NICKS 'N' NOTCHES

Chicago Zoological Society

Annual Summary of the Activities and Findings of the Sarasota Dolphin Research Program, a Collaborative Component of the Chicago Zoological Society's Dolphin Research and Conservation Institute

• January 2011 •

www.sarasotadolphin.org

Recognition and new challenges as we enter our fifth decade of dolphin research and conservation

By Randall Wells, PhD, Director, Sarasota Dolphin Research Program

More than 40 years have passed since the 3rd of October, 1970, when Blair Irvine and I set out in Mote Marine Lab's 13 ft skiff to tag our first dolphins in Sarasota Bay. We still see two of the dolphins tagged during this pilot study, as well as their calves, grand-calves, great-grand-calves, and great-great-grand-calves. In addition to the five generations of resident dolphins we are studying, three academic generations of researchers have trained and participated in our ongoing research efforts. The Sarasota Dolphin Research Program (SDRP) remains the world's longest-running study of a dolphin population. Recognition of the credibility that derives from the consistent high quality work performed by the SDRP over these four decades led to two major developments for the SDRP in 2010.

We entered 2010 with a full schedule of planned research activities, in Sarasota Bay and in Argentina. With the Deepwater Horizon oil spill in late April, our original plans went by the wayside as we prepared for the possibility of oil coming to Sarasota Bay. In addition, because of our program's reputation, unique long-term databases, and well-established field skills, we were contracted by NOAA and others to participate in oil spill-related activities elsewhere in the northern Gulf of Mexico. In May, we were the first-ever recipient of a Morris Animal Foundation Betty White Wildlife Rapid Response Fund grant, to determine distribution, abundance, and tissue concentrations of environmental contaminants of dolphins in Sarasota Bay and Gulf waters immediately offshore. We were contracted through NOAA's Natural Resources Damage Assessment to do similar work in St. Joseph Bay in the Florida panhandle as part of a 4-site study that also included bays in Louisiana and Mississippi. In addition, we are doing remote biopsy sampling of dolphins near Destin, Florida as part of a contract through the Florida Institute of Oceanography, and we are responsible for tagging and follow-up monitoring of dolphins stranding since the beginning of the oil spill, when they are released after rehabilitation. Fortunately, oil did not reach the Sarasota or St. Joseph Bay field sites, and the data from these sites are now being used as controls for comparison with oiled sites.

In September, our long-term program also received Top Honors from the Association of Zoos and Aquariums (AZA), earning the 2010 North American Conservation Award for the Chicago Zoological Society and Mote Marine Laboratory. The prestigious award recognizes exceptional efforts to preserve regional habitat, restore species, and support biodiversity in the wild.

The critical work the Sarasota Dolphin Research Program performed in 2010 was made possible in large part through the generous support of the Batchelor Foundation, the Morris Animal Foundation's Betty White Wildlife Rapid Response Fund, the Disney Worldwide Conservation Fund, the Georgia Aquarium Foundation, the National Geographic Society, Dolphin Quest, the Florida Institute of Oceanography, the National Oceanic and Atmospheric Administration, and a number of donors. The program's operations in 2010 were supported mostly through research grants, contracts, and donations. We are grateful for their belief in our research abilities. This year's efforts, summarized in the following pages, will give scientists and policymakers a better understanding of how humans directly and indirectly affect dolphin health and well-being. What we learn today, building on our first 40 years, may be key to protecting dolphins in the future.

THE BATCHELOR FOUNDATION, INC.

The Chicago Zoological Society and the Sarasota Dolphin Research Program extend a special thank you to the Batchelor Foundation - its staff, Board Members, and family - for supporting our efforts to better understand how we, as humans, directly and indirectly impact dolphins and their well-being. The Batchelor Foundation, founded by George Batchelor, aviation pioneer and philanthropist, has been unwavering in its support of our research program and we are indebted.

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

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

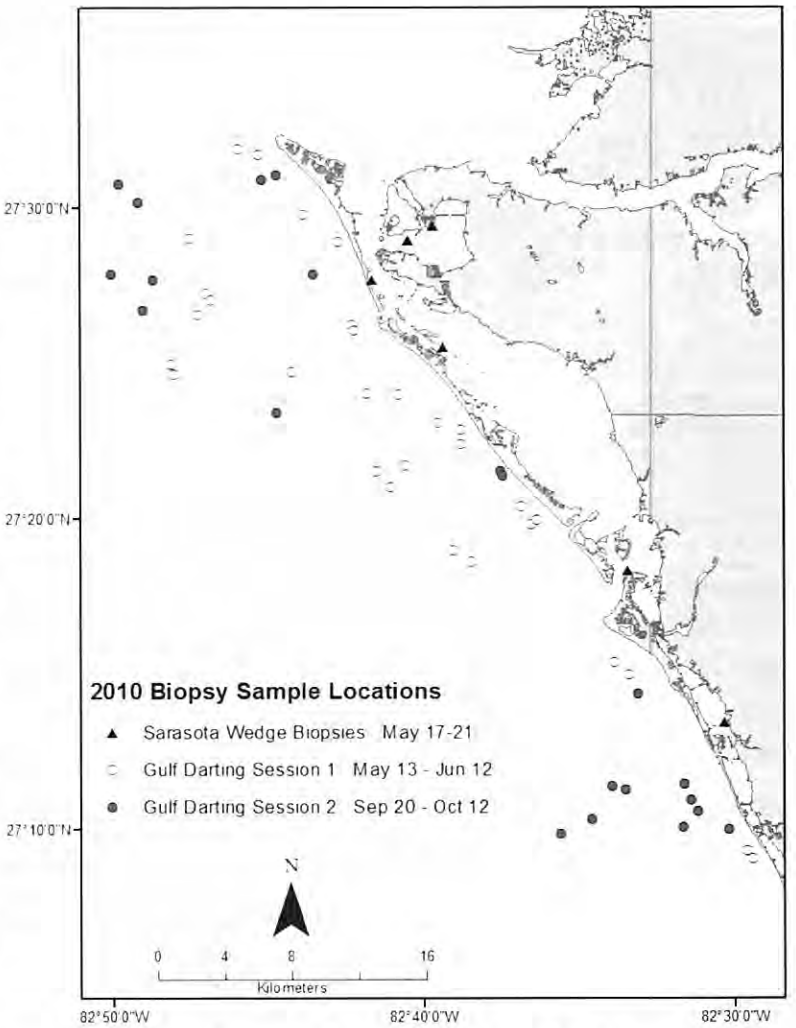
In This Issue

Deepwater Horizon Oil Spill: Responding to threats to dolphins along the central west coast of Florida

By Randall S. Wells, PhD

By mid-May 2010, it was believed by many that the Deepwater Horizon oil spill was destined to be a major environmental catastrophe for the Gulf of Mexico. Communities all around the Gulf and beyond were bracing for the potential arrival of oil. Because of the Loop Current, a major current sweeping northward toward Louisiana from the Yucatan Channel, and then southward along the edge of the west Florida shelf, and because of the uncertainties associated with wind-driven water movements accompanying the upcoming hurricane season, there was much concern about oil approaching the west coast of Florida. In preparation for the possibility of oil reaching Sarasota Bay, we obtained a grant from the Morris Animal Foundation's Betty White Wildlife Rapid Response Fund that enabled us to establish baselines in terms of concentrations of environmental contaminants in tissues of dolphins in Sarasota Bay and within 5 miles of the Gulf beaches, and to determine the abundance and distribution of these animals in advance of the arrival of oil. The grant also supported follow-up sampling and surveys after the oil arrived. Comparisons of before- and after-exposure data would allow identification of impacts of the oil spill. In addition, post-exposure samples could also be compared to data collected over periods of decades preceding the oil spill to provide a deeper understanding of impacts.

From 13 May through 12 October, 61 tissue samples were collected from dolphins through health assessment operations and remote biopsy sampling. Samples were collected with rigorous NOAA Natural Resource Damage Assessment (NRDA) protocols for chain of custody, and they have been provided to NOAA, where they will be analyzed with other samples collected from around the Gulf. Photographic identification surveys were performed through the 150 square mile Gulf study area as well as Sarasota Bay, where regular monthly surveys are conducted throughout the year. Thousands of identification photographs were obtained, and are currently going through photo-analysis. Preliminary analyses suggest that there was no major influx or loss of dolphins from the Gulf waters or Sarasota Bay. Many of the dolphins documented from the Gulf waters already exist in our photo-identification catalog for the west coast of Florida, some with sighting histories extending back decades, reinforcing the idea of long-term residency in coastal waters outside of bays. Fortunately, the oil did not reach Sarasota Bay. The samples and data collected will be used as control data in comparison with data from oiled areas in the northern Gulf, and they will be used for future comparisons to evaluate the possibility of more subtle, long-term ecological changes.



Map of tissue sampling locations from health assessments and remote biopsy darting.

Long-term Gulf resident, "Clown"(FB89), seen during June 2010 Gulf surveys (top). She was first documented in nearshore Gulf waters 29 years ago, but had not been seen since 1999 (bottom).

Deepwater Horizon Oil Spill: Natural Resource Damage Assessment (NRDA) of the St. Joseph Bay bottlenose dolphin community

By Brian Balmer, MS, PhD Student, Chicago Zoological Society and University of North Carolina Wilmington

In response to the Deepwater Horizon oil spill, we were contracted to perform a Natural Resource Damage Assessment (NRDA) on the St. Joseph Bay bottlenose dolphin community. The overall goals of the NRDA process, which is part of NOAA's Damage Assessment, Remediation, and Restoration Program (DARRP), are to:

1) Identify the extent of resources that were damaged
2) Determine methods for resource restoration
3) Assess the amount of restoration required to bring the resources back to levels pre-oil spill

Although it was uncertain if the Deepwater Horizon oil spill would reach St. Joseph Bay, the bottlenose dolphins in this region are one of the best-studied communities along the northern Gulf of Mexico coast. Since 2004, there have been two health assessments and follow-up radio tracking on 29 individuals, 103 remote biopsy samples collected, and 165 photo-identification surveys performed on the St. Joseph Bay bottlenose dolphin community, with a catalog of over 350 individuals. Thus, the bottlenose dolphins in St. Joseph Bay could provide insight into possible effects that the oil spill might have on other coastal bottlenose dolphin communities in the more affected regions of the northern Gulf coast.

The goals for this particular NRDA assessment were to monitor the St. Joseph Bay (and vicinity) bottlenose dolphins before, during, and after the oil spill. Specifically, remote biopsy samples from individual dolphins were to be collected and analyzed for contaminants before oil reached the region as well as if/when oil actually entered St. Joseph Bay. Seasonal abundance estimates utilizing mark-recapture, photo-identification surveys were to be performed during the same time periods as the above mentioned biopsy sampling, as well as an additional set of surveys planned for February 2011. The St. Joseph Bay research is part of a larger study by NOAA that includes similar efforts in Barataria Bay and Chandeluer Sound in Louisiana, and Mississippi Sound.

The "pre-oil" surveys for this assessment were conducted during 17 – 30 June 2010. During this survey effort, 21 remote biopsy samples were collected, and 123 distinctive dolphins were identified. In addition, 14 of the 29 individuals that were captured during health assessments in 2005 and 2006 were re-sighted, of which 6 females had new calves that had not been sighted until these surveys. No oil was observed in the region, but remediation efforts were apparent, with oil containment booms positioned along much of the coastline surrounding St. Joseph Bay. Abundance estimates are typically low during the summer and winter, with year-round residents (approximately 120 individuals) inhabiting the St. Joseph Bay region. During spring and fall, a two to three fold increase of animals is observed in which the majority of individuals are suspected to be seasonal residents or transients to St. Joseph Bay. Interestingly, the abundance estimates generated from these June 2010 surveys were much higher than expected and more similar to the spring and fall time periods when an influx of animals is observed in the region.

At the beginning of August 2010, when it was evident that the oil spill was not going to come into direct contact with the St. Joseph Bay region, the second round of remote biopsying and photo-identification surveys for NRDA was performed. During this survey effort, an additional 17 biopsy samples were obtained and 18 of the 29 individuals that were captured during previous health assessments were sighted. Although photo analysis is not complete for this portion of the project, preliminary data suggest that the abundance estimates for August 2010 will be similar to "typical" summer estimates in St. Joseph Bay, with a lower number of individuals sighted, primarily those with long-term residency patterns to the region. No oil was observed during this survey period and our field crew was able to observe the oil containment booms along the St. Joseph Bay coastline being removed by the hard working remediation crews; an encouraging sight to witness when just a few months earlier the ecosystem of St. Joseph Bay was under threat from the worst marine oil spill in history.

Funding for this research was provided by NOAA's Damage Assessment, Remediation, and Restoration Program.

"X23" with "X29" and calf travelling past oil containment booms in Crooked Island Sound, along the northern Gulf coast of Florida.

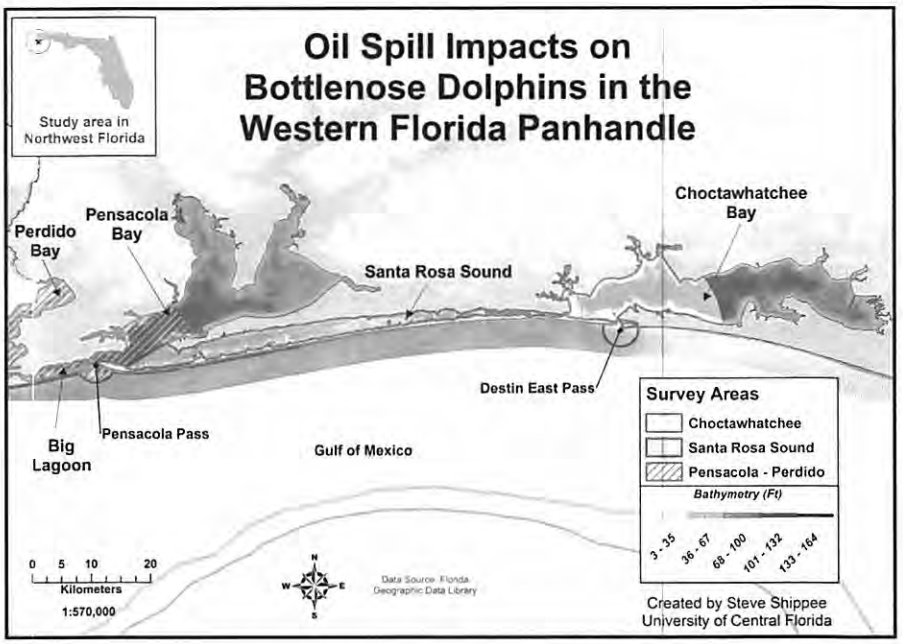
Deep Water Horizon Oil Spill: Impacts on estuarine bottlenose dolphins in the West Florida Panhandle

By Graham A.J. Worthy, PhD (UCF), Steve Shippee (UCF), Randall S. Wells, PhD (CZS/Mote Marine Laboratory), Martin Shannon (FFWRI), and Peggy Ostrom, PhD (MSU)

We have assembled a collaborative team of researchers from the University of Central Florida, the Sarasota Dolphin Research Program, and the Florida Fish and Wildlife Research Institute to study the potential impacts of the DWH oil spill in two connected estuaries in the Florida Panhandle. Our team is coordinating efforts to: assess population size and genetic discreteness of oil spill impacted bottlenose dolphin communities in these bays; determine their feeding habits; and examine the relationship between feeding habits and trophic interactions as a diagnostic tool in assessing the potential impacts of oil/dispersants throughout the region.

As apex predators, dolphins serve as key sentinel species for monitoring ocean and human health. Their roles as travelers between oceanic and coastal ecosystems emphasize their relevance for monitoring the potential impacts of oil and dispersants on fragile estuarine systems over both the short and long-term. We have begun a comprehensive assessment of the current status of bottlenose dolphin stocks in Pensacola Bay, Santa Rosa Sound and Choctawhatchee Bay and will assess the immediate impact of oil and residual contaminants on their distribution, habitat use, and feeding habits. Ultimately, these baseline data will be critical in the long-term assessment of their health and survival. Specifically we are conducting photo-ID surveys to determine their population size and distribution as well as collecting biopsy samples for direct assessments of genetic relatedness and feeding ecology. In addition, we are collecting possible prey species from these same bay systems for nutritional/chemical analysis. The dart biopsy samples from select dolphins will allow us to combine standard toxicological and enzyme marker assays of blubber, with genetic analysis, stable isotope analysis of skin (to assess feeding ecology and habitat utilization), and fatty acid signature analysis of blubber (feeding ecology) to better understand oil exposure both from direct contact as well as through their food chain. Pre- and post-spill knowledge of the spatial and temporal scales of the movements of these animals, population structure, specific habitat utilization and feeding preferences is critical to the proper interpretation of toxicological and medical data. Data from these multiple approaches will enable resource managers to develop predictive models that evaluate response strategies and to integrate the impacts of stressors at all levels of the ecosystem.

This project is funded by grant number 4710-1101-00-D from the Florida Institute of Oceanography.



Study area for joint University of Central Florida/Mote Marine Laboratory/ Chicago Zoological Society study of oil impacts near Destin, Florida, sponsored by the Florida Institute of Oceanography.

The Choctawhatchee Bay field team, including SDRP staff member Aaron Barleycorn (left), UCF graduate student Steve Shippee (right), and a local volunteer, sets out for biopsy darting on a beautiful day in November.

Deepwater Horizon Oil Spill: Follow-up monitoring of dolphins rehabilitated and released since the beginning of the spill

By Randall S. Wells, PhD

The SDRP is a pioneer in tagging and tracking of dolphins, with our radio-tagging roots extending back to 1975. Over the years, we have worked closely with a number of colleagues and tag production companies to design, test, and deploy tags of smaller sizes and more effective designs. Because of our experience and expertise in this area, we were contracted by NOAA and BP to provide tagging and post-release monitoring services for any dolphins stranding in the oil spill impact area since the beginning of the spill. To date, two bottlenose dolphins have stranded in Louisiana and are undergoing rehabilitation, with one being prepared for release at the time of this writing. Released dolphins will receive two kinds of tags. The first is a small VHF transmitter for direct radio-tracking, to facilitate observations of behavior and body condition. The second is a small satellite-linked tag with time-depth recording capabilities (STDR) to provide remote tracking options, with information provided on dive depth and duration. The VHF tags have been used extensively for many years, and the STDR tags are the latest in a series of ever-smaller tags designed to reduce potential impacts on the animals. The STDR tags were successfully deployed by the SDRP on Franciscana dolphins in Argentina earlier this year.

