THE CHICAGO ZOOLOGICAL SOCIETY'S SARASOTA DOLPHIN RESEARCH PROGRAM

NICKS 'N' NOTCHES

December 1999

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The Sarasota Dolphin Research Program Enters the 30th Year of Its Long-Term Conservation Research and Education Program

Randall Wells

October 2000 will mark 30 years since the time when, as an assistant to Blair Irvine, I participated in the initiation of this research program, starting what has become the longest-running study of wild dolphins in the world. Over the last 30 years, Blair and I have slowed and acquired gray hair (no doubt due at least in part to our struggles to keep things going...), but the program itself increases in vitality with each passing year, as new and exciting findings lead to new questions, and our colleagues and students contribute new ideas, approaches, and energetic enthusiasm.

Longterm studies allow a closer look at the lives of individuals such as this adult male, Blackstripe.

The program began as a pilot study with Blair and I (joined in 1974 by Michael Scott) tagging dolphins between Tampa Bay and Charlotte Harbor in order to learn about their ranging and social patterns, with no initial intention of developing a long-term program. Nearly three decades later, our research team is still monitoring half of the dolphins we first identified, along with many of their calves, grand-calves, and even great-grand-calves. The 100 plus dolphin community members are year-round residents to the inshore waters near Sarasota and Bradenton, including shallow bays, seagrass meadows, channels, passes between barrier islands, and the coastal waters of the Gulf of Mexico. Other communities of dolphins live in surrounding waters, and on occasion they interact with the Sarasota dolphins. More than 2,500 different individuals have been identified from these waters, based on natural markings on their dorsal fins.

This work is conducted under the umbrella of the "Sarasota Dolphin Research Program" (SDRP). This name links the efforts of several organizations that work together to ensure the continuity of the long-term dolphin research in Sarasota. The Conservation Biology Department of the Chicago Zoological Society (CZS) has provided my salary along with crucial staff and operational support for the program since 1989. Dolphin Biology Research Institute, our non-profit corporation established in Sarasota in 1982, provides logistical support with its small fleet of vintage research vessels, computers, cameras, field equipment, etc. Since 1992, Mote Marine Laboratory has provided a convenient base for field operations, with office, storage and dock space. The SDRP maintains academic connections including graduate student sponsorships primarily through the University of California at Santa Cruz, Woods Hole Oceanographic Institution, and the University of North Carolina at Wilmington.

The main focus of the SDRP has been to follow identifiable individual dolphins through time. Most of the research consists of observations from small boats; some individual dolphins have been observed more than 600 times over more than 20 years. From time to time small numbers of dolphins are briefly captured, examined and sampled by veterinarians, and then released, in order to assess their health and body condition, learn their gender, determine their age, monitor their growth, and evaluate their genetic relationships. Nearly all of the Sarasota residents are distinctively marked, and more than 90% are of known sex, age, and/or genealogy.

The compilation of "case histories" for known individuals is a powerful tool for learning about the lives and needs of animals. The well-known Sarasota dolphins have provided much information to aid those whose responsibility it is to care for them, both in the wild and in zoological parks. One of the first and most important contributions of the program was the determination that coastal bottlenose dolphins in Florida waters inhabit long-term, multi-generation, year-round ranges. This has allowed the National Marine Fisheries Service to establish a geographical basis for their protection plans, and to relate possible impacts of human activities on specific populations of dolphins residing in definable regions. The recognition of dolphin residency also set the stage for long-term research into life history and population dynamics, health and effects of environmental contaminants, and social structure.

Knowledge of how long dolphins live, when they reach sexual maturity, how often they produce calves, how many calves survive, and how frequently dolphins immigrate or emigrate under normal circumstances is crucial for understanding how a population might respond to human impacts or to a natural catastrophe. Deviations from normal patterns can be indicative of problems requiring closer scrutiny by government wildlife management agencies, either through research or intervention. Longitudinal studies of the Sarasota dolphin community have provided the first and most complete empirical information on the life history patterns and vital rates of a living population of bottlenose dolphins. These values are used as baselines to evaluate the dynamics of other dolphin populations.

Large-scale deaths of dolphins around the world are occurring with increasing frequency and environmental contaminants are being found in alarming concentrations in the tissues of dolphins. Most of what we know about these events and the effects of pollutants comes from examination of carcasses, with the information coming too late to be of benefit to the living animals. Knowledge of the health status of dolphin populations can aid management agencies in being proactive in their response to potential problems. The health assessment program involving the Sarasota dolphins traces the health of individuals through time, evaluates the overall health of the population from year to year, and relates health and reproductive parameters to levels of environmental contaminants. The findings from the Sarasota dolphin community provide a model health assessment system and reference values for application to other regions. In addition, studies of the living Sarasota dolphins have provided information on the deleterious effects of even low levels of environmental contaminants, such as DDT metabolites and PCBs on dolphin health, by reducing immune system function, or through effects on reproduction. Many of these measures and techniques have been applied with increasing success to the care of stranded dolphins at Mote Marine Laboratory's Dolphin and Whale Hospital and elsewhere.

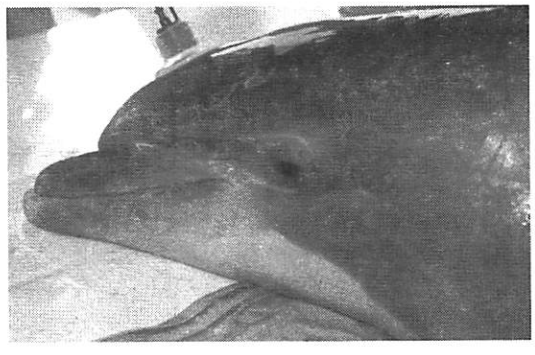
Much of the program's research is focused on understanding the impacts of humans on these and other residents of local waters. Recent studies have determined that boats are responsible for dolphin mortalities and serious injuries in Sarasota Bay (especially during the calving season, around the Fourth of July), and that boats approaching dolphins, especially in shallow water, can lead to changes in the animals' behavior. These studies have been aided by the application of a newly-developed technique, using a tethered helium-filled airship to support a remotely controlled video camera, allowing an overhead view of the dolphins and approaching vessels. We have been able to apply this same observation system to similar studies of manatees to try to learn how manatees respond to approaching boats.

