperature in Sarasota Bay, FL, U.S.A.. *Marine Mammal Science*.
- Barros, N.B., P. Ostrom, C. Stricker and R.S. Wells. In press. Stable isotopes differentiate bottlenose dolphins off west central Florida. *Marine Mammal Science*.

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Professional Activity Summary (continued)

Contract and Other Reports

- Gannon, D.P., D.A. Fauquier, E.J. Berens, S.A. Camilleri, J.G. Gannon, J.B. Allen, R.S. Wells. 2009. Ecological effects of harmful algal blooms on fish and wildlife communities associated with submerged aquatic vegetation. Final Report to Florida Fish and Wildlife Conservation Commission Wildlife Legacy Initiative State Grant Program for award SWG05_028, 52 pp.
- Wells, R.S. 2009. Small cetaceans and climate change in shallow habitats. International Whaling Commission Second Workshop on Climate Change and Cetaceans, 21-25 February 2009, Siena, Italy. SC/F09/CC6, 15 pp.

Theses and Dissertations

Doctoral Dissertations

- Yordy, J.E. 2009. Persistent Organic Pollutant (POP) mixtures in wild bottlenose dolphins: the influences of life history, dietary exposure, physiology and their potential for endocrine disruption. Dissertation, Medical University of South Carolina. 169 pp.

Master's Theses

- Powell, J. 2009. Depredation and angler interactions involving bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. Master's thesis. University of South Florida, St. Petersburg, FL.