Banked SDRP samples - a wealth of knowledge at the Marine ESB

By Amanda Moors, BS, Jennifer Yordy PhD, and John Kucklick, PhD

For 10 years, the National Institute of Standards and Technology (NIST), with partial support from the National Oceanic and Atmospheric Administration (NOAA) and the Chicago Zoological Society, has partnered with the Sarasota Dolphin Research Program (SDRP) to collect, analyze, and bank samples from bottlenose dolphin health assessments. Biological samples, such as blubber, blood (plasma, serum, red blood cells), milk and urine have been collected from Sarasota Bay bottlenose dolphins since November 2002. Tissues sampled by NIST personnel are collected according to strict, well defined protocols specifically designed for dolphin health assessments and ensure that the integrity of the samples are preserved for accurate contaminant and health analyses.

Samples collected from SDRP health assessments are banked for long-term storage in liquid nitrogen vapor phase freezers at the Marine Environmental Specimen Bank (Marine ESB) in Charleston, SC. Banked specimens provide an important function in that they allow for retrospective analyses. In addition, the banked specimens provide a means for future retrospective analyses for new contaminants of emerging concern, provide samples for future analyses with improved analytical techniques, and provide a resource of samples that have been collected and stored in a systematic and well-documented manner for comparing results over time to identify whether environmental trends in contaminant usage exist. To date, over 1000 samples from SDRP health assessments have been banked at the Marine ESB.

Recently, banked SDRP samples have been analyzed for legacy persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs) and chlorinated pesticides (i.e., DDT), as well as contaminants of emerging concern such as the polybrominated diphenyl ether (PBDE) flame retardants. Results have shown that the resident population is exposed to substantial concentrations of these compounds. The continued collection of samples from Sarasota Bay will allow for an assessment of temporal trends in contaminant exposure in Sarasota Bay over the last ten years. Additionally, the existence of samples banked prior to the BP oil spill in the Gulf of Mexico provide an excellent reference for assessing contaminant exposure in Sarasota dolphins both pre- and post- oil spill.

A systematic well-designed specimen bank program, such as the Marine ESB, is not only a valuable component of real-time monitoring and basic research, but it also enables future investigators to extend their research into the past and provides for future verification of analytical results. Collaborations between NIST, NOAA and the Sarasota Dolphin Research Program will continue into the future and will provide a traceable record of contaminant exposure and health of the resident dolphin population.

Funding for this project has been provided by NIST and NOAA Fisheries Service.

NIST collaborators Amanda Moors and Jennifer Yordy process a milk sample during Sarasota Bay health assessments.

SDRP samples are stored in liquid nitrogen vapor phase freezers at the Marine Environmental Specimen Bank.

Relationship between persistent organic pollutants (POPs) and ranging patterns in bottlenose dolphins from coastal Georgia, USA

By Brian Balmer, MS, PhD Student, Chicago Zoological Society and University of North Carolina Wilmington

Bottlenose dolphins are apex predators in coastal southeastern U.S. waters, and as such can be sensitive indicators of persistent organic pollutants (POPs) in coastal ecosystems. The concentrations of POPs and patterns of specific compounds measured in a dolphin's blubber are influenced by a number of factors, including the animal's sex and ranging pattern in relation to POP point sources. Extremely high concentrations of POPs, specifically polychlorinated biphenyls (PCBs), have been measured in the soils, groundwater, and estuarine biota within the Turtle/Brunswick River Estuary (TBRE), located along the southern coast of Georgia. The primary PCB congeners found in the TBRE are those that comprise Aroclor 1268, a highly chlorinated mixture of PCBs. This mixture was used by LCP Chemicals, a chlor-alkali plant in operation within the TBRE from 1955 to 1994.

This study examined concentrations of POPs measured in blubber of bottlenose dolphins sampled from the southern Georgia coast in relation to their individual ranging patterns and specifically, distance of sightings in relation to a POP point source (LCP Chemicals) near Brunswick, Georgia. Dolphin ranging patterns were determined based upon 5 years of photo-identification data from two field sites approximately 40 kilometers apart: (1) the Brunswick field site, which included the TBRE, and (2) the Sapelo field site, which included the Sapelo Island National Estuarine Research Reserve (SINERR). The SINERR is part of a federal network of protected areas and was chosen with the intent that dolphins in this area could potentially act as a reference group for comparison with dolphins inhabiting the more contaminated TBRE. Dolphins were categorized into three distinct ranging patterns from photo-identification data. Individuals with sighting histories exclusively within one of the defined field sites were considered to have Brunswick or Sapelo ranging patterns. Individuals sighted in both the Brunswick and Sapelo field sites were classified as having a Mixed ranging pattern.

Brunswick male dolphins had the highest levels of PCBs ever reported for any marine mammal. PCB levels in Sapelo males were lower than Brunswick males, but comparable to the highest levels previously measured in other dolphin populations along the southeastern U.S. Female dolphins had higher proportions of Aroclor 1268 than male dolphins from their respective ranging patterns suggesting that the highly chlorinated congeners associated with the Aroclor 1268 mixture may not be offloaded to their calves as observed in other regions of the southeastern U.S. In addition, individual dolphins that were sighted farther from the Superfund point source were identified to have lower proportions of Aroclor 1268 congeners.

Results of this study suggest that POP, and specifically Aroclor 1268, contamination extends further outside of the TBRE than previously documented. Numerous studies have linked high tissue levels of PCBs to negative effects on reproduction and immune function. The high levels of PCBs and limited ranging patterns of bottlenose dolphins along the southern coast of Georgia provide a unique opportunity to identify any deleterious effects associated with chronic PCB exposure.

Funding for this research was provided by NOAA's Ocean and Human Health Initiative, NOAA's Marine Mammal Health and Stranding Response Program, and the Chicago Zoological Society. This research would not have been possible without additional support from the University of North Carolina Wilmington, and the Georgia Department of Natural Resources.

Male pair "2035" (front) and "7034" (back) with unknown individual (middle). 2035 has the highest PCB levels of any bottlenose dolphin along the southern coast of Georgia to date.

It takes two: Scientists and managers working together to solve wild dolphin conservation issues

By Jessica Powell, MS and Stacey Horstman, MES, NOAA Fisheries Service, Southeast Regional Office

The NOAA Fisheries Southeast Regional Office (SERO) is located in St. Petersburg, Florida. This office is responsible for managing and ensuring all wild dolphin populations within the southeastern United States (North Carolina through Texas and the Caribbean) are protected in accordance with the federal Marine Mammal Protection Act (MMPA). Conservation efforts require dedicated partnerships because the geographic area is large and also includes many tourists that come to the southeastern U.S. to enjoy water activities year-round.

Human and wild bottlenose dolphin interactions have been and continue to be a major management and conservation concern for SERO. Human interactions include: (1) harassment of wild bottlenose dolphins by commercial and recreational boaters, as well as people swimming with wild dolphins; (2) illegal feeding of wild dolphins; (3) dolphins taking bait or catch from fishing gear; (4) dolphins scavenging on fishing discards; and (5) harmful retaliation to dolphins. Harassment and feeding of wild dolphins is illegal under the MMPA, and all of these human interactions are harmful and can lead to serious injuries and mortalities of dolphins. Of particular concern are bottlenose dolphin populations in bays, sounds, and estuaries like Sarasota Bay. Because these populations are smaller and in constant proximity to people, they are more likely to be affected by human interactions.

The Sarasota Dolphin Research Program (SDRP) has long supported SERO by providing research to help inform management decisions. Studies on illegal feeding of wild dolphins, consequences of injuries on survival and reproduction, and bottlenose dolphin interactions with recreational anglers have been particularly valuable in addressing conservation needs.

In August 2010, SERO hosted a workshop with prominent bottlenose dolphin researchers to identify research priorities addressing bottlenose dolphin and human interaction management challenges in the southeastern U.S. Managers need research results to support conservation efforts. It is also crucial for research to be transferable to all areas of the Southeast where dolphin and human interactions are problematic. Dr. Randall Wells from the SDRP participated in this workshop with managers and scientists from the southeastern United States, Scotland, and Australia. The workshop discussions highlighted the need for long-term data sets to understand dolphin and human interactions and their value for determining population level effects. Therefore, workshop participants are now working together and plan to use SDRP's long-term data to inform innovative efforts for analyzing the impacts of human interactions on survivability, health, and reproductive success of dolphin populations. The end result will be transposed into definitive numbers of impacted dolphins that managers can use to address the conservation implications of human interactions across the southeastern United States. This collaboration and innovative use of long-term data will be ground-breaking for conservation.

This workshop outcome is just one example of the importance of scientists and managers partnering to solve complex conservation issues. As dolphin and human interactions continue to evolve, partnerships, long-term data, and innovation are crucial to effectively meet conservation mandates.

Dolphins feeding near a commercial fishing vessel in the Gulf of Mexico.

Dolphin-friendly fishing and viewing tips

By Randall S. Wells, PhD

In response to the increase in dolphins taking bait, catch and discards from anglers, we worked with NOAA 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 264,250 cards have been distributed since January 2008, including 13,150 in Spanish.

The United States Coast Guard and Coast Guard Auxiliary will soon begin to distribute our cards to fishermen and marinas up and down the eastern seaboard. The stock of cards will be kept at the Auxiliary National Supply Center in Granite City, Illinois. When marina visits or major waterway functions are scheduled, these cards will be requested by the visiting Coast Guard or Auxiliary personnel and will be disseminated to those individuals most likely to come in contact with dolphins. The Coast Guard Sea Partners program is dedicated to protecting our marine environment and its inhabitants, and believes that "it is imperative that the public is aware of things that can harm these majestic creatures and how to appropriately respond if they do encounter dolphins."

Distribution throughout Florida and the southeastern United States has been coordinated by the SDRP. Funding for subsequent re-printings has been provided by Marineland: Dolphin Conservation Center, Disney Worldwide Conservation Fund, Harbor Branch Oceanographic Institution, and Fish Florida. Please contact our website 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 below, are available in English and Spanish as downloads at: www.sarasotadolphin.org.

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

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

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

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

MOTE MARINE LABORATORY

NOAA

Chicago Zoological Society
Inspiring Conservation Leadership

Disney Worldwide Conservation

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.

Evaluation of harmful interactions between bottlenose dolphins and sport fishing in Northwest Florida and Alabama

By Steve Shippee, PhD student, University of Central Florida

With the support of the Mississippi-Alabama Sea Grant Consortium, I conducted a study to assess the problem of harmful interactions between bottlenose dolphins and the sport fishery along the Northwest Florida – Alabama Gulf Coast. I made observations on deep-sea sport fishing trips and used photo-identification of individual dolphins to characterize their persistence and frequency of engaging in fishing interactions. In addition, I monitored dolphin depredation activity at four Gulf fishing piers and conducted angler surveys to measure public attitudes. Overall during 76 deep-sea trips encompassing 378 separate reef fishing spots, dolphin interactions were noted at 16.9% of the spots. Of those interactions, scavenging of discarded fish was noted on 90.6% of the observations while depredation of caught fish occurred on 39.1%. During 100 visits to the Gulf fishing piers, dolphins were seen within 100 m of the piers on 42% of the visits. Fishery interactions involving depredation of caught fish were observed on 17% of the pier visits. Two cases of dolphins entangled in fishing gear were noted during the study. Numerous dolphins (N > 10%) that were identified on the offshore reefs were seen multiple times over a two-year period, and the majority of the dolphins that were photo-identified around the Gulf fishing piers were known resident animals that frequent the nearby inlets and bays. This suggests that the populations involved are discrete and that harmful impacts to dolphins on deep-sea reefs and at fishing piers may affect resident communities of animals in those respective areas.

Improving fish catch and release practices in order to reduce the incidental feeding of dolphins, along with increasing public awareness of this issue, are effective means to alleviate harmful dolphin-fishery interactions. Our surveys indicate that recreational anglers generally enjoy observing dolphins in spite of interaction problems. Building on this finding in partnership with members of the recreational fishing community, we are exploring mitigation techniques involving gear modifications, fish release practices, and fostering a shift toward embracing eco-tour principles by for-hire sport fishing operators. The new Gulf of Mexico "Certified Fisher Invested in Sustainable Harvests (CFISH) Program" promotes these ideas to participating Gulf Charter Fishing professionals.

Dolphin taking discarded red snapper.

Depredated king mackerel recovered on fishing pier.

Dolphin communication studies

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

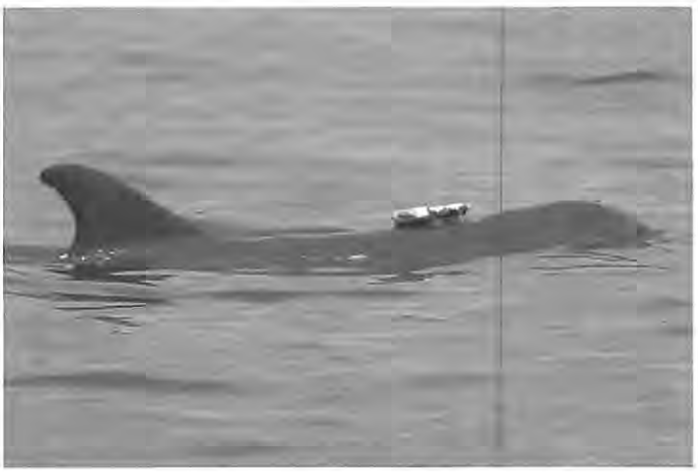
This year we had an exciting new development in our dolphin communication studies, by successfully testing the attachment for a newly developed digital acoustic tag, the DTAG version 3. The DTAG v.3 is a powerful, non-invasive tool for the study of behavior and communication of dolphins; it records movement and orientation of free-ranging dolphins, along with a complete broadband acoustic record. In May 2010 we deployed a "dummy" DTAG v.3, equipped with a radio antenna, and attached using non-invasive suction cups with a programmable release. Previous attempts to use similar tag attachments have had mixed results; with most deployments not lasting for more than a few minutes. We attempted three deployments, and all stayed on the dolphin for at least 2 hours (the one that lasted only 2 hours had a faulty suction cup). Exact durations were not known for the other two tags, since tracking was suspended at sunset after 2.5 and 6.5 hours. In both cases the tags were retrieved the following morning. Dolphins behaved normally while wearing the tag; they were observed feeding, travelling, and interacting with other dolphins. We plan to deploy fully functioning tags in May 2011, which will open new doors to the study of dolphin communication.

During capture-release sessions in 2010 we also began a new set of playback experiments to begin looking at whether dolphins discriminate between signature whistles produced by the owner vs. copies of these whistles that are produced by another dolphin. We experimented with a new playback design, the habituation-dishabituation design, in which we played back a series of signature whistles that were previously recorded from the owner of that whistle, followed by a series of copies of that whistle produced by a different dolphin. We hope that these experiments will set the stage for further studies with DTAGed, free-ranging dolphins, to investigate how whistle copies function in the natural communication system of dolphins.

We have also started to look systematically at occurrences of whistle matching, in which one dolphin copies another's signature whistle in vocal interactions. Over the years we have observed several such events during capture-release operations. It turns out that this matching only occurs between animals that spend a lot of time together: either mothers and calves of all ages, or male pairs that form alliances in the wild. We also found that dolphins that copy the signature whistle of another dolphin modify that whistle slightly so that it is recognizable as a copy. We do not know whether this is just a copying error or whether it is to let other dolphins distinguish the copy from the original. Hopefully we will learn more about how these copies are used over the next years when we get a closer look at dolphin communication in free-swimming animals wearing the new DTAGs.

We continue to build up the Sarasota dolphin whistle database, which currently contains signature and other whistles of 240 individuals that have been recorded during brief capture-release events over the last 35 years. The database contains multiple recordings of individuals that cover time spans of up to 34 years, with up to 16 recordings of each individual. We are currently working on putting sample data sets of whistles on the Woods Hole Oceanographic Institution Marine Mammal Center website, to make them openly accessible to anyone wishing to work with them.

Vincent Janik (white shirt) uses suction cups to attach a "dummy" DTAG to F227 in order to test the new design as DBRI president, Blair Irvine (white hat), looks on.



F227 wearing a "dummy" tag during a successful test deployment of the new DTAG v.3 in May 2010.

Juvenile dolphin behavioral development

By Katie McHugh, PhD, Chicago Zoological Society

The juvenile period can be fragile and formative for young animals learning to navigate complex social and ecological environments. My doctoral dissertation project used the long-term natural laboratory of Sarasota Bay to explore behavioral development of bottlenose dolphins, provide insights into the functional significance of juvenile groups, and examine the effects of environmental disturbance on the behavior of newly-independent animals. To achieve this, I combined long-term sighting records from Sarasota Bay with behavioral observations on 27 young resident dolphins during 2005-2008. This research is one of the first studies of independent juvenile behavior in cetaceans and provides a more comprehensive understanding of behavior throughout life history as well as behavioral responses to disturbance events. In 2010, this research officially came to a close with the completion of my dissertation through the Animal Behavior Graduate Group at UC Davis.

In general, I found substantial individual variation in the behavior patterns and developmental trajectories of young bottlenose dolphins. Sex- and age-related differences in juvenile behavior were evident, especially in social behavior, and many of these differences probably relate to the differing future social roles of males and females. Juvenile dolphins spent a relatively large amount of time devoted to social behavior and had a general tendency to engage in alloparental behavior. While juveniles interacted with a wide variety of individuals, young dolphins showed a distinct preference for interacting with other juveniles.

In addition, male and female dolphins in Sarasota Bay exhibited a high degree of attachment to the region where they were raised and had similar ranging and habitat selection patterns during the juvenile period. Juveniles displayed dramatic reductions in home range size after independence, whereby individuals used only a subset of their former range after separating from their mothers and then expanded their movements as they got older. Habitat preferences appear to be transmitted from mother to calf early in development, and there also appear to be lasting maternal influences on sociality and ranging patterns after independence.

Several facets of their behavior suggest that newly independent animals may actively seek social opportunities and that they likely face special challenges due to their smaller size and relative inexperience. Taken together, the behaviors exhibited by young dolphins point towards the probable importance of juvenile groups for promoting socialization and providing predator protection benefits.