Sarasota dolphin field studies also contribute to the care of dolphins in zoological parks. Observations of typical social units and social interactions in the wild help in the establishment of appropriate social groupings in colonies at oceanaria and aid in breeding efforts, thus reducing pressure for collection of dolphins from the wild. Field records of typical weights and lengths of wild animals assist with husbandry by providing goal ranges for their oceanarium counterparts. Measurement of blubber thickness, accomplished non-invasively through ultrasound, serves as a tool to monitor body condition and health for guidance with diet recommendations. Blood chemistry and hematology measures from the wild animals can be used as indications of "normal" ranges of variability for evaluating blood samples from oceanarium or stranded dolphins.

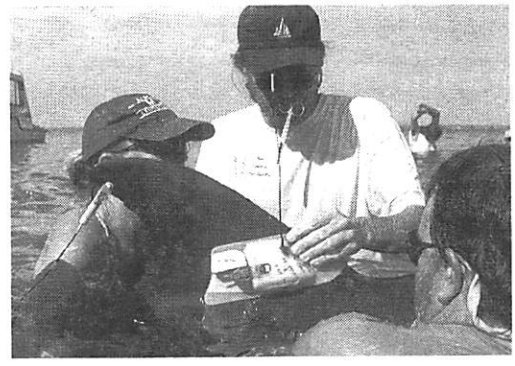
Disseminating the information from the Sarasota dolphin research is as important as collecting it in the first place, so that it may benefit as many dolphins as possible. The research team is dedicated to this goal, having produced numerous scientific and general publications, and through frequent public and professional presentations. Graduate student thesis research, and training programs for scientists from other countries, student interns, and Earthwatch volunteers help to spread the information and techniques world-wide. Caring comes from knowledge; much has been learned from the Sarasota dolphins since 1970, and efforts continue to translate this knowledge back into care for them and their kind.

Genetic and Contaminant Studies

Long-term studies are of particular value for investigations that require time-series samples, large sample sizes, or thorough sampling of a population unit. During brief capture-release projects conducted over a number of years we have been collecting biological samples for genetic studies of population structure and paternity patterns, and for examination of levels of environmental contaminants in local dolphins. These samples have been archived as we have attempted to find funding for analyses. During 1998-1999 we have been fortunate to obtain significant funding to analyze these archived samples. The National Marine Fisheries Service has provided support for Dr. Wally Jarman of the University of Utah to analyze contaminant concentrations in archived dolphin blood, milk, and blubber samples. The data resulting from these analyses will be interpreted relative to dolphin age, sex, reproductive history, reproductive hormone concentrations, health, and exposure histories. Our unique contaminant sample and database has led to the selection of our program as a major component of a planned International Whaling Commission study of biomarkers of contaminants in cetaceans, scheduled to begin in 2000. In addition, we have received funding from the Disney Wildlife Conservation Fund for Dr. Debbie Duffield of Portland State University to complete paternity analyses of the banked Sarasota dolphin samples, using the latest genetic methodology. The results of these analyses will be the most complete paternity analysis ever conducted for a cetacean community. Both of these projects benefited from a capture/release program conducted during summer 1999, in which ten dolphins were sampled (six for the first time). Two of these were the last two adult male Sarasota Bay residents for which genetic samples were previously lacking for paternity analyses (Blackstripe and Pair o' Nicks). Their inclusion in our sampling means that we can now calculate accurate measures of genetic exchange between communities.



Pair o' Nicks June 1999



Andrew Westgate places a Trac Pac® on Pair o' Nicks to take thermal measurements.

Trac Pac® Developments

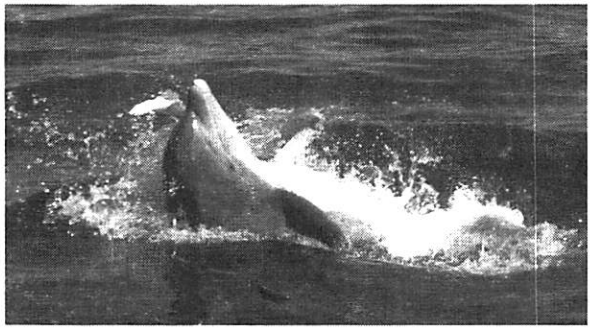
Doug Nowacek

During the 1999 capture-release project we tried a re-designed Trac Pac® to attach our acoustic data logger. The new pack used softer, thinner molded plastic than we have used in the past. Our hope was that a more compliant pack, i.e., a pack that moved with the fin instead of trying to stay attached despite the dorsal fin movement, would stay on the fin longer than our previous packages. The idea had success in the form of the 'thermal pack' used by Pabst, McLellan, and Westgate whose pack stayed on for up to 7 hours and 25 minutes which was just what they had hoped. Our pack did not stay attached for as long as we had hoped, but we learned some valuable insights for the next round of Trac Pac® design. The next acoustic data logger we deploy in a Trac Pac® will be the new solid state digital archival tag developed by Dr. Mark Johnson. This new tag has a high speed digital signal processor at the helm that samples a sensor suite consisting of 3 accelerometers, a hydrostatic pressure sensor, a temperature sensor, and a digital compass. In addition to these sensors the tag also records acoustic signals from the tagged animal through a suction cup hydrophone. We successfully attached this tag to northern right whales, *Eubalaena glacialis*, in the Bay of Fundy this August. The data told us a great deal about the diving behavior and acoustic activity of the whales. We hope to attach this tag to dolphins in Sarasota in June, 2000.