Presentations at Professional Meetings

- Bassos-Hull, K. 2009. Dolphin research in Charlotte Harbor and Pine Island Sound, Florida. Florida Marine Science Educators Association Conference, 15-16 May, Sarasota, FL. (spoken)
- Bazúa-Durán, C., V. Vergara and S. Dussán-Duque. 2009. We are not silent! *Sotalia guianensis* calls are mainly ultrasonic. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, 2009, Quebec City. (spoken)
- Berens McCabe, E., D.P. Gannon, N.B. Barros, and R.S. Wells. 2009. Prey selection in a resident common bottlenose dolphin (*Tursiops truncatus*) community in Sarasota Bay, Florida. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (poster)
- Bordino, P., R.S. Wells, and M.A. Stamper. 2009. Diving and social patterns of Franciscana dolphins (*Pontoporia blainvillei*) in Bahia San Blas, Argentina. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (spoken)
- Burdett, L.G., R.S. Wells, J.D. Adams, and L.H. Schwacke. 2009. Longitudinal photographic and cross-sectional health assessment data to estimate lobomycosis prevalence and lesion growth rates for common bottlenose dolphins in Sarasota Bay, Florida, USA. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (spoken)
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- Burdett, L.G., R.S. Wells, J.D. Adams, D.S. Rotstein, and L.H. Schwacke. 2009. The use of longitudinal photo-identification data to quantify the progression of a skin disease, Lacaziosis (*Lacazia loboi*), in a wild bottlenose dolphin (*Tursiops truncatus*). Hollings Marine Laboratory Research Symposium. Summer 2009. (poster)
- Burdett, L.G., R.S. Wells, J.D. Adams, D.S. Rotstein, and L.H. Schwacke. 2009. 19 years of Lobomycosis: A quantitative analysis of Lobomycosis progression in a wild, bottlenose dolphin (*Tursiops truncatus*). Southeast and Mid-Atlantic Marine Mammal Symposium. Wilmington, NC. April 3-5, 2009. (spoken)
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- Fluech, B., K. Bassos-Hull. 2009. A new twist to the Monofilament Recovery and Recycling Program: personal-sized recycling bins. Florida Marine Science Educators Association Conference, 15-16 May, Sarasota, FL. (spoken)
- Gridley, T., P. Berggren, O.J. Boisseau, T. Morisaka, V.G. Cockcroft, M. Lemon Blewitt, L.S. Sayigh, and V.M. Janik. 2009. Population level variation in wild bottlenose dolphin (*Tursiops* sp.) signature whistle types. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (spoken)
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- Janik, V.M. 2009. Communication skills and population differences in the social behaviour of bottlenose dolphins. European Science Foundation Conference "Social genes, social brains and social minds". Budapest, Hungary. 13-16 May 2009.
- King, S.L., V.M. Janik, L.S. Sayigh, V.B. Deecke, and R.S. Wells. 2009. A method of identifying signature whistle types from field recordings of wild, unrestrained bottlenose dolphins (*Tursiops truncatus*). 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (spoken)
- King, S. L., V. M. Janik, L. S. Sayigh, R. S. Wells and V. B. Deecke. 2009. A method of identifying signature whistle types from field recordings of wild, unrestrained bottlenose dolphins (*Tursiops truncatus*). Spoken presentation at the UK Student Regional Chapter of the Society for Marine Mammalogy, February 2009.
- Kucklick J.R. 2009. Contaminants of Emerging Concern (CECs): Job security for environmental chemists. Hollings Marine Laboratory Research Symposium, Charleston, SC
- Kucklick J.R., J.M. Keller, S.S. Vander Pol and J.E. Yordy. 2009. Current-use flame retardants in NIST Reference Materials and environmental samples. BFR 2009 the 11th Annual Workshop on Brominated Flame Retardants, Ottawa, Canada
- Kucklick J.R., R. Day, A. Guichard, and S.S. Christopher. 2009. NIST contributions to monitoring in coastal Georgia. Sapelo Island National Estuarine Research Reserve Symposium, Sapelo, Island, GA.
- Lane, S.M., B.C. Balmer, K.H. Sparks, T.R. Speakman, E.S. Zolman, R.C. George, and L. H. Schwacke. 2009. Reproductive success of bottlenose dolphins (*Tursiops truncatus*) along two regions of the Georgia coast, USA; a highly polluted site near Brunswick, Georgia and an adjacent reference site near Sapelo Island National Estuarine Research Reserve. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (poster)
- McHugh, K.A. and R.S. Wells. 2009. Social and behavioral development of free-ranging juvenile bottlenose dolphins in Sarasota Bay, Florida. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (spoken)
- McHugh, K.A. 2009. Social and behavioral development of free-ranging juvenile bottlenose dolphins, *Tursiops truncatus*. Allee Competition Session, 46th Annual Meeting of the Animal Behavior Society, 22-26 June 2009, Pirenopolis, Brazil.
- Pertree, R.M., K. Bassos-Hull, J. Koelsch, and R.S. Wells. 2009. Angler interactions with bottlenose dolphins at the South Sunshine Skyway Fishing Pier and impacts of an educational campaign. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (spoken)
- Powell, J.R. and R.S. Wells. 2009. Depredation and angler interactions involving bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (spoken)
- Powell, J.R. 2009. Depredation and angler interactions involving bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. Southeast and Mid-Atlantic Marine Mammal Symposium, 3-5 April 2009, Wilmington, North Carolina.
- Shippee, S., R.S. Wells, and C. Pabody. 2009. Preliminary assessment of interactions between bottlenose dolphins and sport fishing in northwest Florida and Alabama. 37th Annual IMATA Conference, 2-6 Nov 2009, Atlanta, GA.
- Wells, R.S. 2009. Potential impacts of climate change on inshore dolphins. Keynote address: ColacMarCuba 2009. 26-30 October, Havana, Cuba.
- Wells, R.S. and B.D. Smith. 2009. Impacts of global climate change on inshore dolphins. 18th Biennial Conference on the Biology of Marine Mammals, 12-16 October, Quebec City. (spoken)
- 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. 2009. Consequences of injuries on survival and reproduction of bottlenose dolphins in Sarasota Bay, Florida. NMFS Southeast Region Biennial Stranding Meeting, 2-4 September 2009, St. Augustine, FL. Invited presentation.
- Wells, R.S. 2009. Dolphin research and conservation. Conference on Cuba-México-US Collaboration in Marine Sciences and Conservation, 18-19 March 2009, Veracruz, México.
- Wells, R.S. 2009. How might coastal dolphins be impacted by climate change? Invited keynote presentation. 23rd Annual Conference of the European Cetacean Society, 2-4 March 2009, Istanbul, Turkey.

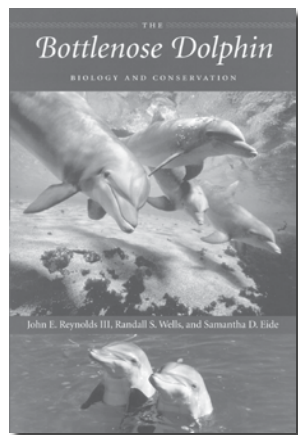
EDUCATION, OUTREACH AND TRAINING

Professional Activity Summary (continued)