Finally, I found that inshore dolphins displayed a suite of behavioral changes associated with severe red tide blooms, including significantly altered activity budgets, increased sociality, and expanded ranging behavior. This portion of my dissertation was recently published in *Marine Mammal Science*.

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

Former focal dolphin "Bud" (F196) socializing in the Gulf of Mexico with his male alliance partner IBMP in June 2010.

Bottlenose dolphin health assessments in Sarasota Bay

By Randall S. Wells, PhD

Health assessments of Sarasota Bay dolphins were elevated by circumstances to a higher level of urgency this year with the Deepwater Horizon oil spill. In advance of the possible arrival of oil from the spill, we wanted to collect baseline health information and tissue samples for measurement of contaminant concentrations, for comparison with post-exposure samples. The 2010 bottlenose dolphin health assessment project was conducted successfully during 17-21 May. High among the additional goals for this year's session was training of veterinarians and local Sarasota residents to be able to participate in a dolphin rescue team should the oil arrive. Over the five days, 109 people participated, and 12 dolphins were captured, examined, sampled, and released, eight of which were first-time captures, our highest priority. One of the dolphins sampled was Ginger, a dolphin stranded on Siesta Beach in December 2008, rescued by SDRP, rehabbed at Mote Marine Lab, released in February 2009, and observed subsequently by SDRP staff. Her condition is excellent as compared to other females her size and age. Support for this year's health assessment project was provided by the Georgia Aquarium Foundation, the Batchelor Foundation, Dolphin Quest, and the Morris Animal Foundation's Betty White Wildlife Rapid Response Fund.

Obtaining a milk sample from 26-year-old F231 for measurement of environmental contaminants being transferred to her 2-year-old son.

Release of Ginger after her check-up with a clean bill of health!

Obtaining whistle recordings from F231 just before release.

Cleaning the net before the next set is a team-building activity.

Prevalence of lacaziosis and lacaziosis-like disease in bottlenose dolphins inhabiting Sarasota Bay and Charlotte Harbor, Florida

By Leslie Burdett Hart, PhD Candidate, Medical University of South Carolina

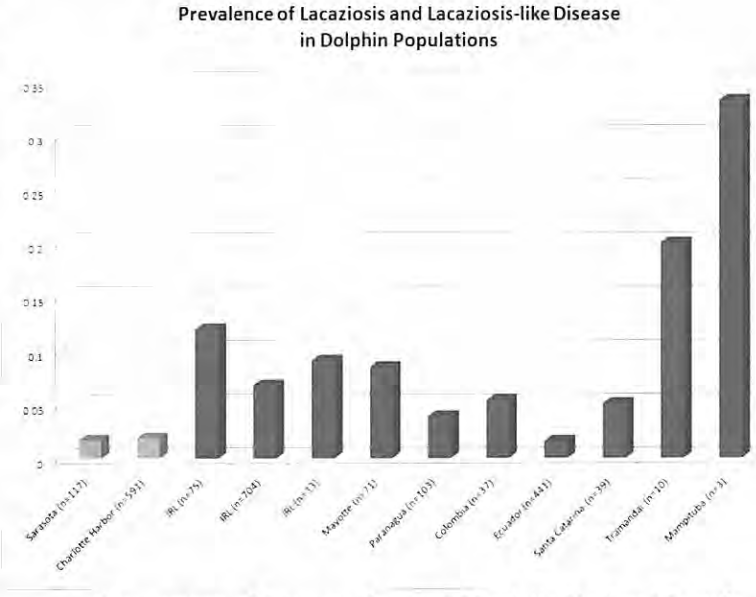
Lacaziosis (*Lacazia loboi*) is a chronic, fungal skin disease that naturally occurs only in humans and dolphins, and was first discovered in a dolphin from Sarasota Bay in 1970 that was recovered and necropsied by Blair Irvine and Randy Wells. Recent analyses of longitudinal photographs of diseased dolphins have revealed that lacaziosis is slowly progressive and that lesion growth may be variable among individuals belonging to the same population. In addition to historical observations of lacaziosis in Sarasota Bay, bottlenose dolphin photo-ID efforts in Charlotte Harbor during the 1990s have also revealed the occurrence of skin lesions consistent with lacaziosis. Although lacaziosis has been documented for over 20 years in Charlotte Harbor and over four decades in Sarasota Bay, the disease burden in these populations was previously unknown.

Lacaziosis (LD) prevalence in Sarasota Bay was estimated using historical capture-release health assessment records for the time periods 1980-1989 and 1990-1999. Cases were identified through historical photographs (see below), skin assessment forms, veterinary records, and pathology reports confirming the presence of *L. loboi* in lesion biopsies. A total of 106 and 117 individual dolphins were captured and released during the 1980s and 1990s, respectively, and of these, approximately 2-3% were diagnosed with lacaziosis. This skin disease has been observed in dolphins from many populations across the globe, including the Indian River Lagoon (IRL) in Florida, Mayotte, Colombia, Ecuador, and Brazil (see graph below). Statistical analyses comparing the Sarasota Bay lacaziosis prevalence to these other population estimates revealed no significant differences in disease occurrence.

For Charlotte Harbor bottlenose dolphins, lacaziosis confirmation was not possible as lesion biopsies were not available for histological diagnosis. Instead, the prevalence of lacaziosis-like disease (LLD) was estimated using photo-ID images from 2003 that were screened for the presence of skin lesions consistent with characteristics of lesions from confirmed lacaziosis cases (see photo below). Of the 591 individual dolphins with images suitable for case detection, animals were classified as either 1) no LLD; 2) possible LLD; or 3) LLD case. Overall, the prevalence of LLD in Charlotte Harbor for 2003 ranged between 2% and 5% depending on the inclusion of 'possible LLD' cases. Statistical comparisons of the Charlotte Harbor LLD prevalence estimate to other estimates of lacaziosis in dolphin populations across the globe revealed significant differences in LLD/LD between Charlotte Harbor and IRL dolphins.

Despite their close proximity, the LD/LLD estimates for Sarasota Bay and Charlotte Harbor were lower than estimates for dolphins inhabiting the IRL on the east coast of Florida. Future research efforts will focus on methods to identify geographic, environmental, and demographic factors that may contribute to differences in disease occurrence across populations. Because lacaziosis is a zoonotic pathogen, the discovery of factors that contribute to disease susceptibility, transmission, and persistence in infected dolphins may also enhance our understanding of disease mechanisms in human populations.

Image of FB98 with lacaziosis lesions on the dorsal fin during 1987 capture-release health assessment project.



Comparison of Sarasota Bay and Charlotte Harbor LD and LLD prevalence estimates to LD/LLD estimates in dolphin populations across the globe.

Image of RBCS with lacaziosis-like lesions in Charlotte Harbor.

Hearing abilities of stranded cetaceans and Sarasota Bay bottlenose dolphins

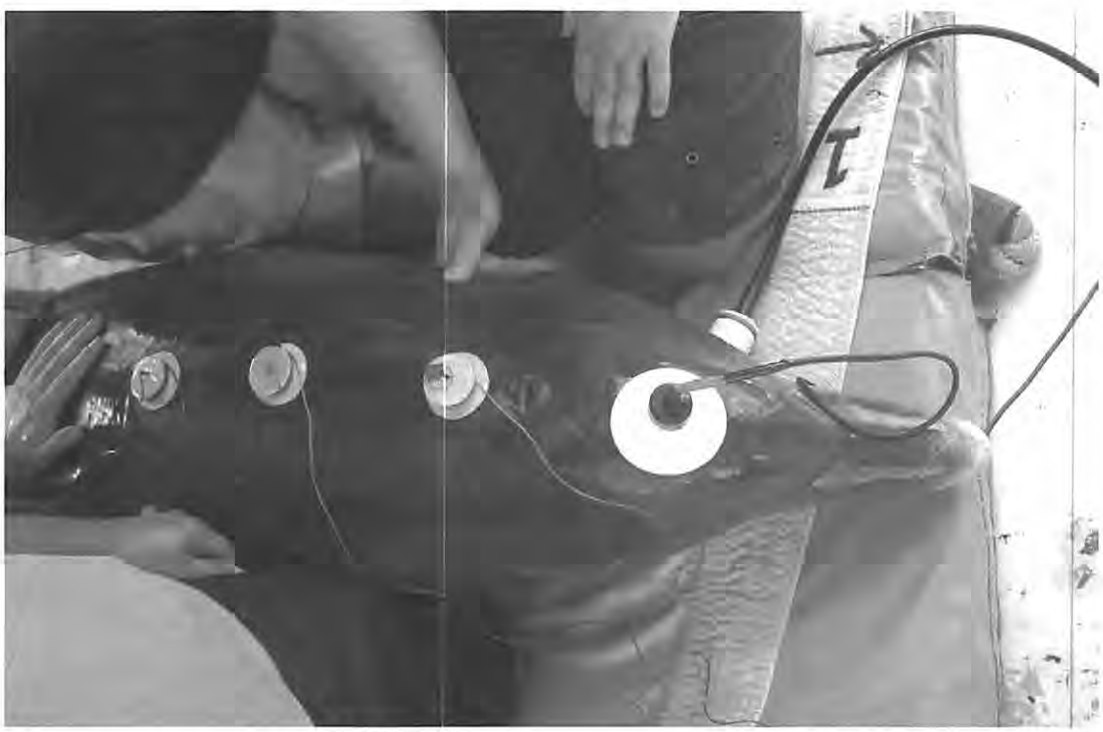
By Mandy Cook, PhD, Portland State University, and David Mann, PhD, University of South Florida

Bottlenose dolphins can hear from about 75 Hertz (Hz) to over 150,000 Hz, well beyond the range of human hearing (20-20,000 Hz). Because they are exposed to a wide variety of both naturally-occurring and anthropogenic noise in their environment, 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 sound production and reception to navigate, forage, and communicate with each other.

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 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 (7 females and 3 males, ages 2-39 years) during May's health assessments. We were especially excited to re-evaluate the hearing of F211, Ginger, on the last day of health assessments this summer. Ginger stranded on December 16, 2008 on the Gulf side of Siesta Key, FL. We initially tested Ginger's hearing on December 23, 2008, while she was being rehabilitated at the Mote Marine Laboratory Dolphin and Whale Hospital. Testing her hearing during health assessments this year showed that her hearing was still excellent, with almost identical hearing thresholds at every level tested. In addition, Ginger's re-evaluation provided additional support for the robustness of our techniques for measuring dolphin hearing during health assessments. Overall, our findings show that the bottlenose dolphins in Sarasota Bay do not exhibit increasing hearing losses with increasing age (including the 39-year-old female tested this year), 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 such as boat engines.

This is in stark contrast to our recent findings (Mann et al. 2010) that hearing loss could play a significant role in stranding events of toothed dolphins and whales. Approximately 57% of the stranded bottlenose dolphins tested in our study showed some form of significant hearing deficit, which we suggest could significantly impair their abilities to navigate, communicate, and forage successfully in the wild. Hearing loss was also found in 36% of stranded rough-toothed dolphins, which are found offshore in deep water. No hearing loss was found in other species including Risso's dolphins and pygmy killer whales. The study of a large number of wild dolphins provides an important perspective on the prevalence of hearing loss in stranded dolphins, because dolphins with hearing loss have been rarely encountered in Sarasota Bay.



Ginger being re-examined 15 months after her release. The soft rubber suction cup sensors are used to test hearing, as is done for human infants.

Astroviruses

By James Wellehan, DVM, MS, DACZM, DACVM, University of Florida College of Veterinary Medicine

The viral diseases of marine mammals are not yet well understood, but samples from Sarasota Bay bottlenose dolphins are helping us to learn more. Astroviruses are a leading cause of diarrhea in children. The Marine Animal Disease Laboratory at the University of Florida has developed testing methods for identification of previously unknown astroviruses and identified fifteen novel viruses from samples from bottlenose dolphins, minke whales, California sea lions, and Steller sea lions. Evidence was found for recombination between a human and a sea lion virus, indicating involvement of marine mammals in human astroviral ecology. Both Atlantic and Pacific bottlenose dolphins develop antibodies to bottlenose dolphin astrovirus 1 as calves, indicating that, as in humans, this is primarily an infection of young animals. Specific diagnostic testing for this virus found a higher prevalence of shedding than has been reported from terrestrial animals, the ability to infect multiple host species, and a correlation with abnormal behavior. The marine environment appears to be an important reservoir for astroviruses. Marine mammals may serve as important sentinels for human disease from marine environments. These data may improve management of both marine mammal and human health.

Sarasota Bay dolphins provide important clues about kidney stones

By Stephanie Venn-Watson, DVM, MPH, Director of Clinical Research, National Marine Mammal Foundation

Many animals can get kidney stones, including bottlenose dolphins and humans. Most kidney stones that have been found in dolphins are made of ammonium acid urate (AAU). AAU stones are very rare in humans in the United States but are common in people living in developing countries. Scientists do not know why this difference exists. Learning how and why dolphins get AAU stones may help prevent this disease not only in dolphins, but in people too.

Urine tests were conducted on dolphins from eight different populations, including dolphins living in Sarasota Bay. The researchers looked for differences in urine tests that may reflect differences in diet or susceptibility to kidney stones. The findings were quite interesting. While dolphin populations with a lot of kidney stones had low to no citrate in their urine, dolphin populations with low or no kidney stones had high citrate in their urine. In humans, low urinary citrate can be a direct cause of kidney stone formation.

Results from this study, led by the National Marine Mammal Foundation, were recently published in *Comparative Medicine* (April 2010) and have led to collaborations and a funded research study with human kidney stone experts at the University of California, San Diego and the University of Texas Southwestern. Investigations include looking at the effects of high-protein diets, insulin levels, and citrate supplementation on the prevalence of dolphin kidney stones.

Kidney ultrasound and bubbles

By Michael Moore, Vet MB, PhD, Woods Hole Oceanographic Institution

As an air breathing mammal dives, the air in its lungs is compressed and the amount of gas in blood and tissues increases. As the diver begins to return to the surface, the amount of gas decreases again with the reducing pressure, with a risk of bubble formation. If such bubbles affect normal processes the bends can result. Bubbles have been described in atypically mass stranded beaked whales in the vicinity of large naval training exercises involving the use of sonar. This has led to a rekindling of the question of how marine mammals dive without being impacted by the effects of pressure on gas solubility.

We have been finding bubbles in dolphins and seals accidentally drowned in regional fisheries, and in mass stranded dolphins, which we relocate and release successfully on Cape Cod. This led us to question whether bubbles would be present in healthy dolphins examined by the Sarasota Dolphin Research Program.

Using a veterinary ultrasound probe we found evidence of bubbles in the kidneys of three out of six animals for which kidneys were examined. These observations, along with our finding of bubbles in mass stranded dolphins that were then successfully released make us suspect that dolphins have bubbles quite commonly, as do human divers, and that their presence isn't sufficient to suggest that there may be a clinical problem. The stranded beaked whales were shown to have tissue damage from the bubbles observed. Thus, as in humans, bubbles are common, but not always dangerous. Funded by the Office of Naval Research.

Michael Moore from WHOI conducting an ultrasound examination during May 2010 health assessments.

Assessment of fertility potential in bottlenose dolphins

By Leslie Schwierzke-Wade, MS Student, Dana L. Wetzel, PhD, and John E. Reynolds, PhD, Mote Marine Laboratory

Environmental and anthropogenic stressors can affect marine populations in a variety of ways. Marine mammals, specifically bottlenose dolphins, can serve as excellent indicators of environmental health in coastal ecosystems. Though possible stressors have been identified for dolphins, their effects on important biological functions, such as reproduction, immune system function, and energetic fitness remain poorly understood. It has been difficult to assess the effects of stressors using traditional methods. Sophisticated "biomarkers" have been developed, with the potential to identify a response or exposure to a specific stressor. By applying biomarker technology and a careful research design, facilitated by the presence of longitudinal databases such as that for Sarasota Bay dolphins, we hope to acquire the information necessary to answer questions of effects of stressors on dolphins.

We used a specialized chemical test, an ELISA (Enzyme-Linked ImmunoSorbent Assay), to analyze three peptide hormones (anti-Müllerian hormone [AMH], inhibin A, and inhibin B) that serve as biomarkers of fertility potential. These assays were initially developed to promote better understanding of reproductive potential and fitness in humans, and appear to do so in other mammals as well.

Our study is in the beginning stages. Blood serum and data were collected from 12 bottlenose dolphins (9 females and 3 males, ages 2-39 years) in Sarasota Bay during the May 2010 health assessments. The ELISA tests provided strong cross-reactions for all three peptides, suggesting that the biomarker assays work well for bottlenose dolphins. To date, our results have shown a significant difference in AMH concentrations between sexes, where male hormone levels were ~1000 times higher than female levels. There was not a strong difference in average concentrations for inhibin A and inhibin B between sexes. However, the sample set contains both adult and juvenile individuals, and further analysis that considers data from adults vs. subadults separately will likely reveal interesting patterns. This represents the first detection of these hormones in bottlenose dolphins, and further research will help clarify fertility potential in this species and how stressors might be affecting reproduction.

This research would not be possible without the guidance and support from Mote Marine Laboratory, valuable samples and accompanying life history data from the Sarasota Dolphin Research Program, and the funding support and additional samples from Harbor Branch Oceanographic Institute.

Leslie Schwierzke-Wade performing biomarker assay analyses of dolphin fertility potential.

Dolphin population monitoring program: 2009-2010

By Jason Allen, BS, Chicago Zoological Society

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

Photo-identification surveys were conducted on 126 days from November 2009 through October 2010 with the assistance of dedicated volunteers and undergraduate interns. We had 970 group sightings that totaled 3,437 dolphins (including resighted animals). Monthly values varied, but overall we averaged about 8 sightings and 27 dolphins per day. These values have remained fairly consistent over the past several years. We had a high of 78 dolphins seen in one day on 18 November 2009. The largest number of dolphin groups seen in one day was 16. One of these groups was our largest seen for the year. The 28 resident SB dolphins in this group included five male pairs, four mother-calf pairs, and ten other well known individuals.

We documented the births of seventeen new calves during the summer of 2010 while monitoring the Sarasota dolphin community; this is the most in one year since 1999. First time moms included: Trisha, Petal, and DABL. Other new moms included Lightning, FB55, FB79, Scooter, and Allison. Interestingly, Hair had another baby this summer after having lost her last summer's baby within a short period of time. All the young from this summer are still alive and appear to be doing well as of mid-November 2010.