Foraging Behavior and Acoustics

Doug Nowacek

Animal foraging can be thought of as a stage-structured sequence of behaviors, with feeding occurring at the end of a series of specialized behaviors (search, encounter, and pursuit). The behaviors preceding feeding do not necessarily occur in a predetermined sequence, but are adaptive and flexible. I have identified significant links between observed behaviors and confirmed feeding events and



demonstrated the stage-structured nature of dolphin foraging. We now know a great deal more about specific behaviors previously reported in Sarasota dolphins such as "the pinwheel." We always assumed that the pinwheel was involved in feeding, but we didn't know where in the sequence it occurred nor its central importance. In addition, I investigated factors affecting the occurrence of specific behaviors. Factors such as habitat variation (seagrass meadow versus sandy bottom) and individual preferences have significant effects on the repertoire of feeding behaviors observed.

The role of sound in foraging, especially echolocation, is less well understood than the behavioral component. Recent studies have explored both the use of echolocation by dolphins in zoos and aquariums while foraging and presumed feeding events in wild animals. However, simultaneous, detailed behavioral and acoustic observations are challenging and have not been scientifically performed.

I collected acoustic data using two different methods during my study. The overhead video system includes two hydrophones towed by a specially outfitted boat to record the 'ambient' sounds of dolphin foraging. The sounds we recorded are considered 'ambient' because the source of the sounds, i.e. the individual animal, could not be localized. Many focal animal follows, however, were conducted with single animals, and from these records the timing of echolocation and other sounds relative to the foraging sequence could be examined. The 'ambient' recordings revealed that single animals are much more vocal than animals in groups, both overall and during foraging. When not foraging, single animals vocalized at a rate similar to those in groups of two or more. For animals foraging alone, the use of different sound types is significantly affected by habitat. The presence of multiple animals in a foraging group apparently reduces the need to vocalize.

The second acoustic data collection method records sounds known to be from a specific animal. An acoustic recording tag was developed that records all sounds the animal produces including every echolocation click. The tag also includes an acoustic sampling interval controller and a sensor suite that measures pitch, roll, heading, and surfacing events. No foraging events occurred while an animal was wearing an acoustic data logger; the rates of echolocation and whistling during different activities such as traveling were relatively low.

The Impact of Boat Traffic on the Florida Manatee in Sarasota, Florida

Stephanie M. Nowacek

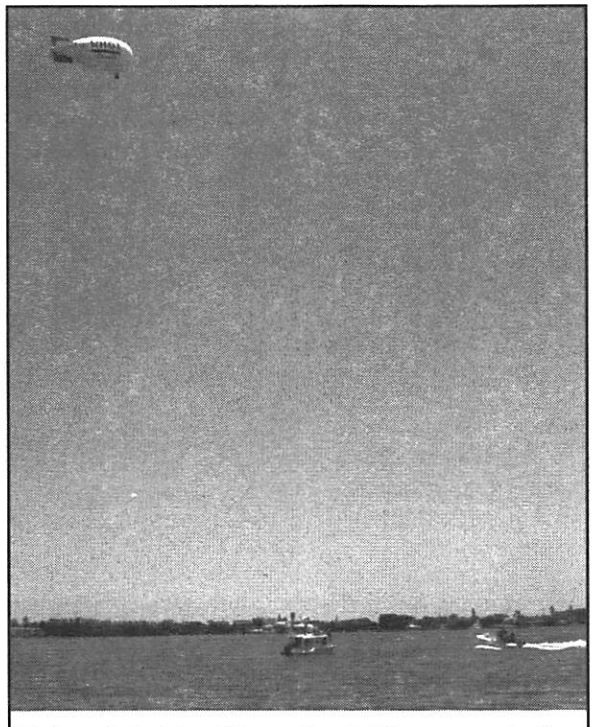
Humans impact many species by engaging in seemingly harmless activities. One such activity is recreational fishing and boating. Florida manatees bear the scars produced from too many boats and manatees sharing the limited

waterways. In 1998, 28.6% of all Florida manatee deaths could be attributed to boats and so far this year, 31.1% of deaths have been watercraft related. A Sarasota Dolphin Research Program team, funded by the Florida Department of Environmental Protection, set out in May 1999 to try to determine how manatees respond in the presence of an approaching vessel. Using the overhead video system developed over the last five years by Dr. Douglas Nowacek in conjunction with other SDRP staff , we were able to watch for changes in swimming direction, orientation relative to deeper water, swimming speed, swimming depth, and mobility. Preliminary analyses indicate that manatees most frequently do not respond at all to the presence of vessels approaching and passing nearby. When they do respond, it is likely that they will quickly move towards deeper water. Although this seems to be an appropriate response, this move toward deeper water oftentimes takes the animal right into the path of the approaching boat. Further analyses should better describe these responses and future field work planned for 2000 should help to show under which specific circumstances certain responses are elicited. Ultimately these data will lead to improved management recommendations to make waterways safer for both boaters and manatees.