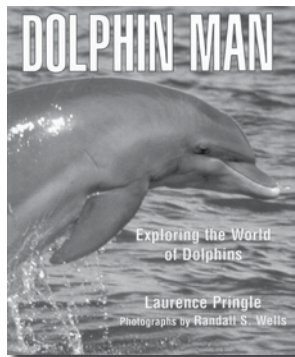
- Wells, R.S. 2009. How can long-term, multi-faceted research benefit behavioral studies of cetaceans? Invited presentation, Student Workshop. 23rd Annual Conference of the European Cetacean Society, 2-4 March 2009, Istanbul, Turkey.
- Wells, R.S. 2009. Small cetaceans and climate change in shallow habitats. International Whaling Commission Second Workshop on Climate Change and Cetaceans, 21-25 February 2009, Siena, Italy. SC/F09/CC6, 15 pp.
- Wells, R.S. and D. Mann. 2009. Sarasota Dolphin Research Program: 38 years of study of a resident bottlenose dolphin population. Population Consequences of Acoustic Disturbance to Marine Mammals, ONR Workshop, 23 February 2009, Arlington VA. (presented by Mann)
- Wharton, J., K. Bassos-Hull, M. Knapp, C. Keller, J. Shabetai, R. Dawson, K. Hoyt, G. Cassagrande. 2009. Communicating solutions: evaluating human-dolphin interactions in Sarasota Bay with high school student volunteers. Florida Marine Science Educators Association Conference, 15-16 May, Sarasota, FL. (spoken)
- Yordy, J., M. Mollenhauer, R. Wilson, R.S. Wells, A. Hohn, J. Sweeney, L. Schwacke, T. Rowles, J.R. Kucklick, and M. Peden-Adams. 2009. Complex contaminant exposure in cetaceans: A comparative E-SCREEN analysis of dolphin blubber and mixtures of four persistent organic pollutants. Society for Environmental Toxicology and Chemistry North America 30th Annual Meeting. November 19-23, 2009, New Orleans, LA.
- Invited Public and University Lectures**
- Balmer, B.C. 2009. Characterizing bottlenose dolphin community structure near the Sapelo Island National Estuarine Research Reserve and an adjacent polluted site. Guest Speaker, The Dolphin Project. 17 Oct 2009.
- Bassos-Hull, K. 2009. Bottlenose dolphin abundance, distribution, seasonal, and long-term site fidelity in the Charlotte Harbor ecosystem. Invited speaker, Captiva Cruises Ecotours, Sanibel, Florida. 9 Apr 2009.
- Bassos-Hull, K. 2009. Bottlenose dolphin abundance, distribution, seasonal, and long-term site fidelity in the Charlotte Harbor ecosystem. Invited speaker, Cape Coral Sea Scouts/ Florida Gulf Coast University, Cape Coral, FL. 27 Oct 2009.
- Bassos-Hull, K. 2009. Dolphin research along the west coast of Florida: 40 years of study. Invited speaker, docent training, Sanibel Captiva Conservation Foundation, Sanibel, Florida. 9 Nov 2009.
- Burdett, L.G., R.S. Wells, J.D. Adams, D.S. Rotstein, T.K. Rowles, W.A. McLellan, D.A. Pabst, and L.H. Schwacke. 2009. The Bottlenose Dolphin (*Tursiops truncatus*) as a Model Species to Study Infectious Disease: Lacaziosis (*Lacazia loboi*). The Perry V. Halushka 2009 MUSC Student Research Day. Charleston, SC. 6 Nov 2009.
- McHugh, K.A. 2009. Red tide effects on juvenile bottlenose dolphin behavior in Sarasota Bay, FL. Biology and Marine Science Seminar, Eckerd College, St Petersburg, FL. 16 Sep 2009.
- Wells, R.S. 2009. The world's longest-running study of a dolphin population: Lessons from 39 years and 5 generations. Mote Marine Laboratory Volunteer Class. 30 Nov 2009.
- Wells, R.S. 2009. Dolphin conservation research in Sarasota Bay, Florida: Lessons from four decades and five generations. Wildlife Ecology and Conservation Department, University of Florida, Gainesville, FL. 23 Nov 2009.
- Wells, R.S. 2009. The world's longest-running study of a dolphin population: Lessons from 38 years and 5 generations. Earth Day Celebration, Conservancy of Southwest Florida, Naples, FL. 19 Apr 2009.
- Wells, R.S. 2009. The world's longest-running study of a dolphin population: Lessons from 38 years and 5 generations. Environment Day, Sarasota Chamber of Commerce Leadership Group, Mote Marine Laboratory, Sarasota, FL. 17 Apr 2009.
- Wells, R.S. 2009. The world's longest-running study of a dolphin population: Lessons from 38 years and 5 generations. Mote Marine Laboratory Volunteer Class. 11 Mar 2009.

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.