This year, we have accounted for 99% of the dolphins who use Sarasota Bay on a regular basis. Included among these is Nicklo (our oldest know individual) who had her 60th birthday this year, and F154 (one of our oldest males) who turned 47. As of October 2010, the number of dolphins regularly using the waters surrounding Sarasota Bay stands at approximately 164 animals. The only documented loss in 2010 through mid-November was 2252, the 3-yr-old calf of F225, who died from a stingray barb in her lung, and shark bites.

Scooter and her new calf traveling though Sister Key Flats on September 8th.

Nicklo, the oldest known dolphin in Sarasota Bay at 60 years of age, swims off Siesta Beach in July 2010.

F127, Ginger's mother, leaps in Big Pass in April 2010.

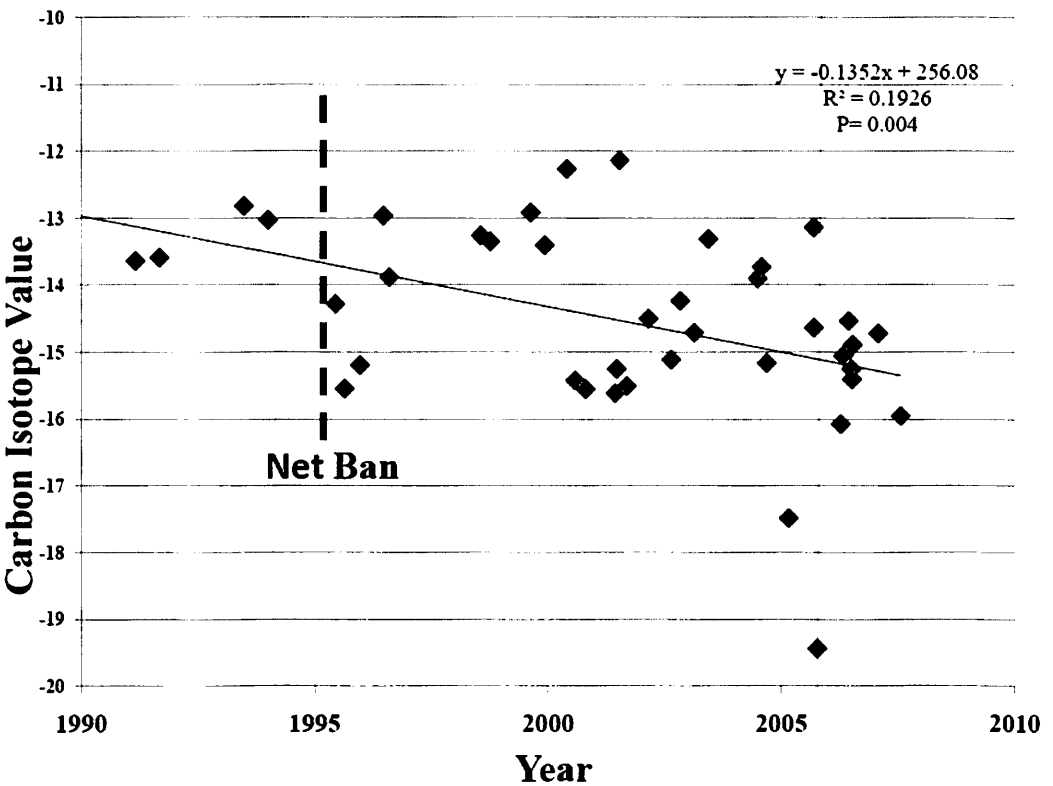
Historical trends in Sarasota Bay bottlenose dolphin foraging habits revealed through carbon isotopes

By Sam Rossman, PhD student, Michigan State University (with Peggy Ostrom, PhD, MSU, Craig Stricker, PhD, USGS, Nélio Barros, PhD, and Randall Wells, PhD)

My contribution to dolphin conservation comes not from observing bottlenose dolphins directly in the warm Sarasota sun but rather by exploiting new mass spectrometric techniques that allow me to uncover various attributes of foraging habits by measuring tiny amounts of animal tissue. These techniques involve analysis of the stable isotopes of carbon. Different types of primary producers incorporate unique amounts of the two stable isotopes of carbon (the abundant stable isotope ^{12}C and the rare stable isotope ^{13}C). For example seagrass incorporates a greater amount of ^{13}C compared to algae. Thus, the ratio of the amount of ^{13}C to the amount of ^{12}C (carbon isotope ratio) in these plants differ. In fact, seagrass is unique among marine primary producers in having an unusually high carbon isotope ratio. Carbon from primary producers is transferred to all consumers in the food web without any change to the carbon isotope ratio. As a consequence, I am able to distinguish dolphins that depend on carbon derived from a seagrass based food web from those that rely on carbon from other primary producers. We have shown that carbon isotope ratios correlate with observational data on time spent foraging in seagrass. Carbon isotope ratios compliments other methods used by the Chicago Zoological Society's Sarasota Dolphin Research Program (SDRP) because they can be used to assess foraging when observational data are not available (e.g., for elusive individuals that are infrequently observed).

Of particular interest to dolphin conservation is how populations respond to changes in their environment. For instance in 1995 Florida enacted a statewide ban on inshore commercial fishing nets. Carbon isotope values taken from dolphins stranded between 1994 and 2007 show a significant decline that likely reflects decreased use of seagrass foraging habitat over this time period. Bottlenose dolphins in Sarasota Bay may have been in competition with the fishery prior to 1995 and forced to consume less commercially important fish that derive their carbon primarily from and associate with seagrass (i.e., pinfish). Once the fishery closed, bottlenose dolphins may have exploited prey fish that are not as strongly dependent on seagrass derived carbon (i.e., white mullet and seatrout).

I extended foraging records back further, to 1944, through analysis of bottlenose dolphin teeth. Bottlenose dolphins possess a single set of teeth that are formed in annual layers. The tip of the tooth is formed before age 1. Once the tooth material is formed it remains inert and, thus, records the isotopic signature of the diet from the first year of life. Because dolphins are long lived and some of our individuals were born more than six decades ago, I was able to provide a retrospective view on foraging prior to the onset of the SDRP (as far back as 1944). While carbon isotope values show a striking decline from 1944 to present, the data must be corrected for the Suess effect. The Suess effect results from burning of ^{13}C depleted fossil fuels which causes a decrease in the carbon isotope ratio of atmospheric CO_2 that then depresses isotope ratios in food webs. Suess corrected carbon isotope values do not show a temporal linear trend. While documented declines in seagrass abundance prior to 1980 may influence our data, the decline in carbon isotope value of atmospheric CO_2 is likely an important factor that controls the isotopic composition of dolphin tissues. My results suggest that dolphins act as environmental sentinels whose carbon isotope values record perturbations across space and time, incorporating changes from a statewide net ban to alterations in global carbon cycling.



Carbon isotope values from muscle taken from deceased stranded dolphins resident to Sarasota Bay highlighting a possible change in foraging from a 1995 statewide commercial net fishing ban.

Long-term site fidelity and seasonal abundance estimates of bottlenose dolphins along the southwest coast of Florida, and responses to natural perturbations

By Kim Bassos-Hull, MS, Mote Marine Laboratory and Chicago Zoological Society

The Sarasota Dolphin Research Program has been studying dolphin populations along the central west coast of Florida from Tampa Bay down through Charlotte Harbor/Pine Island Sound (CHPIS) and the nearshore Gulf of Mexico waters since 1970. While the primary research focus has been the Sarasota Bay dolphin community, additional surveys in the other regions have increased our knowledge of how dolphins use these west coast Florida estuaries. In CHPIS, tagging studies in 1970-71 and 1984 followed by opportunistic and standardized surveys since 1990 have provided evidence of long-term site fidelity and abundance patterns similar to Sarasota Bay. These photographic identification surveys as well as genetic sampling that cover multiple contiguous estuaries in a larger geographic region are important for defining stock structure for management purposes. Seasonal abundance estimates were generated from seven multi-week field seasons during 2001 through 2006, before and after Hurricane Charley (a 2004 category four storm) and severe red tide events occurred in the area. Since 1982 in CHPIS a total of 1,154 distinctive dolphins were identified up to 34 times each with 84% of individuals resighted on more than one day. Multiple year residency rates were high with 81% of dolphins sighted in at least two years and 30% over ten or more years. Seventy-six percent of individuals with sightings on two or more days were observed in both summer and winter. Of 249 dolphins sighted on ten or more days in the study area, 83% were never observed outside the study area, indicating strong site-fidelity. Two years after Hurricane Charley in 2004 and following two years of *Karenia brevis* harmful algal blooms, 94% of dolphins were observed in the same region within the study area and abundance estimates remained stable. Documenting ranging and site fidelity patterns of individuals over long periods of time is helpful for characterizing population structure and for examining changes attributable to environmental factors and perturbations such as hurricanes, harmful algal blooms, climate change, and oil spills.

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 NOAA Fisheries Service, Dolphin Biology Research Institute, and Earthwatch Institute.

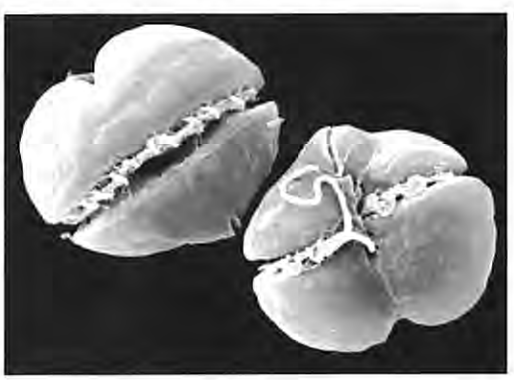
Genetic susceptibility to red tides

By Kristina Cammen, PhD student, Duke University

Red tides of the toxic algal species *Karenia brevis* occur regularly in western Florida and can pose a great threat to coastal bottlenose dolphins. In the past two decades, four large-scale mortality events of bottlenose dolphins have been associated with red tides. Interestingly, dolphin populations appear to vary significantly in their susceptibility to this threat. Populations in central-west Florida, including Sarasota Bay, are exposed to red tides on an almost annual basis, but have suffered little related mortality. In contrast, populations in the Florida Panhandle appear to be more susceptible. Since 1999, the mortality of more than 300 dolphins from this area has been associated with red tides. This difference in mortality may be due to the frequency of past exposure to red tides. The Sarasota Bay population, which has been historically and regularly exposed to red tides, may have evolved resistance over time. In contrast, the Florida Panhandle population may be more naïve and susceptible because red tides are relatively infrequent occurrences in the northern Gulf of Mexico.

We are currently investigating the hypothesis that dolphin susceptibility is related to genetic variation, in particular at the genes encoding the voltage-gated sodium channels, which are the biological target of red tide toxins. In other animal systems exposed to similar neurotoxins, researchers have found that animals evolve resistance via mutations in their sodium channels that prevent neurotoxin binding. We are sequencing the sodium channel genes in dolphins from the Florida Panhandle and Sarasota Bay in order to determine if they have similar mutations that result in resistance to red tides. We are also investigating variation in immune system and detoxification genes. Our study could uncover a new factor, genetic variation, which could help predict the effect of future red tides on dolphin populations in the Gulf of Mexico.

Our research is supported by funding from the Duke University Marine Lab, the PADI Foundation, and the American Fisheries Society. Samples were provided by the Sarasota Dolphin Research Program and the NMFS SEFSC Marine Mammal Molecular Genetics Laboratory.



Karenia brevis. Photo Credit: FWRI

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

By Elizabeth Berens McCabe, MS, Chicago Zoological Society

Natural disturbances such as harmful algal blooms can greatly affect the community dynamics of estuaries and nearshore environments. In Florida, red tides are a type of harmful algal bloom caused by the dinoflagellate *Karenia brevis*. This naturally occurring alga produces brevetoxins (PbTx), lethal neurotoxins which affect the respiratory system of vertebrates, including fish, manatees, turtles, dolphins, and seabirds. Recent work suggests PbTx persists in the food web, cycling through low trophic level fish and benthic organisms to top predators. Community and species specific responses to *K. brevis* blooms and PbTx likely function on different scales based on the temporal and spatial nature of the bloom, as well as bloom severity. Possible responses include changes in fish abundance, species composition, growth and mortality rates, and community structure. Along the west coast of Florida, *K. brevis* harmful algal blooms occur regularly in estuarine and nearshore ecosystems, with varying degrees of severity and longevity. It is imperative to identify common and species specific response patterns to fully understand the impact of a bloom.

In 2004, the Sarasota Dolphin Research Program initiated a multi-species fish survey in Sarasota Bay to investigate distribution and abundance of dolphin prey fish, in addition to fine-scale habitat selection and prey selection in bottlenose dolphins. We regularly catch, measure, count, and release fish from June-September and January-March using our 183 m purse seine sampling gear. Since this survey began, two red tides have occurred (Jan-Nov 2005 and

Aug-Oct 2006) in Sarasota Bay and vicinity. Using data gathered from our fish survey, our work has shown that these two red tide events corresponded with massive fish kills, sharp decreases in the abundance of living fishes, and changes in fish community structure (Gannon et al., 2009, *Marine Ecology Progress Series* 378:171-186). Densities of some fish species were reduced by as much as 94%. Three months following the cessation of the *K. brevis* bloom, PbTx levels in the viscera of some fish were still >1,400 ng/g. In fact, PbTx 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.

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 summer data from 2004-2009 in the seagrass habitat showed that fish abundance in Sarasota Bay was significantly lower during 2005 (red tide occurred Jan-Nov 2005) compared to all other years based on catch per unit effort (i.e., the number of fish caught per net set, CPUE). Fish abundance in the seagrass habitat rebounded in 2006 despite a brief *K. brevis* bloom that occurred Aug-Oct 2006. When the CPUE data were analyzed by month, fish abundance in August was significantly lower in 2005 compared to all other years, and in September, abundance was significantly lower in 2005 compared to 2006, 2008, and 2009. We did not detect any significant differences in CPUE across years in June and July. Our highest fish densities in the seagrass habitat were recorded in summer 2008, after a nearly two-year absence of red tide. After standardizing for differences in fishing effort between years, we were not able to detect significant differences in overall species richness across years, nor did we detect significant differences when the data were analyzed by two-month periods across years. 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. When Shannon-Weaver diversity values were analyzed, diversity differed significantly in 2005 compared to all other years. At the species level, CPUEs were analyzed for significant differences across years and then within each month across years. Several species CPUEs were significantly lower in 2005 compared to all other years, including the CPUEs of such important dolphin prey as pinfish, pigfish, spotted seatrout, and silver perch. However significance was not consistent. After the 2005 and 2006 red tides, catches of most species rebounded by 2008, however, recovery varied by species. 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). In contrast, 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).

In addition to *K. brevis* harmful algal blooms, a bloom of the diatom *Pseudo-nitzschia pseudodelicatissima* was confirmed in Sarasota Bay in 2008. Toxic *Pseudo-nitzschia spp* are known to produce domoic acid (DA), a neurotoxin that can cause amnesic shellfish poisoning in humans. Throughout 2009 and early 2010, low to moderate levels of *Pseudo-nitzschia spp* persisted. Detectable levels of PbTx and DA occurred in SB bottlenose dolphins and fish (Twiner et al., in review, *PLoS ONE*). PbTx and DA appear to persist in the food web, cycling through low trophic level fish and benthic organisms to top predators. An understanding of the possible synergistic effects of both toxins is lacking.

A Sarasota Bay resident dolphin feeding on pompano this past January.

To date, we have completed 1049 purse seine sets in 5 distinct habitats since 2004. We have sampled 132 different species and 420,968 individual fish. This past summer and winter we focused our efforts on the seagrass habitat because it is considered one of the most productive habitats in our study area. We completed 30 purse seine sets last winter despite unusually cold temperatures and 40 sets last summer. Our total winter catch consisted of just 45 species and 2528 individual fish. The average number of fish caught per set in the winter was 84.27 fish and 9.10 species per set. Our summer catch was comprised of 66 different species and 35,878 individual fish, an average of 896.95 fish and 14.95 species per set. Fish are known to move to deeper, warmer waters as temperatures drop. Our winter sampling targeted shallow water seagrass beds, therefore, our winter catch results likely reflect a temporary change in overall fish distribution rather than a dramatic drop in fish abundance in Sarasota Bay.

While fish abundance in Sarasota Bay appears to have recovered from the severe red tide events in 2005 and 2006, important questions remain 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) the differences among species regarding their responses to red tide, and (4) the economic and resource-management implications of red tide to fisheries. Long data sets are needed to answer these questions due to natural variation and the complex interactions that occur in nature. We plan to continue monitoring fish abundance and species composition in Sarasota Bay and hope to address some of these questions in the near future.

We thank the many interns and volunteers who worked on this project. This work would not be possible without them. The Batchelor Foundation, Disney Worldwide Conservation Fund, 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. This research was authorized by the Florida Fish and Wildlife Conservation Commission (Special Activity License nos. 03SR-809, 04SR-809, 04SR-809a) and by Mote Marine Laboratory's Institutional Animal Care and Use Committee (protocol nos. 06-10-DG1, 07-10-DG1, 09-09-RW2).

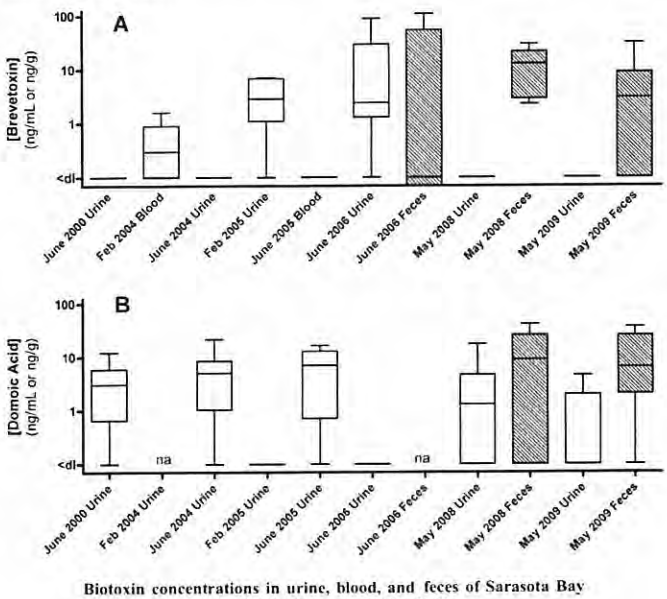
Co-occurrence of multiple algal toxins in dolphins

By Mike Twiner, PhD, University of Michigan and Spencer Fire, PhD, NOAA Marine Biotoxins Program

Marine sentinel species such as bottlenose dolphins can be negatively impacted by toxic compounds produced by naturally occurring phytoplankton (single-celled marine algae). The Sarasota Bay bottlenose dolphin population is frequently exposed to toxic blooms of the marine algae *Karenia brevis* and its associated neurotoxins, called brevetoxins. Recently, we and our colleagues at SDRP have also discovered that another group of toxic phytoplankton, known as *Pseudo-nitzschia spp.*, can also be present in Sarasota Bay and its associated neurotoxin, called domoic acid, was detected in live dolphins during a recent health assessment.