The Effects of Boat Traffic on Bottlenose Dolphins, *Tursiops truncatus,* in Sarasota Bay, Florida

Stephanie M. Nowacek

Coastal cetaceans are subject to potential disturbance by both recreational boaters and commercial fishermen. In Sarasota, Florida, where about 100 resident bottlenose dolphins, *Tursiops truncatus*, share the inshore waters with over 34,000 registered boats, disturbance potential is high. We initiated a boat disturbance study in 1997 with funding from the Disney Wildlife Conservation Fund, the Chicago Zoological Society, the Henry Foundation, Don and Lee Hamilton, the Earl and Ethyl B. Myers Oceanographic Trust and the University of California, Santa Cruz to assess the specific behavioral responses of individual dolphins to boat traffic. Focal animal behavioral observations were conducted during opportunistic and experimental boat approaches on well-known identifiable individual bottlenose dolphins in Sarasota Bay, Florida. Analyses were completed in 1999 showing that boat traffic does influence the daily movement patterns and group interactions of the resident Sarasota dolphins. We found that dolphins of varying age, sex and reproductive states made significantly longer dives in response to approaching vessels and dive duration increased as distance to the nearest boat decreased. During experimental approaches, we used a video system suspended from a tethered airship to observe subsurface responses of focal dolphins. Dolphins decreased subgroup diameter, changed heading, and increased swimming speed significantly more often in response to an approaching vessel than during control periods. These responses were heightened when dolphins were approached while in shallow water. This body of evidence demonstrating that dolphins are disturbed by recreational boaters provides additional support for the need to consider disturbance in management plans for cetacean conservation.



Tethered airship with overhead video system during experimental approaches. The airship support vessel (left) carries observers and video recording gear.

The Effects of Watercraft Noises on the Acoustic Behavior of Bottlenose Dolphins, *Tursiops truncatus*, in Sarasota Bay, Florida

Kara Buckstaff

Concern has arisen that sounds introduced into the water environment by humans could have deleterious effects on marine mammals. Sarasota Bay is an optimal location for research due to the heavy watercraft traffic persisting throughout the year. My Master's research project, through the University of California, Santa Cruz, will examine acoustic behavioral responses of bottlenose dolphins, *Tursiops truncatus*, in Sarasota Bay, Florida caused by watercraft noise. Beginning the summer of 2000, I will be collecting data on dolphin acoustics to answer the following questions: 1) is there an overlap of frequency ranges for watercraft noise and dolphin vocalizations? 2) if so, is there a shift in the frequency range of dolphin vocalizations in response to watercraft noise? 3) are there distinct vocalizations that can be correlated to watercraft distance, size, speed, or propulsion? 4) do dolphins produce acoustic signals during a dive sequence when a vessel approaches? 5) do vocalizations evoke the decrease in subgroup spread and change in the group's heading that has been observed when vessels are approaching? 6) are there differences in dolphin vocalizations between different habitat types in the presence of watercraft?

The proposed questions for this project have been based on findings from Stephanie Nowacek's research in which non-acoustic behavioral responses to watercraft traffic in Sarasota Bay were documented. In building upon these findings by examining the acoustic component, I hope to further elucidate the impacts of watercraft noise on this bottlenose dolphin community. Determining the impacts of watercraft noise in shallow water habitats is of critical importance as these relatively protected waters are used for calving and feeding purposes. If there proves to be negative consequences from watercraft noise, especially in an essential shallow water habitat, then perhaps stringent regulations regarding usage of these waters should be implemented.

Primary funding for this project has yet to be secured; however, partial funding from the Florida Fish and Wildlife Conservation Commission will be provided by my involvement in the acoustic transmission loss project.

The Reproductive, Social, and Ecological Functions of the Pair Bond Between Adult Male Bottlenose Dolphins

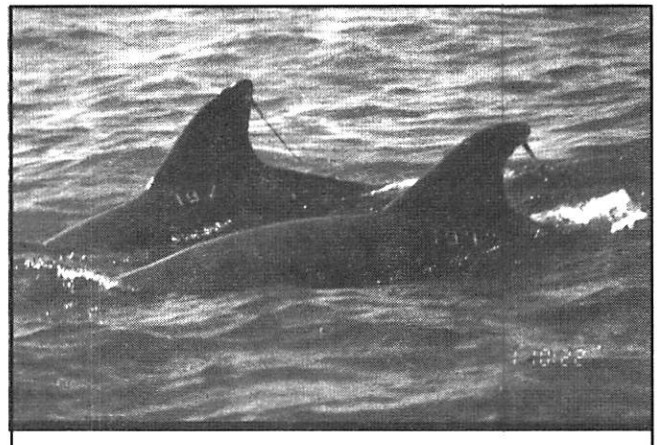
Edward Owen

In Sarasota, about 58% of adult male bottlenose dolphins form tight pair bonds that may last for the duration of the males' adult lives. Members of these male pairs are rarely sighted without their male partner. The exact function of these pair bonds is unclear, although it has been suggested that they may play a significant role in the mating system of bottlenose dolphins, and they may also serve other social and ecological purposes. Understanding the role of this male pair-bond will be important to the study of mammalian breeding and social systems, for it will elucidate the interplay between ecological factors and individual reproductive success as driving forces in evolution.

From May-August, 1999, I spent my first field season conducting research for this project which will serve as the basis for my doctoral dissertation at the University of California, Santa Cruz. The primary goal for this first summer was to establish, develop, and refine the field techniques that I will be using to collect the necessary data to address my hypotheses. The primary thrust of my research is to examine why adult males form these pair bonds. It has been suggested that for a variety of reasons, mating opportunities are increased for members of a male pair. It has also been hypothesized that male pairs may provide increased detection of, and protection from, predators, enhance foraging ability through cooperative efforts, and provide mutual protection during conflicts with other adult males. Despite these apparent advantages, approximately 42% of adult males do not form partnerships and remain single throughout their adult life. It is known however through preliminary genetic paternity analyses on blood samples obtained from Sarasota calves, mothers, and potential fathers during temporary capture/release projects that both single males and members of male pairs have sired calves.