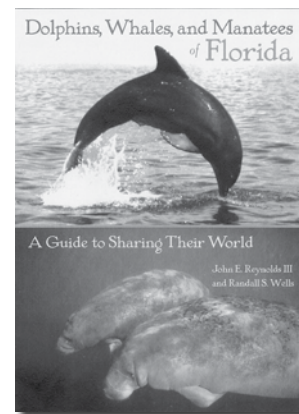


Reynolds, John E., III, and Randall S. Wells. 2003. Dolphins, Whales, and Manatees of Florida: A Guide to Sharing Their World. University Press of Florida, Gainesville, FL. 150 pp. ISBN 0-8130-2687-3



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

Long-term Datasets

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. Over 250 dolphins have been freeze-branded since the inception of the program in 1970.

More than 350,000 dolphin photographs from 1970 to the present are currently archived by the DRCI. They have been collected during more than 37,755 dolphin group sightings. Our digital photographic identification catalog currently includes 6,044 images, including 3,502 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 107,700 sightings of these

identifiable individuals, over periods of more than 39 years. Some individuals have been identified more than 1,339 times.

This year, we have continued our initiative to archive all behavioral data collected on the dolphins of Sarasota Bay over the years. We have now compiled data from 6 of the 16 past research projects that conducted focal animal behavioral observations (also known as ‘follows’) on Sarasota dolphins. While each project has had its own specific aim, many behavioral parameters have been collected consistently across researchers, and once complete, this archive will provide a unique opportunity to follow the behavior of some individuals over time, answer new research questions with existing data, and supply important baseline and background information for future projects. So far, the archive contains over 600 focal follows conducted on 110 different individuals from 1992 to 2008. We currently have data on adult males, adult females both with and without calves, and juveniles of both sexes collected in all seasons of the year. We even have some individual dolphins that have been followed over 30 times by different researchers! ‘Whitestripe’ (FB36) still has the lead, with 35 follows conducted by three different research teams. Also, four females have each been followed by three different studies over the years, both with and without calves by their side. As more projects contribute data, this archive will provide a unique resource to current and future studies on the dolphins of Sarasota Bay and elsewhere.

People make the program

Chicago Zoological Society DRCI Staff

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Jennifer Hebert, MS, Research Associate
Elizabeth Berens McCabe, MS, Research Associate
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Mote Marine Laboratory Staff

Kim Bassos-Hull, MS, Research Associate

Dolphin Biology Research Institute Officers

Blair Irvine, PhD, President
Michael Scott, PhD, Secretary
Bill Scott, Vice President
Randall Wells, PhD, Treasurer

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Isabel Baker (Ireland)	Jeff Hollway
Stan Balmer	Mike Huff
Julia Bartmes	Lima Kayello (Saudi Arabia)
Danielle Berger	Bill Kayser
Rene Byrskov (Denmark)	Katrina Kerzner
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Leslie Burdett, Medical University of South Carolina
Kristina Cammen, Duke University
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Salomé Dussán-Duque, University of Saint Andrews
Deborah Fauquier, University of California-Santa Cruz
Katherine McHugh, University of California-Davis
Martin Mendez, Columbia University
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Sally Senger
Jeff Stover
Lorry Stover
Chan Fook Sum (Singapore)
James Thorson
Jillian Vitacco
Alexandra Workman

OPPORTUNITIES TO HELP DOLPHIN RESEARCH

We need your financial help to continue the important work of the Dolphin Research and Conservation Institute. The federal support that sustained the program during 2001-2009 has come to an end and, at the same time, the funding opportunities through competitive grant programs have declined in recent years. We must now rely almost completely upon contributions from individual donors to keep our program operating.

Our projected program budget for 2010 is \$700,000. This includes support for staff and graduate students, facility and administrative costs, boat operations, international training programs, dolphin rescues and the associated follow up monitoring, field research supplies, and travel to field sites and conferences.

We are at a critical juncture and we need your support more than ever. Please be generous.

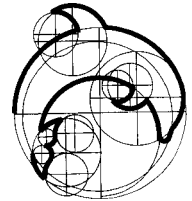
Please direct your contribution to:

Steve Birkhauser
Dolphin Research & Conservation Institute
Chicago Zoological Society
3300 Golf Road
Brookfield, IL 60513
(708) 688-8316
steve.birkhauser@czs.org

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. Dolphin Biology Research Institute thanks Edward McCormick Blair, Jr., Ronnie and John Enander, Ramsey Frangie, Lee and Don Hamilton, and The Whales of Randy Puckett for their contributions in 2009.