These new findings led us to initiate a retrospective survey of live dolphins sampled during health assessments in order to measure the levels of brevetoxins and domoic acid present in these animals. We have determined over a ten-year study period (2000-2009) that bottlenose dolphins are exposed to brevetoxins and/or domoic acid on a nearly annual basis, with 36% of all animals testing positive for brevetoxins and 53% testing positive for domoic acid. We also demonstrated that domoic acid concentrations in dolphins were associated with changes in white blood cell counts. In addition, we detected both of these toxins in several species of fish known to be major prey items for the Sarasota dolphin population.

Although the levels of either of these toxins in Sarasota dolphins were much lower than those reported to cause large scale mortalities in marine mammals, the effects of long term exposure or simultaneous exposure to low levels of either toxin are unknown. Our findings are an important demonstration of exposure to multiple algal toxins, and provide the scientific basis to further explore the potential long-term impacts on bottlenose dolphin health. Given that bottlenose dolphins are frequently viewed as a sentinel species that serves as an indicator of ocean health, investigations of toxic impacts on these animals can be more broadly expanded to understand the effects of toxin-producing blooms on coastal ecosystems. We thank the SDRP and their associates for their genuine interest in, and generous support of our research.



Biotoxin concentrations in urine, blood, and feces of Sarasota Bay dolphins between 2000 – 2009.

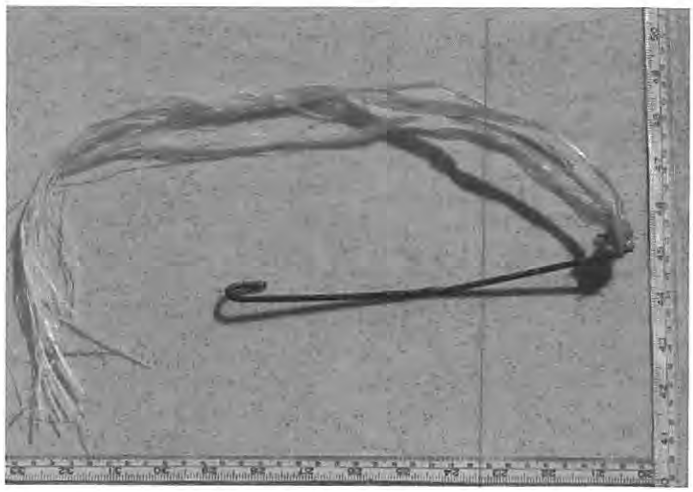
Domoic acid and brevetoxin concentrations of Sarasota Bay dolphins.

Nellie Rescue

By Katie McHugh, PhD, Chicago Zoological Society

During our February 2010 population monitoring surveys, SDRP staff observed the 9-month-old, seventh calf of a well-known Sarasota Bay resident, FB25, with something entangled around its head. Although the calf was in good condition and behaving normally, examination of photos from that encounter as well as subsequent sightings over the next few days showed both that a white plastic material had become tightly wrapped around her head and knotted near the front of her right pectoral fin and that the plastic was beginning to cause deep abrasions. Because of the potential for this type of entanglement to severely injure or kill the dolphin over time, the NOAA Fisheries Service gave SDRP the go ahead to attempt a rescue operation to cut the material off of the animal.

Rescue efforts were mobilized quickly, and with the help of staff from Mote, CZS, NOAA Fisheries Service, and Disney's Animal Programs, we made two attempts to locate and disentangle the calf at the end of February and beginning of March. On the first attempt, the team was able to locate the animal in a group heading into deep, rough waters in the Gulf of Mexico. Although we waited for several hours for them to come back towards calmer waters, unfortunately we had no such luck that day and decided to make a second rescue attempt the following week. On 1 March 2010, the team tried again and was able to quickly locate and capture the calf and her mother as well as her older sibling together in the calm, shallow waters of Little Sarasota Bay. The plastic line was removed, the calf was briefly examined by a veterinarian, and she was given a small tag to aid in identification before all three dolphins were released on site a few minutes later. The calf (formerly C257) was reserved the number FB221 and nicknamed "Nellie" in honor of Dr. Nélio Barros, a colleague who recently passed away.



Close up of the plastic material that was removed from behind Nellie's head.

Since her rescue, Nellie and her mother have been seen 17 times during our monthly population monitoring surveys. Fortunately, she healed very quickly and has been observed behaving just as any healthy dolphin calf should, often socializing with other young dolphins. She was most recently seen on 3 November 2010 in a large group of mothers, calves, and older siblings, which also included Ginger, another young Sarasota Bay resident dolphin who was successfully rehabilitated and released last year (see the next story for an update).

Deep laceration from tightly wrapped line behind Nellie's head.

Nellie, healing well about a month after her rescue.

Follow-up on recent rescues: Ginger, FB28 and Scrappy

By Aaron Barleycorn, BS, Chicago Zoological Society

The Sarasota Dolphin Research Program has participated in several dolphin rescues over the past few years. Our involvement can range from disentangling free-swimming dolphins, to treatment and release in the field, to rescuing and helping transport the animal to Mote's dolphin and whale hospital for rehabilitation. One important aspect of rescue is to track the success of our efforts through post-release follow-up monitoring. Three recent success stories are the rescues of Ginger, FB28 and Scrappy.

In December 2008, a 3-year-old female resident dolphin named Ginger stranded on Siesta Beach and was taken to Mote for rehab. Ginger was treated for respiratory and gastrointestinal problems and released 2 months later sporting a brand new radio tag. She was closely monitored for two months post-release. Initially, her range was very small; most of Ginger's early sightings were of her feeding alone off the same seawall. After the radio tag stopped transmitting, we kept track of Ginger during our monthly population monitoring surveys. She was seen over 50 times in 2009 (mostly during the early radio tracking), and 19 times in 2010. Over time, her range has increased, and she has been seen in larger groups, often socializing with other juveniles. Her most recent sighting was on 3 November 2010 off the coast of Longboat Key in a group of 21, including several juveniles, her mom and younger sibling, and FB25 with Nellie (see more about Nellie in the previous article).

Ginger, seen here on 3 November 2010, with C796 and C256, other well known Sarasota Bay juveniles.

On 22 June 2007, FB28, a 42-year-old male dolphin first tagged by the SDRP in 1971, 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 SDRP rescue team was able to approach FB28 with a long handled cutting tool and remove the line from around the dorsal fin. The line was still draped across his fluke, but cutting the tension allowed the line to clear the rest of the way on its own. FB28 was sighted 13 times in 2010, most recently on 3 November 2010 in Anna Maria Sound. He is often seen "fish-whacking," a foraging strategy involving striking fish with a quick movement of the fluke, an excellent sign that his fluke is functioning well. Now 45 years old, FB28 is one of our oldest known males. He suffers from a chronic fungal disease, lacaziosis, and is a subject of the dissertation research of Leslie Burdett Hart (see article in this issue).

FB28 alone in Anna Maria Sound during his most recent sighting on 3 November 2010.

In 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 point that it was cutting deeply into the leading edge of both of his pectoral fins. Scrappy was temporarily captured on 3 August 2007, the bathing suit was removed, and he was released at the capture site. Since his release, he has been seen over 100 times including 15 times in 2010. His last sighting was on 3 November 2010, socializing in a group of 17 dolphins in mid-Sarasota Bay. He has yet to attempt any other fashion statements.

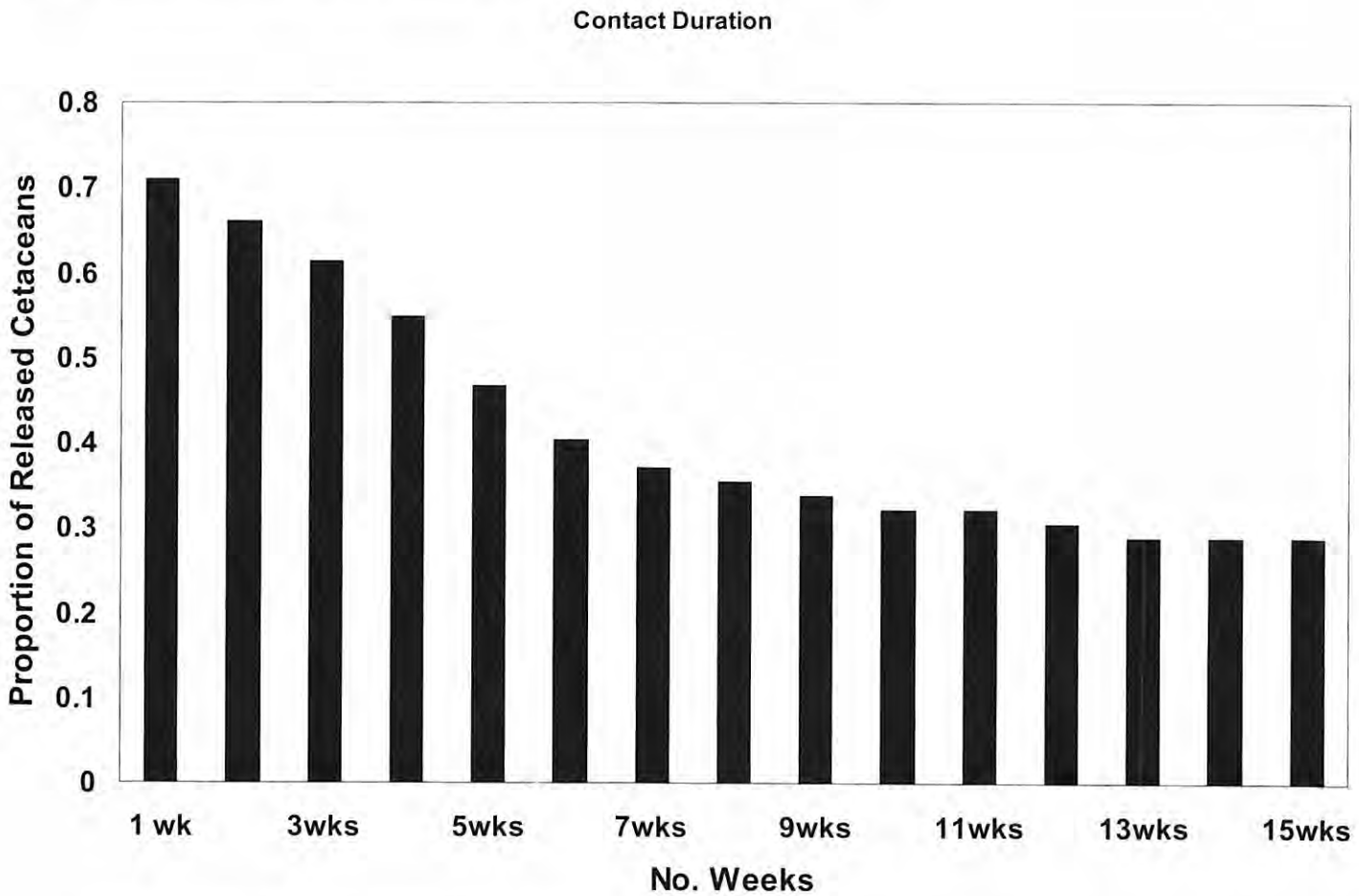
Scrappy, taking a break from socializing in mid-Sarasota Bay, 3 November 2010.

Post-release follow-up monitoring of stranded or injured dolphins

By Randall Wells, PhD, Chicago Zoological Society

Understanding the fates of dolphins returned to the wild following rescue, stranding, and rehabilitation is crucial to evaluating the effectiveness of treatments and knowing what should be done in the best interests of the sick or injured animals. Over the past two years, we have received grants from NOAA's J.H. Prescott Marine Mammal Rescue Assistance Grant Program to: 1) compile and evaluate cases of rescue or rehab and release where follow-up monitoring occurred, and 2) to provide follow-up monitoring services to cetacean rehabilitation facilities in Florida. The investigative team, including Dr. Forrest Townsend, Dr. Frances Gulland, Dr. Deb Fauquier, and Rob DiGiovanni, is evaluating 63 release cases, 31 involving bottlenose dolphins, and 32 involving Risso's dolphins, rough-toothed dolphins, short-finned pilot whales, common dolphins, harbor porpoises, and a pygmy sperm whale. Initial findings suggest that released animals that survive at least six weeks have a high probability of longer-term survival (see graph). This is a conservative estimate of how much time should pass before a rehab/release case could be declared a success, because it is influenced by premature tag failure as well as animal deaths. Not surprisingly, those animals that are able to be rescued, treated and released in the field without requiring rehabilitation and without stranding demonstrate a higher survivorship than do dolphins that come ashore or require lengthy periods of treatment.

For their 2010 NOAA's J.H. Prescott Marine Mammal Rescue Assistance Grant, the SDRP team is prepared to tag rehab dolphins with two kinds of tags. The first is a small VHF transmitter for direct radio-tracking, to facilitate observations of behavior and body condition. The second is a small satellite-linked tag with time-depth recording capabilities (STDR) to provide remote tracking options, with information provided on dive depth and duration. No cases requiring tagging and post-release monitoring have occurred in Florida since the beginning of the grant in September 2010.



The proportion of released dolphins with which contact was maintained during each week post-release. Note the leveling-off after the sixth week, suggesting a high probability for longer-term survival if they survived the first six weeks.

Manatee rescue

By Aaron Barleycorn, BS, Chicago Zoological Society

In January 2010, SDRP staff were asked to help with the rescue of a manatee cow/calf pair in the Caloosahatchee River, and I was deployed to assist. The mom, "Hatchet," had a collapsed lung from a recent boat strike, and her dependent calf, "Hatchling," although uninjured, was too young to survive without its mother. Hatchling was small enough that the rescue team wanted to attempt to catch it in a large hoop net before attempting to rescue Hatchet. This would reduce the risk of injury to both manatees and people. I was given the chance to attempt netting the calf. I felt like I was holding one of those comically large dog catcher nets you see in old movies. As I stood on the bow, we approached the pair, and after a few attempts I was able to get the net around Hatchling. We all worked together to scoop the calf onto the rescue boat (even a baby manatee is pretty heavy), and quickly transferred it to another boat. We were then able to successfully catch Hatchet and bring them both to the waiting transport truck. Both manatees were transported to the Lowry Park Zoo in Tampa for rehabilitation. Happily, both mom and calf were released back into the Caloosahatchee River on 21 September. I'm glad that my first, and probably only, attempt to hoop net a manatee was a success.

Manatee rescue team approaching Hatchling; SDRP staff member Aaron Barleycorn can be seen near the center holding the hoop net.

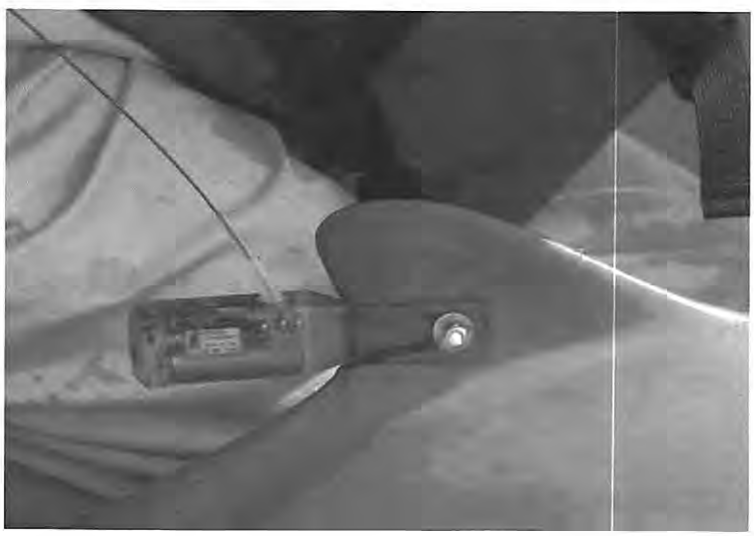
The rescue team works to bring Hatchling on to the boat after successfully hooping it.

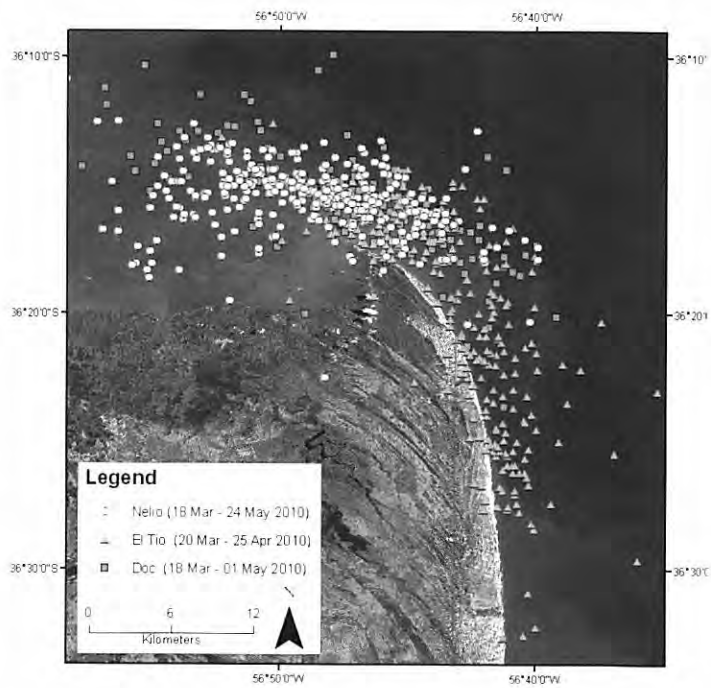
Franciscana dolphin use of waters near fishing activities

By Pablo Bordino, MS, Aquamarina, and Randall Wells, PhD, Chicago Zoological Society

Knowing how dolphins use their habitat features and the water column will provide information about how Franciscana dolphin movements and dive patterns overlap with artisanal fishing locations and activities, providing a means for evaluating potential ways to minimize entanglements in gillnets. To this end, the combined efforts of the Aquamarina, SDRP and Disney team led to the successful attachment of small satellite-linked transmitters equipped with time-depth recorders to three male Franciscana dolphins in Bahia Samborombon in March 2010. These small tags provide information on location, dive depths, and dive durations – critical information for learning how dolphins use the waters in the vicinity of fishing gear. Similar to previous findings in the same bay from tagging with location-only tags, the three tagged dolphins frequented the sandbanks at the mouth of Bahia Samborombon over the 60 days of tracking. However, two of them regularly moved offshore to waters over 15m deep. Although the sample size is small, these findings in combination with previous bycatch records suggest that adult males use habitat differently from adult females, moving farther offshore in the study area. In addition, we learned that the dolphins spent much of their time near the seafloor, where the gillnets are typically set. Our initial findings are important pieces of information for understanding relationships between bycatch and behavior and social structure of the species, as well as guiding conservation strategies, but more information is needed. Support for this project was provided by the National Geographic Society, Chicago Zoological Society, and Disney's Animal Programs.