To address these questions, I am using a variety of techniques, each of which will hopefully answer different pieces of the puzzle. My behavioral observations were made from the trusty research vessel "Hobo," a modified house boat. Stephanie Watwood, a Ph.D. student from Woods Hole Oceanographic Institute, is conducting a concurrent study on the functions of whistle imitation by members of a male pair. The two of us shared the responsibility of captaining the Hobo and we were ably assisted by our interns Daniel Kaminstein, Alexandria Leckliter, Brandie Littlefield and Todd Speakman. We assessed the potential of enhancing behavioral observations of adult males with the use of a high resolution remote-controlled overhead digital video system suspended from a 1500 cu. ft. helium-filled airship, tethered to the support vessel. This system will be an important tool in examining the behavioral differences between single males and male pairs because it provides a unique aerial perspective in the shallow waters of Sarasota Bay of otherwise imperceptible sub-surface behaviors during periods of maximum water clarity. Also, we were able to attach VHF radio transmitters to the dorsal fins of two adult males, "Blackstripe" and "Pair o' Nicks." Hobo was outfitted as a radiotracking boat, and the transmitters allowed us to locate and follow the two males for much longer periods of time than would have been possible otherwise, even at night. Using these transmitters, we were able to radiotrack each of the animals for just over a month. One other component of the research this summer was a collaborative effort with Daniel Kaminstein, a senior undergraduate from Princeton University. This research used a thermal imaging camera to capture images of adult males engaged in different behavioral states. Using the relative temperature of the dorsal fin as an indicator of stress level, Daniel will be analyzing these images in conjunction with behavioral observations to address how stress levels change with different activities and varying degrees of activities.

We were successful this past summer in refining the data collection techniques and protocols which will be used for the remainder of this project. Next summer (2000), I hope to conduct behavioral observations from May-September, making good use of the overhead video system in May and early June, when the water clarity is best, and then deploying radiotransmitters on adult males to continue our tracking efforts. Most of the support for this research is from the Disney Wildlife Conservation Fund.



Blackstripe and Pair o'Nicks with VHF radio transmitters attached to their dorsal fins during June 1999.

Whistling Males

Stephanie Watwood

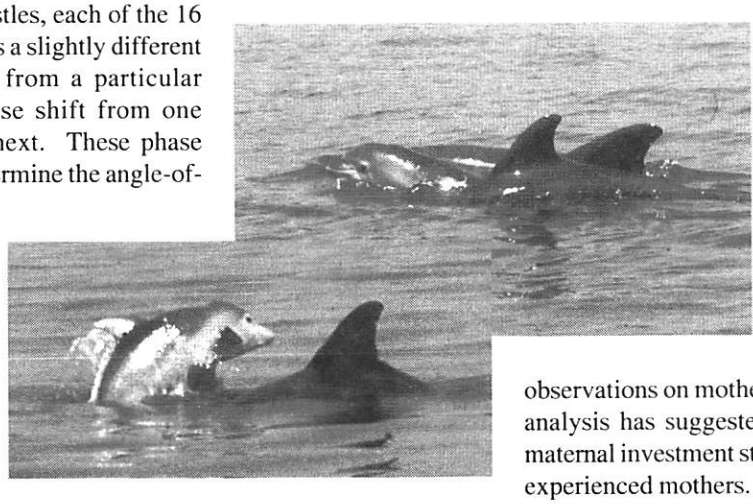
It is generally accepted that dolphins produce individually distinctive *signature whistles*. The highly stereotyped whistle that a dolphin produces most often is its signature whistle. Signature whistles are thought to serve as contact calls. Dolphins also adeptly imitate the sounds they hear in their environment. Previous recordings by Peter Tyack and Laela Sayigh have shown that some Sarasota dolphins imitate the signature whistle of other dolphins. It could be that when one dolphin imitates the whistle of a second dolphin, that dolphin is trying to initiate an interaction with the second dolphin. Alternatively, it could signify a more aggressive exchange. Most interesting of all is preliminary evidence that pair-bonded male dolphins in Sarasota share a signature

Mating System of Sarasota Dolphin Researchers

-Kristi Brockway and Marc Fazioli married - September 1999
-Caryn Weiss and Edward Owen married - September 1999
- Jocelyn Vedder married - September 1999
- Howard Rhinehart and Judi Hartford married - November 1999
- Kim Bassos-Hull and Peter Hull expecting - March 2000

whistle. This might suggest that imitation is useful for coordinating activities or maintaining contact between male partners.

The purpose of my dissertation project through Woods Hole Oceanographic Institution and MIT is to determine when (and hopefully why!) males imitate the signature whistles of their partners. This past summer, with funding from the National Geographic Society, I used a towed linear array of hydrophones to address this question. When a dolphin whistles, each of the 16 hydrophones receives a slightly different signal. The sound from a particular direction has a phase shift from one hydrophone to the next. These phase shifts are used to determine the angle-of-arrival of sounds on the hydrophone array. Concurrent with acoustic recording, Edward Owen and I conducted behavioral follows of males. By localizing whistles and simultaneously following the male dolphins, I am able to tell which dolphin was whistling at a given time (as long as animals are spaced far enough apart). The data from this summer have yet to be analyzed, however, the main focus of the summer was perfecting the array technique. We went through several iterations of data collection and methods for deploying the array from HOBO before we found the best approach. Next summer I plan a longer field season in which I will apply the technique to look at signature whistle imitation.



Maternal investment strategies in free-ranging bottlenose dolphins

Caryn Owen

In Sarasota Bay, differential calf survivorship among distinct age classes of females has spurred various questions regarding parental investment and reproductive success. Within this community, calves of inexperienced (having never successfully raised a calf to independence) female bottlenose dolphins have much lower rates of calf survivorship than experienced (having successfully raised a calf to independence) females. For my Master's thesis, I am examining the behavior of these two classes of females to determine if there is a difference in parental investment strategies which may affect calf survivorship.