For more information, please contact:

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The Chicago Zoological Society is honored to recognize the following individuals for their generous contributions to the Dolphin Research & Conservation Institute:

The Batchelor Foundation

Mrs. Marge M. Brumis

Mr. and Mrs. Robert J. Darnall

The Elizabeth Ordway Dunn Foundation

Mr. Merrick M. Elfman and Ms. Therese L. Wareham

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Marine Mammal Commission

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Mr. and Mrs. Christopher H. Zimmerman

Los delfines necesitan su ayuda. Los daños severos y hasta fatales a los delfines producidos por interacciones con artes de pesca recreativas y con embarcaciones están en aumento. **Ud. puede ayudar a evitar daños a los delfines y otras formas de vida marina – y pasar un mejor día en el agua – siguiendo unas cuantas recomendaciones diseñadas para proteger a los mamíferos marinos.** Estas “Mejores Practicas” fueron desarrolladas por científicos marinos y administradores de vida silvestre en conjunto con dueños de embarcaciones, pescadores con caña y guías de pesca.

1) Nunca alimente a los delfines silvestres – es perjudicial e ilegal.

- Alimentarlos les enseña a los delfines a mendigar su comida y los atrae peligrosamente cerca de las artes de pesca y hélices de embarcaciones.
- Alimentarlos es ilegal bajo el Acta Federal de Protección a los mamíferos marinos.

2) Reutilice o comparta la carnada que le sobra.

- Congele la carnada que le sobra para utilizarla después o dásela a su vecino pescador.
- Desechar la carnada que le sobra puede atraer a los delfines a las áreas de pesca para mendigar o robar la carnada y la captura.

3) Recoja su nylon y línea si aparecen los delfines.

- Recoja y espere que pasen los delfines para evitar perder su carnada o captura y evitar posibles daños a los delfines.
- Nunca lo arroje hacia los delfines.

4) Cambie su ubicación si los delfines muestran interés en la carnada o captura.

- Aléjese de los delfines para evitar enganchar uno accidentalmente con el anzuelo, y evitar así daños en el equipo, línea o captura.

5) Libere la captura de manera tranquila lejos de los delfines y donde sea permitido hacerlo sin violar ninguna reglamentación de pesca estatal o federal.

- Alimentar o tratar de alimentar a un mamífero marino en el hábitat silvestre está prohibido.

6) Controle el equipo y líneas de pesca.

- Inspeccione su equipo con frecuencia para evitar rupturas indeseadas al nylon – hasta las cantidades mas pequeñas de nylon y líneas de pesca en el agua pueden ser perjudiciales para la vida silvestre si quedan enredadas en ellas o si las ingieren.

7) Use anzuelos circulares y corroibles.

- Los anzuelos circulares pueden reducir los daños en los peces, delfines y tortugas marinas.
- Los anzuelos corroibles (cualquier anzuelo que no sea de acero inoxidable) eventualmente se disuelven.

8) Permanezca alejado al menos 50 yardas

- Permanezca a una distancia segura de los delfines silvestres para evitar causarles daños potenciales.
- Mantenerse a una distancia segura ayuda a mantener a los delfines en su estado silvestre.

9) Prevenga el enredo de vida silvestre en artes de pesca. Recicle el nylon

- Coloque el nylon usado o roto en un contenedor de reciclaje de monofilamento.
- Si no dispone de contenedores para reciclaje, coloque el nylon usado o roto, previamente cortado en trozos, en una lata de basura con tapa.

10) Guarde su basura.

- Tirar basura es ilegal y puede afectar a la vida silvestre
- Junte cualquier basura que haya dejado y colóquela en una lata de basura con tapa.

These “Dolphin-Friendly Fishing and Viewing Tips” cards are available in both English and Spanish - see details on page 31.

Para reportar casos de alimentación o acoso a delfines silvestres por humanos,
llame a **NOAA Fisheries Southeast Enforcement Division at: 1-800-853-1964.**

Para reportar un delfín herido o enredado u otro tipo de fauna silvestre,
llame a **Florida Fish and Wildlife Conservation Commission at: 1-888-404-FWCC (3922).**

Para más información sobre reciclaje de nylon, y ubicación de contenedores para reciclaje de monofilamento
por favor visite: **www.fishinglinerecycling.org**

Para más información sobre reciclaje de nylon, y ubicación de contenedores
para reciclaje de monofilamento por favor visite:
www.mote.org o www.sarasotadolphin.org



**Recomendaciones para observar y pescar
en amistad con los delfines.**

Dolphin Research and Conservation Institute



**Four decades of dolphin research,
conservation, and education**



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