Male Franciscana dolphin "Nélio" in Bahia Samborombon in March 2010 with a new design of satellite-linked time-depth recording tag.





Locations of Franciscana dolphins Nélio, Doc, and El Tio from satellite-linked fixes.

Home range and habitat use of Franciscana dolphins in Santa Catarina north shore, Brazil

By Claudia Rocha-Campos, Chico Mendes Institute of Biodiversity Conservation, and Marta Cremer, University of Joinville, Brazil

Franciscana dolphins are small marine cetaceans that occur from the Espírito Santo State, in Brazil, to the Province of Chubut, in Argentina, in depths of up to 30 meters. Because of their behavior and cryptic coloration, these dolphins are very difficult to observe in the wild. Mortality due to incidental captures in fishing nets is the main threat to the conservation of Franciscanas. This factor, in addition to biological and ecological characteristics, such as a relatively short life cycle and habitat limitations, constitute the main threats for survival of this species. Currently, the Franciscana dolphin is classified as vulnerable ("VU") by the IUCN Red List and as "endangered" (EN) by the Brazilian Red List.

Babitonga Bay, in Santa Catarina State, Brazil, is one of the few places within its distribution where the species occurs in estuarine waters and can be observed throughout the year in foraging and socializing areas. The bay has an area of 130 km2 and represents the most important industrial region of Santa Catarina State. The region has been mainly affected by intense boat traffic and pollution due to harbor activities. Since 1983, Babitonga Bay has been identified as an important area to the establishment of a Conservation Unit for planning of human activities, basic measures for the conservation of the typically rich environment of this estuary. Because it is a sheltered place and possesses this Franciscana population, Babitonga Bay presents an excellent opportunity for the development of ecological and behavioral studies on the species and for acquiring important data on its natural history, contributing to the proposal of conservation actions. Efficient measures of conservation depend upon the knowledge of basic ecological aspects, such as the movement patterns and habitat use of these animals.

Although challenging and extremely complex, the first attempt at Franciscana capture, tagging, release, and tracking was carried out in 2005 in Argentina by the teams of researchers Pablo Bordino, from Aquamarina, and Dr. Randall Wells, from the Sarasota Dolphin Research Program. The Proyeto Franciscana began in 2005 with the use of VHF tracking in Samborombon Bay, Buenos Aires, Argentina, and later (2006 to 2010) with satellite-linked transmitters in both San Blas and Samborombon Bays.

Today, only two projects in Brazil are being conducted with cetacean telemetry, one with the Amazon River dolphin, *Inia geoffrensis*, and one more recently with humpback whales, *Megaptera novaeangliae*, along the Brazilian coast. Because Franciscanas are in danger of extinction we began to consider if it would be possible to work with the population in the Babitonga Bay.

This project was conceived in 2008, being inspired by Bordino's research. We began by contacting Bordino, and aimed to obtain training in Argentina and develop a partnership with the teams of Aquamarina and the Sarasota Dolphin Research Program. Then, in March of 2010, researchers Claudia Rocha-Campos, from the Chico Mendes Institute of Biodiversity Conservation (ICMBio/MMA), and Marta Cremer, from the University of Joinville (UNIVILLE), had the great opportunity to participate in the Franciscana capture, tagging and field work in Samborombon Bay, Argentina. This experience was essential for learning the behavior and response of the species to the capture procedure, as well as becoming familiar with the logistical dynamics of a project with such dimensions.

Contact with the SDRP team in Argentina and agreement on the importance and the viability of developing a similar project in Brazil resulted in an invitation to participate in the Sarasota Bay bottlenose dolphin health assessment. So, in May of 2010, we had the great pleasure to participate in the Sarasota capture-release field work, together with more than 100 other cetacean researchers from several parts of the world. In this training, we got essential knowledge for the application of cetacean capture-release techniques in Brazil, and could appreciate all the logistical complexity that is also involved in a project with a bigger species that lives in an open marine environment.

From these two basic experiences of training, in Argentina and the United States, and from the partnership arranged with the teams of Bordino and Wells, we moved forward with the intention to carry out this project in Brazil, linked to the University of Joinville (UNIVILLE), and to search the necessary ways of financing this study. Recently, we received support for the project from the Brazilian oil company, Petrobras, a company with a tradition of financing environmental projects. Simultaneously, in October of 2010, The Chico Mendes Institute of Biodiversity Conservation, from the Ministry of the Environment (ICMBio/MMA), published the Action Plan for the Conservation of the Franciscana, *Pontoporia blainvillei*. This document was a result of the work of several researchers dedicated to the studies of this species in Brazil and by the incentive of projects of research and conservation, financed for the Ministry of the Environment of Brazil. This Action Plan reflects the persistence of the governmental and non-governmental sectors and the scientific community of Brazil in the conservation of this threatened species, demonstrating the importance of the union of efforts in the conservation of biodiversity. Amongst the established conservation actions in this Action Plan are acquiring knowledge of the movement patterns of Franciscanas in Babitonga Bay, increasing public awareness about the importance of conserving this species (both being the main objectives of the present study) and the conclusion of the process of creation of the Conservation Unit in this area, the Babitonga Bay Fauna Reserve.

In addition, the Franciscana Consortium is being developed among Brazil, Uruguay and Argentina, an initiative to strengthen the conservation actions necessary to protect the species along its whole distribution. The recognition of the scientific community and the Brazilian government in the establishment of these actions of conservation with high priority demonstrates the importance of this project with the species in Brazil. For the success of the work, it will be necessary to count on the support and the experience in cetacean capture and tagging of the SDRP and Aquamarina teams.

Genes and satellites to study cetacean populations

By Martin Mendez, PhD, Columbia University

Studying the relationships between environmental heterogeneity and spatial population structure for marine species is fundamental to increase our understanding of marine populations and to enhance conservation strategies. I took on this issue as part of my PhD dissertation, focusing on two coastal cetaceans: Franciscana dolphins in coastal South America, and humpback dolphins off the coasts of South Africa, Mozambique, Tanzania and Oman. Specifically, I used remote sensing oceanographic information to look for abrupt spatial changes in environmental conditions (environmental breaks) in these areas, and combined this information with genetic data to evaluate population structure for both species. Ultimately, the goal was to assess if the environmental breaks coincide spatially with the genetic structure observed.

The Franciscana dolphin work, published in the journals *Conservation Genetics* and *Molecular Ecology*, shows significant population structure between dolphins occurring in Brazilian, Uruguayan and Argentinean waters, and suggests further genetic structure within the groups of animals collected in Argentina. In addition, our analyses show a concordant spatial arrangement of the genetic and environmental breaks for the populations off Argentina, and provide evidence suggesting that a mechanism termed here "isolation by environmental distance" may explain some of the observed patterns. The humpback dolphin work, under review in the journal Heredity, shows regional oceanographic breaks that are concordant to the strong and highly significant genetic structure of this species in the study area, and suggests that surface currents and ocean color properties may play a significant role in dispersal of humpback dolphins in this region. All in all, this type of multidisciplinary work has allowed us to take a more comprehensive look at the relationships between mobile marine populations and their environment, and is currently contributing to the conservation of both species through more specific management recommendations.

Other aspects explored in my dissertation include an assessment of genetic and demographic impacts of by-catch to Franciscana dolphins (currently under review in the journal *PLoS ONE*) and an evaluation of the effectiveness of the Marine Protected Areas in Latin America (published in the journal *Latin American Journal of Aquatic Mammals*). I graduated in May 2010 and was honored with the Columbia University Distinction for my PhD Dissertation.

We acknowledge support from Martin Mendez's Dissertation Committee, Fundación Aquamarina, the local fishermen in Buenos Aires, Sackler Institute for Comparative Genomics at the American Museum of Natural History, Mote Marine Laboratory, Chicago Zoological Society, Wildlife Trust Alliance, Fundación Vida Silvestre, Columbia University and the Argentinean Government.

Education, Outreach, and Training

Education continues to be a major component of our program's 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 (chaired by Randall Wells), the IUCN Cetacean Specialist Group, the IUCN Reintroduction Specialist Group, and the Board of Governors of the Society for Marine Mammalogy, the largest association of marine mammal scientists in the world (Randall Wells, President).

International Training Opportunities: The SDRP is a component of the Chicago Zoological Society's Dolphin Research and Conservation Institute (DRCI). As part of the DRCI, we provide training opportunities for scientists and students from outside of the United States. These sponsored training opportunities allow foreign scientists to participate in SDRP field and laboratory research activities, and discuss with staff how such activities might be applied to their own situations at home. Standardized research methodologies facilitate comparisons across research sites. During 2010, we hosted two people: Ronar Lopez of Cuba, and Sujit Bairagi of India. Because of the importance of Cuba as one of only three nations surrounding and influencing the Gulf of Mexico, we have been trying for seven years to bring Cuban researchers to the SDRP for training and to begin multi-national collaborations, but this is the first time we have succeeded.

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 our program as they conduct their thesis or dissertation research. To date, about 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 2010, two doctoral students involved with our program successfully defended their dissertations: Katie McHugh and Martin Mendez. Currently, eight 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, SDRP Intern Coordinator, at: kmchugh@mote.org). During 2010, 17 interns and out-of-town volunteers provided approximately 6,600 hours of assistance to the program. In addition to the two international training participants from India and Cuba described above, we had several other interns from outside the USA, including two interns from Argentina, and one each from Australia, Denmark, England and Canada. The rest of our interns this year were from the USA. During 2010, we also had 8 local volunteers assist with our rescues, surveys, prey sampling, and capture-release operations.

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.

Mommy and Me at Mote Marine Laboratory

By Miranda Wrobel, Mote Marine Laboratory

Mommy and Me is an education program created for young children (ages 2-5) and their favorite adults to learn together through marine-themed crafts, games, songs, role play, and special guided visits to Mote exhibits.

In April of 2010, Mommy and Me curriculum focused on research projects that were being conducted by Mote staff and partners all over the world. This included the Chicago Zoological Society's program on Argentina where SDRP scientists traveled to study the Franciscana dolphin. Students learned about the biology of the Franciscana dolphin and how the scientists were able to tag the dolphins with radio transmitters to learn about their habitat and range.

The children began by breaking up into small groups and boarding their imaginary boats. Students worked together to gently lift stuffed dolphins out of the water and onto their boats to tag them with clothes-pin radio tags. Each student was able to simulate being a scientist by finding the dolphin and properly tagging and releasing it. In addition, students were able to match the colors from their tags to different locations in the classroom where those dolphins were located. By incorporating maps into the activity, students learned that the Franciscana dolphin has a small range and likes to stay in one location, very similar to the bottlenose dolphins that inhabit Sarasota Bay!

A child "tags" a Franciscana dolphin during the Mote Marine Laboratory Mommy and Me program.

Where are they now? An SDRP past intern's perspective: A journey from the east to the west to study dolphins!

By Mridula Srinivasan, PhD, NOAA Fisheries Service

As a girl born and raised in India, marine biology was not a subject that was known or discussed as a career option. My only exposure to marine mammals and the oceans was through television documentaries and magazines. I saw my first wild dolphin when I was 22 years old! Yet, driven by a strong desire to study and learn about the oceans and dolphins in particular, I took a trans-Atlantic trip to the United States to pursue higher studies.

My first serious foray into studying dolphins in the field was courtesy of a 3.5 month internship at Mote Marine Laboratory with the SDRP through then PhD student Spencer Fire in May-Aug 2004. Spencer was looking at the effect of *Karenia brevis* on bottlenose dolphin behavior in Sarasota Bay, Florida. It involved both lab and field components. I am very grateful to Spencer, Kim-Bassos Hull, Damon Gannon, other interns and staff with the SDRP for patiently teaching me the ropes of boat-based field work. During my internship, I was involved in photo-identification, collection of dolphin behavioral data, biopsy sampling, radio-tracking, synoptic surveys, purse seining and dolphin prey acoustics and identification. It was perhaps one of the best experiences of my life, a hard hitting and intensive introduction to dolphin research. I was particularly impressed by the corporate efficiency with which the SDRP conducted its daily and long-term operations. Data were collected and archived in a systematic fashion. Also, all new recruits and volunteers went through a training period that ensured consistent data collection methods regardless of a change in research leads - a model worth following for those engaged in marine mammal research.

In 2005, I joined a PhD program in Wildlife and Fisheries Sciences/Marine Biology at Texas A & M with Dr. Bernd Würsig as my academic supervisor. Besides having an excellent mentor in Bernd, the faculty at Texas A & M and the resources available made it a wonderful place for higher learning. My dissertation research dealt with trying to understand the costs vs. benefits of dusky dolphin (*Lagenorhynchus obscurus*) anti-predator decision making under threat from killer whales (*Orcinus orca*) and sharks off Kaikoura, New Zealand. Post completion of my PhD in 2009, I secured a 1-year Knauss Sea Grant Fellowship at National Oceanic and Atmospheric Administration (NOAA) Research –International. The Knauss Fellowship provided me an excellent opportunity to integrate science with marine policy at the highest echelons of NOAA Research leadership. Besides the opportunity to travel domestically and internationally, I learned about the latest developments in climatic and physical sciences, which I hope to incorporate into marine mammal studies. Currently, I work as a marine mammal biologist in the Office of Science and Technology, NOAA Fisheries Service, handling Protected Species Science issues. Besides actively working with Indian partners to set up a research and marine animal stranding program in India, I continue to work on my doctoral related interests and plan to return to New Zealand to follow up on previous research. There have been ups and downs, missed opportunities and detours, and yet for what seems a lifetime, it was well worth the trip to becoming a marine mammal scientist! Thank you, Sarasota Dolphin Research Program!

Beginning the Cuba-SDRP training and research collaboration

By Ronar Lopez Cañizares, MS, Animal Health Group, National Aquarium of Cuba

To participate in the activities of the Sarasota Dolphin Research Program was a privilege for me. The first thing that I could see was the quality and professionalism of each member of the staff. They are excellent people. I had the opportunity to work in the field in two surveys carried out in Sarasota Bay. The health of the environment is remarkable, how the bay sustains a wide variety of species like dolphins, birds, fishes and manatees, and how they cohabit apparently peacefully with human activities (fisheries, nautical activities). During surveys, the work is meticulous and serious. It's amazing how the staff know almost every dolphin in the area -- of course, that's due to hard work for more than forty years.

I spent many hours working in the lab on the data processing, especially with the photo-identification. It is impressive the database that the program possesses, both digital and hard copy as well, the records of all their animals and the zeal with which they preserve and maintain it in the institution. The work in the program is familiar for me, because I have been working in that theme in Cuba for six years. There are many similarities in the methodology of the two programs. The Sarasota Dolphin Research Program has been a guide for the Cuban team since the beginning of our study twelve years ago. The processing of images was crucial for me, because it gave me an idea of how to organize our database for a faster and more efficient use. This exchange between two groups allows standardizing methods to obtain results that can be compared. My visit to Sarasota is, undoubtedly, a big step in that direction. I would like to thank all of the staff of the Sarasota Dolphin Research Program for treating me as a member; especially to Randall Wells for all his teachings, his help, his concern and for being a promoter of this training. Special thanks to Jason Allen for his attention and his unconditional help.

Ronar Lopez (first row, far right) of Cuba, with Alberto Delgado (to his right) of Mexico and Randall Wells (to Alberto's right), comprise the cetacean research committee of the Trinational Initiative for Marine Science and Conservation in the Gulf of Mexico. The group convened at Mote Marine Laboratory in September 2010. Photo Credit: Mote Marine Laboratory.

International training perspective

By Celeste Bollini and Yamila Rodriguez

We came from Mar del Plata, a tourist city known as "La ciudad feliz" (The happy city), situated on the Atlantic coast of Argentina in Buenos Aires Province. We are studying biology at the University of Mar del Plata (UNMdP). Our town is famous for its beautiful beaches, which every year attract a great number of tourists to our coast.

Two years ago we thought that we needed to get some fieldwork and research experience, so we decided to apply for some programs around America. We were very lucky because we got the chance to participate in two different programs at Mote Marine Laboratory. Therefore in December 2008 we came to Sarasota for the first time. During that first visit, Yamila worked in the Sea Turtle Care and Research Program, whose coordinators were Kelly Martin and Sarah Alessi. In that program, Yamila got some experience with regard to the care and training of captivity sea turtles (green and loggerhead), the design of environmental enrichment devices and in the interaction with the public. Celeste worked as an intern with Joe Gaspard, Kim Dziuk and Latoshia Read in the Manatee Care and Research Program, where she says "they taught her so many things starting with the biology of manatees (given that manatees are not distributed in Argentina), conservation status, training techniques, feed preparation, and environmental enrichment. Also, I had the great opportunity to participate in their research project, something completely new for me because that was the first time that I was involved in a scientific team."