From May-August 1999, I conducted field observations in Sarasota Bay from the research vessel Makila. As it turns out, the summer of 1999 could not have been a better year to begin my research. We had 15 calves born this summer which ties a record for the most calves born in one breeding season. Additionally, three of the females who gave birth were first time mothers. With the help of my three interns Carrie Merola, Jocelyn Hittle and Stephanie Young, we conducted 122 hours of focal animal observations on mothers and calves. Preliminary descriptive analysis has suggested that there are subtle differences in maternal investment strategies between first time mothers and experienced mothers. My field research will resume in May 2000 to further examine these behavioral differences.

In addition to my own thesis research, data for two other projects were collected from Makila. We collected respiration rates of newborn dolphins for Shawn Noren's doctoral dissertation at the University of California, Santa Cruz. Shawn is examining the diving physiology of bottlenose dolphin calves and hopes to use the respiration rates of wild newborns to complement her physiological research on captive dolphins. Jocelyn Hittle, a senior at Princeton University will also be using the respiration data for her senior thesis to examine the use of respiration rates as a measure of maternal investment.

Hobo Rescue - "If you sink before we do, we'll save you"

This past summer we established the inaugural Hobo Rescue Team. Its members include Daniel Kaminstein, Alexandria Leckliter, Brandie Littlefield, Todd Speakman, Stephanie Watwood and myself, Edward Owen. On July 1, we were engaged in a focal follow just south of the Siesta Key Bridge when a large thunderstorm rolled in and it started to pour with rain so we took shelter under Siesta Bridge. As we were waiting for the storm to move through, a small rental outboard with a family of 4 passed us, with water pouring over its stern - a matter not helped by all of the crew members standing in the stern. They yelled that they were sinking, but didn't respond to our requests for them to throw us a line so that they could attach their boat to ours. The rental boat drifted out from under the bridge into the storm and we decided that we should help them. 4 of our crew donned life jackets and swam after the sinking boat while the other 2 members stayed on board, calling for help on the radio. We reached the boat and the youngest member of the crew, a small boy, was launched overboard towards us. Fortunately he was wearing a lifejacket since, we soon discovered, he was unable to swim. We swam with him, and his mother and grandmother back to the Hobo. The boy's father refused to leave the sinking vessel, despite attempts at persuasion from our crew.

We were able to reach help on the radio and all of the crew members of the sinking vessel - the Rodrigues family - were safely transferred to other boats and were able to return home. The storm passed by and we decided that we should call it a day too, and returned to the docks. Thus the Hobo Rescue Team was born, and our motto:"If you sink before we do, we'll save you."

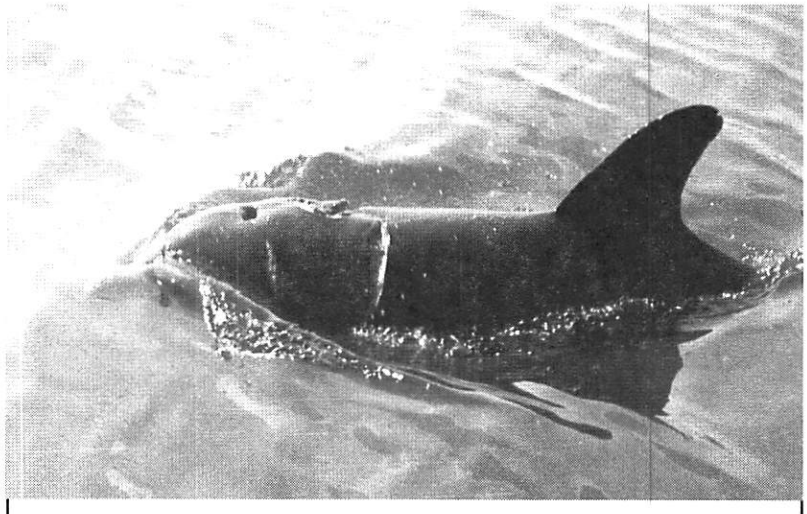
Earthwatch Dolphin Monitoring Program

Sue Hofmann

The support of Earthwatch volunteers has allowed us to continue the monthly monitoring of the Sarasota dolphin community. Conducting intensive, year-round studies of the distribution, social and reproductive patterns of the resident bottlenose dolphin community ensures continuity for our long-term database. As this is the most thoroughly known free-ranging dolphin population under study anywhere in the world, we are able to address increasingly refined questions about the lives of these animals. The resulting information can be used in developing and improving management plans for the conservation of bottlenose dolphins throughout the world.

With the assistance of 72 Earthwatch volunteers from 22 states and 5 countries, photo-identification surveys were conducted on 95 days from October 1998 through September 1999. Including resighted animals, we had 633 group sightings totaling 2,139 dolphins. We averaged nearly 7 sightings per day with just over 3 animals per sighting. Our annual average of the number of dolphins sighted per day was slightly higher, at 22.5, than in the previous three years.

While monitoring the presence or absence of community members, we were able to document the births of new calves. This year has been a boom year for young of the year (YOY). Fifteen calves were born to Sarasota community members beginning in April 1999. First time mothers include FB 3, FB 55 and Murphy Brown. Other mothers include Clown Look-alike, Lightning, Pumpkin, Moonfin Look-alike, Dr. Strangenotch, Killer, Blacktip Doubledip, FB 25, Tramp, FB 75, FB 79, and Claire. Unfortunately as of this writing, Murphy Brown has lost her YOY, as have FB 25, FB 79 and Dr. Strangenotch. The seven 1998 calves that survived through last year are still all doing fine as of this date. We had a scare in July when Bobby Jo's calf showed up with a shark bite on its head. We monitored the animal closely, and as of the end of October, the calf appears well healed and doing fine.



Calf of Bobby Jo with shark bite on head.

Several animals that are new to our study area have been identified during this past year, and we continue to see animals previously identified as inhabitants of surrounding areas frequenting the study area and interacting with Sarasota community members. We have accounted for at least 90 % of the community members as a result of our Earthwatch-sponsored surveys. During these surveys, we continued to monitor the distribution of watercraft throughout our study area. Data analysis on three full years of boat distribution data is only in the initial stages as of this writing and will become a priority when we bring our photo-analysis up to date. Rough estimates indicate that watercraft traffic is involved in more that 50% of our sightings, while we had at least one dolphin sighting involving boat traffic on 90% of our survey days.

In the coming year, we will begin to determine the distribution and abundance of the fish that are dolphin prey. Using a wide-mouth, conical net, we will sample select areas of the bay bottom in an attempt to collect the fish that the dolphins are catching as prey. A suite of environmental parameters will be measured in conjunction with these samplings.

As 1998 ended, two roughtoothed dolphins were patients at Mote Marine Laboratory's Dolphin and Whale Hospital. Herc and Holly stranded in the Florida panhandle in late December. They were transported to Mote where they were treated with antibiotics and antifungal medications. Unfortunately, both animals died in March 1999 as a result of severe colitis and intestinal lesions. The Dolphin and Whale Hospital was fortunate to have only one new patient this year. Peanut, a young male bottlenose dolphin, stranded on New Smyrna Beach on July 12, 1999. He was transported to Mote where he was treated for pneumonia, parasites, malnutrition and an intestinal infection. After 3 months of treatment and rehabilitation, he was deemed healthy enough to be released. Peanut was released off the east coast of Florida, near his stranding site, on October 12, 1999. Sadly, his decomposed body was discovered near the release site on October 23, 1999 after having washed ashore during Hurricane Irene.

We would like to thank all of our Earthwatch volunteers for your time and effort. It is because of you that we are able to continue our year-round observational surveys.

Sarasota Dolphin Status in 1999

FEMALES		EVENT
1	Daughter of FB 43	
3	Daughter of FB 19	Had a YOY in 1999
5	FB 5	
7	Lightning	Had a YOY in 1999
9	Pumpkin	Had a YOY in 1999
11	Merrily	
13	47LA	
15	Nicklo	
17	FB 17	
25	FB 25	Had a YOY in 1999
27	Moonfin Look-alike	Had a YOY in 1999
33	Saida Beth	
35	Squiggy	
43	Cathy	
54	FB 54	
55	Daughter of FB 5	Had a YOY in 1999
59	Genie	
63	Ms. Mayhem	
65	Tramp	Had a YOY in 1999
73	Tag 51	
75	Pup	Had a YOY in 1999
79	FB 79	Had a YOY in 1999
83	Jagged Mama	
84	Mama Mia	
87	Squarenotch	
90	Killer	Had a YOY in 1999
93	Daughter of FB 35	
101	Rose	
105	43LA	
109	Scooter	
111	Clown Look-alike	Had a YOY in 1999
113	Lizzie	
115	Mother of FB 166	
117	FB 117	
131	Claire	Had a YOY in 1999
149	FB 149	
153	Blacktip Doubledip	Had a YOY in 1999
155	Murphy Brown	Had a YOY in 1999
157	Pecan Sandie	
163	LA94	
175	Daughter of FB 75	
183	Tri A	
191	FB 191	
RP27	Bobby Jo	
DRSN	Dr. Strangenotch	Had a YOY in 1999
FTTP	Fattop	
49LA	49LA	
IKNO	I know	
JOSE	Jose	
WTMA	Whitetip Mama	Not IDed in1999

UNKNOWN GENDER		
POOF	Poof	Not IDed in 1999
PUMP	Pumpkin Look-alike	
SBDO	Scooby Doo	
ZRBA	Zorba	New animal in 1998
CWM3	1991 calf of WTMA	
C354	1992 calf of FB 35	
C652	1994 calf of FB 65	Not IDed in 1999
C133	1995 calf of FB 13	
1535	1995 calf of FB153	
49C4	1995 calf of 49LA	Not IDed in 1999
C253	1996 calf of FB 25	
C871	1996 calf of FB 87	
1311	1996 calf of FB 131	
C154	1998 calf of FB 15	
C596	1998 calf of FB 59	
C835	1998 calf of FB 83	
1011	1998 calf of FB 101	
1633	1998 calf of FB 163	
1833	1998 calf of FB 183	
CRP1	1998 calf of RP27	Shark bite-14 July 99

MALES		EVENT
2	Son of FB 59	
6	Son of FB 71	
10	Petey	
14	Jack	
20	Perry	
24	Son Of FB 35	Not IDed in 1999
26	Norman	
28	FB 28	
32	Son of FB 5	
36	B-8	
38	Q-2	
44	R	
46	FB 46	
48	Jimmy Durante	
58	Ken	
66	Otter	
76	Racing Stripe	
78	Riptorn	
92	Lasagna	
94	Sparks	
96	H	
100	Scythe Fin	
102	Scoopnick	Not IDed in 1999
106	3NIK3	
108	3NIK	
110	FB 110	
114	FB 114	
116	FB 116	Not IDed in 1999
118	Son of FB 54	
128	Son of FB 153	
130	FB 130	Not IDed in 1999
132	FB 132	Not IDed in 1999
134	Mr. Natural	
136	Sawblade	
138	Son of FB 63	
142	FB 142	
146	Son of FB 11	
148	Son of FB 54	
152	Son of FB 163	
154	RT-3	Not seen in 1999
160	FB 160	
162	FB 162	
166	Son of FB 115	
174	TNLV	
176	FB 176	
178	pi; son of FB 9	
180	HSM2	
182	Son of FB 183	
184	Son of FB 149	
186	Famous Amos; son of FB 157	
188	Noah; son of FB 33	
190	Son of Fattop	
192	Blackstripe Leadcrease	
194	Pair 'O Nicks	
C834	Pokey	