As for how we got connected to the Chicago Zoological Society's Sarasota Dolphin Research Program, we both have personal stories. For Yamila, it began with a popular Argentine custom: "As most Argentine people, I like drinking a lot of "mate" (a type of infusion drink with a special straw and cup), which is a very traditional custom in my country. When Sarah saw my mate she said "I have a friend that works with dolphins that drinks mate all the time!" That's how I met Jason Allen – he knew about mate because he frequently visits Argentina for research - and he invited me to go with him one morning to do a dolphin survey. I was charmed with his work so I decided to apply to come back the following summer as an intern for the SDRP. When they told me that I had been accepted it was great news because I knew that program is the world's longest-running study of a wild dolphin population, and therefore, a great opportunity for us to learn new things."

Celeste was equally excited: "During December 2008, the first time that I came to Mote, I got the chance to participate once in a dolphin survey with SDRP. That was the first time that I saw these wonderful animals in their natural habitat. In that moment I realized that I wanted to apply for the SDRP internship so I could work close to them. With the help of Joe, Kim and Latoshia, on February 24, 2009, Jason Allen and Aaron Barleycorn called Yamila and me and gave us the news: we had been accepted to participate in their program. I am not going to forget that day because it was my birthday and that was the best present ever."

After a long year of studying and working back home, last summer we came back to Sarasota to participate in the SDRP. The experience was excellent because we learned a lot about bottlenose dolphins and their prey. Also we were trained in photo-id techniques, boating (for example, boat maintenance and knotting), dolphin behavior observation, data entry, sighting sheets and different lab procedures, such as GIS. But above all we are very grateful because in our last week we were involved in the rescue of a dolphin calf named "Nellie". About this rescue, Celeste said that: "One of the things that I liked the most about this experience was the great professionalism with which the staff worked in such a complex situation, but at the same time, making it look easy for me." From Yamila: "I feel that that day was the best that I had ever had because in that moment I confirmed that this is what I want to do for the rest of my life."

To sum up this brief description of our experience as interns, we want to deeply thank all the staff members of the SDRP who were always teaching and explaining things to us. Thank you for giving us this unique and wonderful opportunity and for making us happy during the time we spent in the SDRP and making us feel all the time like we were at home.

We will be returning to the SDRP in 2011 to work on our senior theses for our university.

Celeste Bollini and Yamila Rodriguez participating in the rescue of "Nellie" earlier this year.

Professional Activity Summary

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

Peer-reviewed Journal Articles and Book Chapters

Balmer, B.C., L.H. Schwacke and R.S. Wells. 2010. Linking dive behavior to satellite-linked tag condition for a bottlenose dolphin (*Tursiops truncatus*) along Florida's northern Gulf of Mexico coast. Aquatic Mammals 36:1-8.

Barbieri, M.M., W. A. McLellan, R. S. Wells, J. A. Blum, S. Hofmann, J. Gannon, and D. A. Pabst. 2010. 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 26:53-66.

Barros, N.B., P. Ostrom, C. Stricker and R.S. Wells. 2010. Stable isotopes differentiate bottlenose dolphins off west central Florida. Marine Mammal Science. 26:324-336.

Berens McCabe, E., D.P. Gannon, N.B. Barros and R.S. Wells. 2010. Prey selection in a resident common bottlenose dolphin (*Tursiops truncatus*) community in Sarasota Bay, Florida. Marine Biology 157(5):931-942. DOI 10.1007/s00227-009-1371-2

Bowen, W.D., J.D. Baker, D. Siniff, I.L. Boyd, R. Wells, J.K.B. Ford, S.D Kraus, S.D., J.A. Estes and I. Stirling. 2010. Long-term Studies. Pp. 283-305 *In*: I. Boyd, D. Bowen and S. Iverson (eds.), Marine Mammal Ecology and Conservation: A Handbook of Techniques. Oxford University Press.

Bryan, C.E., S.J. Christopher, W.A. McLellan, W.E. McFee, L.H. Schwacke and R.S. Wells. 2010. Application of ICP-MS to examining the utility of skin as a monitoring tissue for trace elements in bottlenose dolphin, *Tursiops truncatus*. The Open Chemical and Biomedical Methods Journal 3:169-178.

Burdett Hart, L., R.S. Wells, J.D. Adams, D.S. Rotstein and L.H. Schwacke. 2010. Modeling lacaziosis lesion progression in common bottlenose dolphins *Tursiops truncatus* using long-term photographic records. Diseases of Aquatic Organisms 90:105-112.

Fauquier, D.A., M.J. Kinsel, M.D. Dailey, G.E. Sutton, M.K. Stolen, R.S. Wells and F.M.D. Gulland. 2009. Prevalence and pathology of lungworm infection in bottlenose dolphins (*Tursiops truncatus*) from southwest Florida. Diseases of Aquatic Organisms 88:85-90.

Kucklick, J., R. Pugh, P. Becker, J. Keller, R. Day, J. Yordy, A. Moors, S. Christopher, C. Bryan, L. Schwacke, C. Goetz, R. Wells, B. Balmer, A. Hohn and T. Rowles. 2010. Specimen banking for marine animal health assessment. Pp. 15-23 *In:* T. Isobe, K. Moniyama, A. Subramanian, and S. Tanabe, eds., Interdisciplinary Studies on Environmental Chemistry – Environmental Specimen Bank. TERRAPUB.

Loughlin, T., L. Cunningham, N. Gales, R.S. Wells and I. Boyd. 2010. Marking and capturing. Pp. 16-41 *In:* I. Boyd, D. Bowen and S. Iverson (eds.), Marine Mammal Ecology and Conservation: A Handbook of Techniques. Oxford University Press.

Mancia, A. G. W. Warr, J.S. Almeida, A. Veloso, R. S. Wells and R. W. Chapman. 2010. Transcriptome profiles: Diagnostic signature of dolphin populations. Estuaries and Coasts 33:919-929.

Mann, D., M. Hill-Cook, C.A. Manire, D. Greenhow, E. Montie, J. Powell, R.S. Wells, G. Bauer, P. Cunningham-Smith, R. Lingenfelser, R. DiGiovanni, A. Stone, M. Brodsky, R. Stevens, G. Kieffer and P. Hoetjes. 2010. Hearing loss in stranded odontocete dolphins and whales. PLoS ONE 5(11):e13824. doi:10.1371/journal.pone.0013824

Mendez, M., H. C. Rosenbaum, A. Subramaniam, C. Yackulic and P. Bordino. 2010. Isolation by environmental distance in mobile marine species: molecular ecology of franciscana dolphins at their southern range. Molecular Ecology 19: 2212-2228.

Sayigh, L. S. and V. Janik. 2010. Dolphin signature whistles. Pp. 553-561 *In:* Breed M.D. and Moore J., (eds.) Encyclopedia of Animal Behavior, volume 1. Oxford: Academic Press.

Schwacke, L.H., A.J. Hall, F.I. Townsend, R.S. Wells, L.J. Hansen, A.A. Hohn, G.D. Bossart, P.A. Fair and T.K. Rowles. 2009. Hematologic and serum biochemical reference intervals for free-ranging common bottlenose dolphins (*Tursiops truncatus*) and variation in the distributions of clinicopathologic values related to geographic sampling site. Am J Vet Res 70: 973-985.

Schwacke L.H., M.J. Twiner, S. De Guise, B.C. Balmer, R.S. Wells, F.I. Townsend, D.C. Rotstein, R.A. Varela, L.J. Hansen, E.S. Zolman, T.R. Spradlin, M. Levin, H. Leibrecht, Z. Wang and T.K. Rowles. 2010. Eosinophilia and biotoxin exposure in bottlenose dolphins (*Tursiops truncatus*) from a coastal area impacted by repeated mortality events. Environmental Research 110:548-555.

Yordy, J.E., M.A.M. Mollenhauer, RM. Wilson, R.S. Wells, A. Hohn, J. Sweeney, L.H. Schwacke, T.K. Rowles, J.R. Kucklick, and M.M. Peden-Adams. 2010. 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 29:2143-2153.

Yordy, J, R.S. Wells, B.C. Balmer, L. Schwacke, T. Rowles and J.R. Kucklick. 2010. Life history as a source of variation for persistent organic pollutant (POP) patterns in a community of common bottlenose dolphins (*Tursiops truncatus*) resident to Sarasota Bay, FL. Science of the Total Environment 408:2163-2172.

Yordy, J.E., D.A. Pabst, W.A. McLellan, R.S. Wells, T.K. Rowles, and J.R. Kucklick. 2010. Tissue-specific distribution and whole body burden estimates of persistent organic pollutants in the bottlenose dolphin (*Tursiops truncatus*). Environmental Toxicology and Chemistry 29:1-11.

Yordy, J.E., R.S. Wells, B.C. Balmer, L.H. Schwacke, T.K. Rowles and J.R. Kucklick. 2010. Partitioning of persistent organic pollutants (POPs) between blubber and blood of wild bottlenose dolphins: Implications for biomonitoring and health. Environmental Science and Technology 44:4789-4795.

Manuscripts In Press

Dunshea, G., D. Duffield, N. Gales, M. Hindell, R.S. Wells and S.N. Jarman. Accepted pending revision. Telomeres as age markers in animal molecular ecology. Molecular Ecology Resources.

McHugh, K.A., J.B. Allen, A.A. Barleycorn, and R.S. Wells. In press. Severe *Karenia brevis* red tides influence juvenile bottlenose dolphin (*Tursiops truncatus*) behavior in Sarasota Bay, Florida. Marine Mammal Science. DOI: 10.1111/j.1748-7692.2010.00428.x.

Mendez, M., H.C. Rosenbaum, R.S. Wells, M.A. Stamper and P. Bordino. In press. Genetic evidence highlights serious demographic impacts of by-catch in cetaceans. PLoS ONE.

Nollens, H.H., R. Rivera, G. Palacios, J.F.X. Wellehan, J.T. Saliki, S.L. Caseltine, C.R. Smith, E.D. Jensen, J. Hui, W.I. Lipkin, P.K. Yochem, R.S. Wells, J. St. Leger and S. Venn-Watson. In press. New recognition of *Enterovirus* infections in bottlenose dolphins (*Tursiops truncatus*). Veterinary Microbiology. DOI: 10.1016/j.vetmic.2009.05.010

Powell, J.R. and R.S. Wells. In press. Recreational fishing depredation and associated behaviors involving common bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. Marine Mammal Science.

Rowles, T.K., L.S. Schwacke, R.S. Wells, J.T. Saliki, L. Hansen, A. Hohn, F. Townsend, R.A. Sayre and A.J. Hall. In press. Evidence of susceptibility to morbillivirus infection in cetaceans from the United States. Marine Mammal Science.

Venn-Watson, S., F.I. Townsend, R. Daniels, J. Sweeney, J. McBain, L. Klatsky, C. Hicks, L. Schwacke, R.S. Wells and C.R. Smith. In press. Hypocitraturia in Atlantic bottlenose dolphins (*Tursiops truncatus*): Assessing a potential risk factor for urate nephrolithiasis. Comparative Medicine.

Manuscripts In Review

Balmer, B. C., R. S. Wells, L. H. Schwacke, T. K. Rowles, C. Hunter, E. S. Zolman, F. I. Townsend, B. Danielson, A. J. Westgate, W. A. McLellan and D. A. Pabst. In review. Evaluation of a single-pin, satellite-linked transmitter deployed on bottlenose dolphins (*Tursiops truncatus*) along the coast of Georgia, U.S.A. Aquatic Mammals.

Bassos-Hull, K., R. Perrtree, C. Shepard, S. Schilling, A. Barleycorn, J. Allen, B. Balmer, W. Pine, and R. Wells. In review. Long-term site fidelity and seasonal abundance estimates of common bottlenose dolphins (*Tursiops truncatus*) along the southwest coast of Florida and responses to natural perturbations. Journal of Cetacean Research and Management.

Burdett Hart, L., D.S. Rotstein, R.S. Wells, L.H. Schwacke. In review. Lacaziosis and Lacaziois-like prevalence among common bottlenose dolphins (*Tursiops truncatus*) from the west coast of Florida, USA. EcoHealth.

DeLynn, R.E., G. Lovewell, R.S. Wells and G. Early. In review. Congenital scoliosis of a bottlenose dolphin. Journal of Wildlife Disease.

Janik, V., S. King, L. Sayigh and R.S. Wells. In review. Identifying signature whistles from recordings of groups of unrestrained bottlenose dolphins (*Tursiops truncatus*). Marine Mammal Science.

Kucklick, J., L. Schwacke, R. Wells, A. Hohn, A. Guichard, J. Yordy, L. Hansen, E. Zolman, R. Wilson, J. Litz, D. Nowacek, T. Rowles, R. Pught, B. Balmer, C. Sinclair, and P. Rosel. In author review. Bottlenose dolphins as indicators of persistent organic pollutants in waters along the US East and Gulf of Mexico coasts. Environmental Science and Technology.

Mendez, M., A. Subramaniam, T. Collins, G. Minton, R. Baldwin, P. Berggren, A. Särnblad, V. M. Peddemors, L. Karczmarski, A. Guissamulo and H. C. Rosenbaum. In review. Molecular ecology meets remote sensing: environmental drivers to population structure of humpback dolphins in the Western Indian Ocean. submitted to Heredity.

Miller, D.L., V. Woshner, E.L. Styer, S. Ferguson, K.K. Knott, M.J. Gray, R.S. Wells and T.M. O'Hara. In review. Histological findings in free-ranging Sarasota Bay bottlenose dolphin (*Tursiops truncatus*) skin: Mercury, selenium and seasonal factors. EcoHealth.

St. Aubin, D.J., K.A. Forney, S.J. Chivers, M.D. Scott, K. Danil, T. Romano, R.S. Wells and F.M.D. Gulland. In review. Hematological, serum and plasma chemical constituents in pantropical spotted dolphins (*Stenella attenuata*) following chase, encirclement and tagging. Marine Mammal Science.

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.

Twiner, M.J., S.E. Fire, L. Schwacke, L. Davidson, Z. Wang, S. Morton, S. Roth, B. Balmer, T. Rowles and R. Wells. In review. Concurrent exposure of bottlenose dolphins (*Tursiops truncatus*) to multiple toxins in southwest Florida, USA. PLoS ONE.

Wells, R.S. In review. Social structure and life history of common bottlenose dolphins near Sarasota Bay, Florida: Insights from four decades and five generations. Pp. xx-xx *In:* J. Yamagiwa and L. Karczmarski, eds., Field Studies of Primates and Cetaceans: Understanding and Conserving Complex Mammalian Societies. Springer.

Doctoral Dissertations

McHugh, K.A. 2010. Behavioral Development of Free-Ranging Juvenile Bottlenose Dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. Dissertation, University of California Davis. 169 pp.

Mendez, M. 2010. Environmental factors to population structure in mobile marine organisms: a combined genetic-oceanographic approach in coastal cetaceans. PhD., Columbia University, New York 124 pp.

Popular Articles

Wells, R.S. 2010. Feeling the heat – potential climate change impacts on bottlenose dolphins. Whalewatcher Journal of the American Cetacean Society 39(2):12-17.

Presentations at Professional Meetings

Balmer, B. C., L. H. Schwacke, E. S. Zolman, S. M. Lane, T. Speakman, J. Kucklick, R. C. George and R. S. Wells. 2010. Utilizing variation in persistent organic pollutants to identify bottlenose dolphin (*Tursiops truncatus*) stock structure along the Georgia coast. Society of Environmental Toxicology and Chemistry (SETAC) 31st Annual Meeting. 7-11 November 2010. Portland, OR (Oral Presentation).

Balmer, B. C., R. S. Wells, L. H. Schwacke, E. Zolman, S. M. Lane, T. Speakman, J. Kucklick and D. A. Pabst. 2010. Geographic variation in persistent organic pollutants (POPs) from bottlenose dolphins (*Tursiops truncatus*) along the Georgia coast. Southeast and Mid-Atlantic Marine Mammal Symposium (Seamamm 2010. 26-28 March 2010. Virginia Beach, VA (Oral Presentation Best Ph.D. Presentation.

Balmer, B. C., R. S. Wells, L. H. Schwacke, W. A. McLellan, T. K. Rowles, F. I. Townsend, J. H. Schwacke, E. S. Zolman and D. A. Pabst. 2010. Combining existing and novel techniques to determine short-term movement patterns of bottlenose dolphins (*Tursiops truncatus*). 2010 Ocean Sciences Meeting. 22-26 February 2010. Portland, OR. (Poster presentation).

Bordino, P., R. Wells and A. Stamper. 2010. Differential habitat use by Franciscana dolphin males? XIV Reunião de Trabalho de Especialistas em Mamíferos Aquáticos da América do Sul e o 8° Congresso de Sociedadae Latinoamericana de Especialistas de Mamiferos Aquáticos (SOLAMAC), 24-28 October, Florianópolis, Brasil.

Kucklick, J., J. Yordy, A. Peck, R. Wells, A. Hohn, J. Litz, L. Schwacke, B. Balmer, L. Hansen, E. Zolman, and T. Rowles. 2009. The influence of location on concentrations and patterns of persistent organic pollutants accumulated in bottlenose dolphin blubber . Society of Environmental Toxicology and Chemistry North American Meeting New Orleans, LA.November 19-23, 2009.

Kucklick, J. 2010. Exposure, toxicology, and risk assessment of contaminants to marine mammals. International Whaling Commission Pollution 2000+. Sausalito, CA. February 22-24, 2010.

Kucklick, J., R. Pugh, P. Becker, J. Keller, R. Day, J. Yordy, A. Moors, S. Christopher, C. Bryan, L. Schwacke, C. Goetz, R. Wells, B. Balmer, A. Hohn, and T. Rowles. 2009. Specimen banking for marine animal health assessment. International Symposium on Specimen Banking. Ehime, Japan. December 3-5, 2009.

Rosenbaum, H.C, R.S. Wells, B.D. Smith, S.E. Alter, C.J. Lagueux, C. Campbell and S. Pacyna. 2010. Ocean giants in a changing climate: Impacts and challenges facing marine species and their conservation. ESA 95th Annual Meeting, August 1-6, 2010 (presented by Rosenbaum)

Rossman, S.L., N.B. Barros, P.H. Ostrom, C.A. Striker, and R.S. Wells. Temporal $\delta^{13}C$ records from bottlenose dolphins (*Tursiops truncatus*) reflect variation in foraging location and global carbon cycling: American Geophysical Union, San Francisco, CA: Dec, 2010.

Sayigh, L. S. and V. M. Janik. 2010. Are bottlenose dolphin signature whistles referential signals? Invited talk at the INCORE Thematic Meeting on Comparative and Evolutionary Perspectives on Referential Communication and Cooperation, Berlin, Germany, June 2010.

Schwierzke-Wade, L., D.L. Wetzel, R.S. Wells and J.E. Reynolds. 2010. Assessment of fertility potential in the bottlenose dolphin (*Tursiops truncatus*): Application of ELISA-based biomarker analysis. SETAC North America Annual Meeting, Portland, OR.

Wells, R.S. 2010. Small cetaceans in a rapidly changing world. Invited banquet address, American Cetacean Society 12th International Conference, November 12-14, Monterey, CA.

Wells, R.S. 2010. Bottlenose dolphins as sentinels of ecosystem health and climate change. SOMEMMA 32 Reunión Internacional para el estudio de los Mamiferos Marinos, 2-6 May 2010, Xalapa, Mexico. (plenary address)

Wells, R.S. 2010. Small cetacean disentanglements: Changing knotty to nice. National Marine Animal Health & Stranding Network Conference. 6-9 April 2010, Shepherdstown, WV.

Wells, R.S. 2010. Sarasota Dolphin Research Program: Four decades of study of a resident bottlenose dolphin population. ONR Population Consequences of Acoustic Disturbance Workshop, 4-6 March 2010, Santa Barbara, CA.

Wells, R.S. 2010. Bottlenose dolphin health assessment in Sarasota Bay, Florida. NMFS Beluga Health Assessment Workshop, 8-10 March 2010, Seattle, WA.

Invited Public, University, School Lectures

Bassos-Hull, K. 2010. Dolphin research along the west coast of Florida: 40 years of study. Invited speaker for the Captiva Island Yacht Club's education series. 10 March 2010.

Bassos-Hull, K. 2010. Dolphin research along the west coast of Florida: 40 years of study including the reintroduction story of Echo and Misha . Invited speaker for the Friends of the Island Library environmental lecture series. 11 March 2010.

Bassos-Hull, K. 2010. Dolphin research along the west coast of Florida: 40 years of study. Invited speaker for National Marine Fisheries Service "Dolphin Smart" workshop. Ft. Myers, FL. 12 May 2010.

Wells, R.S. 2010. Dolphin conservation research in Sarasota Bay, Florida: Lessons from 4 decades and 5 generations. Georgia Aquarium, Atlanta, GA 15 Oct 10.

Wells, R.S. 2010. Factors influencing wild bottlenose dolphin health and survival. Advanced Topics in Zoological Medicine, University of Illinois. 1 Sep 10.

Wells, R.S. 2010. Dolphin conservation research in Sarasota Bay, Florida: Lessons from 4 decades and 5 generations. NOAA Fisheries Service, Southeast Regional Office, St. Petersburg, FL. 29 Jul 10

Wells, R.S. 2010. Factors influencing wild bottlenose dolphin health and survival. SEAVET, U. of Florida, College of Veterinary Medicine. 28 Jun 10.

Wells, R.S. 2010. Cetacean natural history and life history: Odontocete behavioral ecology. Introduction to Marine Wildlife. U. of Florida, College of Veterinary Medicine. 7 Jun 10.

Wells, R.S. 2010. Dolphin mortalities: Individual deaths, mass strandings, and Unusual Mortality Events. Introduction to Marine Wildlife. U. of Florida, College of Veterinary Medicine. 7 Jun 10.

Wells, R.S. 2010. Dolphin field research techniques: Descriptions and applications. Introduction to Marine Wildlife. U. of Florida, College of Veterinary Medicine. 7 Jun 10.

Wells, R.S. 2010. The world's longest-running study of a dolphin population: Lessons from four decades and 5 generations. NMFS Dolphin Smart Program, Sarasota, FL. 12 May 10

Wells, R.S. 2010. The world's longest-running study of a dolphin population: Lessons from four decades and 5 generations. Mote Marine Laboratory Volunteer Class. 29 Mar 10.

Wells, R.S. 2010. They call him Flipper...and Nicklo, and Dr. Strangenotch, and Killer...Getting to know Sarasota Bay's dolphins over four decades. Special Lecture Series, Mote Marine Laboratory. 8 Feb 10.

Wells, R.S. 2010. Mote's Science Café: Exploring the role of creativity in art and science. Ceviché Restaurant Sarasota. 13 Jan 10.

Want to Learn More?

The Sarasota Dolphin Research Program website, www.sarasotadolphin.org, contains archived articles from previous issues of *Nicks 'n 'Notches* as well as updates.

Snap the code to view the Sarasota Dolphin Research Program website. If you do not have an app on your mobile device, simply download a QR code reader application to your phone. Once downloaded, access the app and snap a picture of the bar code to be connected

Another excellent resource is the Society for Marine Mammalogy (SMM) website, which provides up-to-date descriptions of marine mammal species (fact sheets) at:

http://www.marinemammalscience.org/factsheets

In addition, the SMM provides the most current accepted marine mammal taxonomy list at:

http://www.marinemammalscience.org/taxonomy

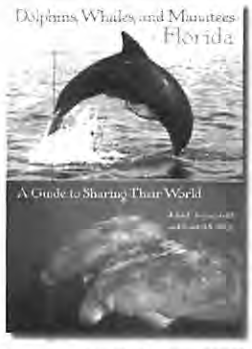
The Society for Marine Mammalogy, the largest association of marine mammal scientists in the world, will hold its 19th Biennial Conference on the Biology of Marine Mammals at the Tampa, Florida Convention Center, during November 26 – December 2, 2011. It is anticipated that 1,500 – 2,000 scientists and students from around the world will attend, presenting their most recent findings on a wide range of topics. For more information and updates on plans for this conference, please see:

http://www.marinemammalscience.org/conference

19TH BIENNIAL CONFERENCE
ON
THE BIOLOGY
OF MARINE MAMMALS
TAMPA, FLORIDA
NOVEMBER 27 - DECEMBER 2, 2011

The IUCN develops and maintains the most widely-accepted descriptions of the status of animal and plant species around the world. For the most up-to-date information on the status of cetacean species, please visit: http://www.iucn-csg.org/

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

Population Dynamics (of SDRP staff and students)

The composition of the SDRP community has seen some changes over the past year. In response to all of the additional work brought on by the oil spill, Carolyn Cush and Sunnie Hart have joined us to help with backlogs of photo-analysis. Carolyn has a number of years of experience with dolphin and manatee photographic identification and Sunnie served as an excellent intern with our program earlier in the year. Sunnie will also help Elizabeth Berens McCabe with our fish surveys and phytoplankton monitoring. Jennifer Hebert has moved on. Katie McHugh, who started as an intern with our program in 2000, completed her doctoral dissertation in 2010 and now works as a post-doc with our program, responsible for overseeing our behavioral studies.

We are very sad to report the loss of a dear colleague in 2010. Dr. Nélio Barros passed away on 10 February, 2010 in Tillamook, Oregon after a battle with cancer. Nélio worked closely with our program for nearly two decades. He was an expert in feeding ecology of small and large cetaceans using stomach contents and tissue samples to examine prey and trophic level interactions. He contributed to field studies throughout the world including the southeast coast of the United States, Hong Kong, Brazil, South Africa and the western United States. He examined small structures including fish otoliths and squid beaks to determine ingested prey in stranded animals and later expanded this work by utilizing tissue samples for stable isotope analysis to determine longer term trends in trophic food webs. He contributed significantly to our understanding of the importance of sound-producing fish in the diets of bottlenose dolphins, and filled in many gaps in our knowledge of the biology and ecology of difficult-to-study pygmy and dwarf sperm whales. He was a remarkable friend and mentor to many and will always be remembered for his smile, generous spirit, and his diligent work on behalf of marine mammals all over the globe.

Nélio Barros uses an ultrasound to measure the thickness of a dolphin's blubber layer during a health assessment.

Nélio Barros, as program manager for Mote Marine Laboratory's Stranding Investigations Program, investigates a report of an entangled dolphin.

Nélio Barros, a consumate gardener and farmer, enjoying the fruits of his efforts at his home in Tillamook, Oregon, in September 2009.

Chicago Zoological Society Staff

Jason Allen, BS, Lab and Field Coordinator
Brian Balmer, MS, Research Associate
Aaron Barleycorn, BS, Research Assistant
Elizabeth Berens McCabe, MS, Research Associate
Carolyn Cush, BS, Research Assistant
Sunnie Hart, BS, Research Assistant
Jennifer Hebert, MS, Research Assistant
Katie McHugh, PhD, Post-doc
Gene Stover, BS, Operations Specialist
Randall Wells, PhD, Program Director

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

Doctoral Students During 2010

Brian Balmer, University of North Carolina-Wilmington
Leslie Burdett, Medical University of South Carolina
Kristina Cammen, Duke University
Glenn Dunshea, University of Tasmania
Salomé Dussan-Duque, University of Saint Andrews
Deborah Fauquier, University of California-Santa Cruz
Katie McHugh, University of California-Davis
Martin Mendez, Columbia University
Sam Rossman, Michigan State University
Peter Simard, University of South Florida

Pablo Bordino, Bill Scott, and Randy Wells in Argentina

Elizabeth Berens McCabe enjoying our new monitors donated by René

Interns and Other Visiting Volunteers During 2010

Sujit Bairagi (India)
Stan Balmer
Celeste Bollini (Argentina)
René Byrskov (Denmark)
Elizabeth Davidson (Canada)
Paul Davison (England)
Julia Goss
Mary Gryzbek
John Hamilton
Sunnie Hart
Forest Hayes
Ronar Lopez (Cuba)
Jennifer Newby
Yamila Rodriguez (Argentina)
Michelle Savoie
Amanda Schworm
Bill Scott (Bermuda)
Kate Sprogis (Australia)
Angie Stiles
Jeff Stover
James Thorson
Alexandra Workman

UK intern Paul Davison doing photo-ID

Australian intern Kate Sprogis taking respiration data during 2010 health assessments

Local Volunteers During 2010

Sondra Fox
Tracy Graham
Jeff Hollway
Charlie Key
Cathy Marine
Nigel Mould
Norma Pennington
Sally Senger

Argentine intern Celeste Bollini taking a photo

Long-term Datasets

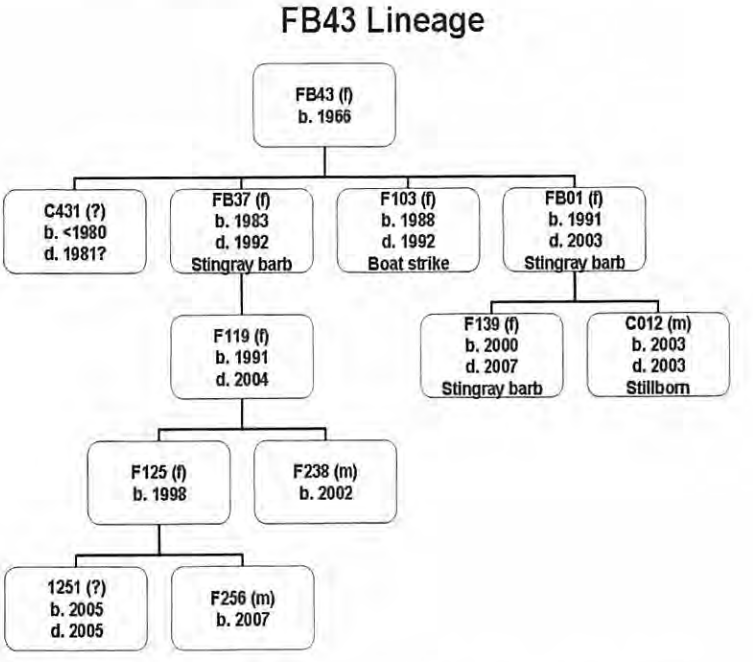
Research since 1970 has been based on compiling longitudinal records of individually distinctive bottlenose dolphins from the central west coast of Florida. Identification efforts have occurred from Tampa Bay through Charlotte Harbor and Pine Island Sound and associated Gulf of Mexico waters. The most 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, serve as a kind of "medical ID bracelet" and 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 375,000 dolphin photographs from 1970 to the present are currently archived by the Sarasota Dolphin Research Program. They have been collected during more than 38,374 dolphin group sightings. Our digital photographic identification catalog currently includes 6,274 images, including 4,186 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 109,477 sightings of these identifiable individuals, over periods of more than 40 years. Some individuals have been identified more than 1,350 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 datasets from 8 of the 16 past research projects that conducted focal animal behavioral observations (also known as 'follows') on Sarasota Bay 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 1,100 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. With our most recent additions to the archive, we now have three adult males who have been followed more than 35 times by different researchers: FB14 (44 follows over 9 years), FB94 (40 follows over 11 years), and FB36 (39 follows over 16 years). Also, there are now three females, FB65, F131, and F109, who have each been followed by four 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.

Field and laboratory methods available on-line

Our program's "Manual for Field Research and Laboratory Activities" published in 2006 is available as a downloadable pdf file at our website, www.sarasotadolphin.org. This 62-page document provides detailed documentation of the protocols used for field operations and data processing. It includes chapters on: 1) Field survey protocols, 2) Post-survey lab protocols, 3) Photo-identification protocols, 4) Database entry, verification, and management, and 5) Operations protocols. The accessibility of these protocols to colleagues and students promotes and facilitates standardization of methodologies across research sites, and provides incoming students and interns with background materials prior to their arrival. This is considered to be a "living document" that will be constantly evolving as we improve and refine our approaches.



Several maternal lineages in Sarasota Bay span five generations, including that of "Cathy" (FB43), shown here in this pedigree. Sightings of members of this lineage are spread throughout the Sarasota Bay dolphin community range.

Cathy's grand-daughter (F119, center), great-grandson (F238, left), and great-granddaughter (F125, right) swim through Sarasota Bay.

Opportunities for You to Help Dolphin Research and Conservation

We need your financial help to continue our important work. Continuity is the essence of a long-term research program. We rely on competitive grants and contributions from donors to keep our program operating. Funding opportunities through competitive grant programs have declined in recent years, and competition for the few remaining grant programs is fierce. Our projected program budget for 2011 is about $800,000, including support for staff and graduate students, facility and administrative costs, boat operations, international training programs, dolphin rescues and follow-up monitoring, field research supplies, and travel to field sites and conferences. Examples of some of the expenses for which we are seeking assistance include:

- Annual support for stipend, tuition, and fees for a single University of Florida graduate student = $30,000
- Annual support for field research expenses for one graduate student = $10,000
- Replacement 4-stroke outboard engine = $10,000
- Support for Franciscana dolphin research in South America = $25,000
- Support for intern from Argentina, Brazil or Cuba to come to Sarasota for training = $5,000

If you can help, contributions of funds should be directed to the Chicago Zoological Society or Dolphin Biology Research Institute, as described below:

A word of thanks from the Chicago Zoological Society

The Chicago Zoological Society is honored to recognize the following donors for their generous contributions to the Sarasota Dolphin Research Program.

Anonymous
Jill L. Allread and Pamela Freese
The Batchelor Foundation
Arlene Bonet and Walter McIntyre
BP
Mr. and Mrs. Robert J. Darnall
Disney Worldwide Conservation Fund
Mrs. Glen E. Dittus
The Dolphin Connection
Dolphin Quest
Dr. and Mrs. Neil Fine
The Georgia Aquarium
Corinne E. Johnson
Keller Family Foundation
Susan Crown and William C. Kunkler III
Sharon S. Manuel
Hollis Merritt
Morris Animal Foundation
Mote Marine Laboratory
National Geographic Society
National Oceanic and Atmospheric Administration
Owens-Illinois, Inc.
Joyce A. Paprocki
Blanche Raab
Mr. and Mrs. Robert H. Schumacher
William H. Scott
Mr. and Mrs. Jan A. Stortz
Melissa and Stuart Strahl
Woods Hole Oceanographic Institution

If you would like to make a gift to support the Sarasota Dolphin Research Program, please contact Terrence Sykes, Vice President of Development, at (708) 688-8379 or Sarah Breen-Bartecki, Vice President of Conservation Funding Initiatives, at (708) 688-8974. The Chicago Zoological Society operates under Florida State Solicitations Registration No. CH19258. A COPY OF THE OFFICIAL FLORIDA REGISTRATION AND FINANCIAL INFORMATION MAY BE OBTAINED FROM THE DIVISION OF CONSUMER SERVICES BY CALLING TOLL-FREE (800-435-7352) WITHIN THE STATE. REGISTRATION DOES NOT IMPLY ENDORSEMENT, APPROVAL, OR RECOMMENDATION BY THE STATE.

Dolphin Biology Research Institute

Dolphin Biology Research Institute (DBRI) would like to thank the following 2010 Major Contributors:

Edward M. Blair, Jr.
René Byrskov
Cannons Marina
Ronnie and John Enander
John Hamilton
Barbara and Blair Irvine
University of St. Andrews, Scotland
William and Sandra Scott
Woods Hole Oceanographic Institution

In addition to funds, our Florida-based not-for-profit corporation "Dolphin Biology Research Institute" can accept donations of boats, vehicles, and other field equipment and assets in good condition. 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. A COPY OF THE OFFICIAL FLORIDA REGISTRATION AND FINANCIAL INFORMATION MAY BE OBTAINED FROM THE DIVISION OF CONSUMER SERVICES BY CALLING TOLL-FREE (800-435-7352) WITHIN THE STATE. REGISTRATION DOES NOT IMPLY ENDORSEMENT, APPROVAL, OR RECOMMENDATION BY THE STATE.). Our current fleet of research boats and trucks is composed largely of donated equipment. Cash realized from sales of such donations goes entirely to offset research and education program expe During the most recent fiscal year, no funds received by DBRI were spent on fund-raising activities. No salaries are paid by DBRI to any of its Officers or Directors. For more information, please contact:

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

People and Partners Make the Program






Dolphin Connection
Florida Keys

Woods Hole Oceanographic Institution
1930

Disney Worldwide Conservation Fund

Chicago Zoological Society
Inspiring Conservation Leadership

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

Morris Animal Foundation
Est. 1948

Dolphin Quest

Georgia Aquarium

Pemberton Place

Aqua Marina

Mote Marine Laboratory

National Geographic

The Batchelor Foundation, Inc.

The Sarasota Dolphin Research Program has been tagged! (see page 38)

Sarasota Dolphin Research Program
708 Tropical Circle
Sarasota, FL 34242
www.sarasotadolphin.org

Sarasota Dolphin Research Program: More than four decades of dolphin research, conservation, and education