UNKNOWN GENDER		
C031	1999 calf of FB 3	
C074	1999 calf of FB 7	
C093	1999 calf of FB 9	
C254	1999 calf of FB 25	Died 21 August 1999
C273	1999 calf of FB 27	
C551	1999 calf of FB 55	
C653	1999 calf of FB 65	
C756	1999 calf of FB 75	
C793	1999 calf of FB 79	Missing 22 Sept. 1999
C905	1999 calf of FB 90	
1312	1999 calf of FB 131	
1536	1999 calf of FB 153	
1551	1999 calf of FB 155	Missing 24 Sept. 1999
CDS2	1999 calf of Dr. Strangenotch	Died 15 June 1999
CCL6	1999 calf of Clown Look-alike	

Population Research in the Gulf of Mexico

Kristi Lynn Fazioli (Brockway)

The first phase of a study of population structure of bottlenose dolphins inhabiting the Gulf of Mexico off Sarasota was seen to completion in June of this year, after 2 ½ years of field work, photo-identification and data analysis. The goal of this research was to examine the stock structure of bottlenose dolphins in a near-shore habitat, make comparisons to adjacent inshore population units, and evaluate interactions between dolphins in these two regions. Our results will influence management and conservation decisions affecting these dolphins and pave the way for future research in the Gulf.

During our study, we identified 580 individual dolphins and designated these individuals as 'Inshore' (long-term bay residents) or 'Gulf' (observed predominately in Gulf waters) regional population units. Dolphins used Gulf waters differently depending on season and regional designation. 'Inshore' dolphins preferred shallow Gulf waters near passes leading to inshore waters. 'Gulf' dolphins used Gulf waters throughout the study area. Gulf dolphins were found in greater abundance in waters offshore of those used by 'Inshore' dolphins. During winter months, abundance indices for 'Inshore' dolphins increased in Gulf waters and indices for 'Gulf' dolphins decreased. Mixing between 'Inshore' and 'Gulf' dolphins occurred year-round in the Gulf, but with greatest frequency during peak reproductive months for inshore dolphins. Some 'Gulf' dolphins displayed year-round, long-term residency patterns; however most individuals were seen less frequently, suggesting patterns of seasonal residency, extended geographic range out of the study area, or transience. Dolphins in this coastal region appear to divide into overlapping communities defined by preferred geographic ranges, habitat use patterns, and social associates.

This research was presented at UC Santa Cruz as my Masters thesis entitled *"Distribution, Relative Abundance, And Community Structure of Coastal Bottlenose Dolphins (Tursiops truncatus) in the Gulf of Mexico off Sarasota, Florida"* and in a Report to the National Marine Fisheries Service. It will also be presented in a poster at the 13th Biennial Conference on the Biology of Marine Mammals, and plans for future publication are underway. Masters degree candidate Anna Sellas is continuing and broadening the scope of this research to lead to an even greater understanding of bottlenose dolphins in this region, through genetic sampling.

Dolphins in the Gulf of Mexico off Anna Maria Island in June 1998.

Gulf Dolphin Biopsy Project

Anna Sellas

With the completion of the Gulf Survey Project by Kristi Fazioli in May, we now have a total of 580 dolphins in our Gulf catalog. This baseline photo-identification project has laid the groundwork to begin exploring the health and stock structure of these animals. The objectives of this project which will be a part of my Master's thesis at the University of California at Santa Cruz are (1) to explore the stock structure of the near-shore Gulf community adjacent to Sarasota and (2) to characterize both red tide (brevetoxin) and environmental contaminant concentrations in these dolphins.

While the photo-identification has allowed us to build sighting records for the Gulf animals, genetic analysis is the next step in examining their stock structure. Using a well proven remote biopsy sampling method, we will obtain small biopsy samples from selected Gulf individuals. Applying DNA analysis techniques to these samples will enable us to target specific aspects of the structure of the near-shore Gulf dolphins. Determining gender and relatedness within and between observed groups will allow us to build an understanding of the social structure within the community. In addition, we are interested in exploring the relationship this community holds with the resident Sarasota dolphins. During the course of the Gulf Survey Project, geographic overlap between the two communities was evident leading to the question of reproductive mixing. Genetic comparisons between these two communities will be made to determine the occurrence of genetic exchange.

In addition, blubber sections obtained from the biopsies will be used to characterize both brevetoxin and environmental contaminant concentrations. Specific questions regarding brevetoxin include: (1) What levels of brevetoxin are typically found in coastal bottlenose dolphins? (2) How do these levels change during a red-tide outbreak? (3) At what levels do dolphins begin to exhibit health problems? It is our hope to continue these sampling efforts in future years in order to build a comparison of both brevetoxin and contaminant levels over time and to draw correlations between brevetoxin levels and known red-tide events.

Conservation managers use genetic studies to tell them how much interchange there is between different managed populations. For populations exhibiting high exchange, conservation implications of one could hypothetically effect the status of the other. Therefore, genetic analyses, along with other population studies, assist in designing effective regulations for the protection of a species. In addition, the investigation of health and mortality factors, such as environmental contaminants and brevetoxin, allow for further examination of the stability of the stock and its potential impact on nearby, neighboring communities. This project is being funded in part by the Florida Fish and Wildlife Conservation Commission.

Associations and Habitat Use by Resident and Non-resident Bottlenose Dolphins in the Cedar Keys, Florida

Ester Quintana-Rizzo

The study of bottlenose dolphins in different geographical regions provides an understanding of how social behavior is influenced by ecological conditions. For my Master's project at the University of Florida, I examined how the associations and habitat use by resident and non-resident bottlenose dolphins are influenced by the ecological conditions of the estuarine system of the Cedar Keys, Florida. The Cedar Keys are part of an open system of shallow waters and channels that connect to the Gulf of Mexico.

Thanks to training provided by my Master's advisors, Dr. John F. Eisenberg and Dr. Randall Wells, and by researchers of the Sarasota Dolphin Research Program, I was able to design and conduct photo-identification surveys to identify and quantify the number of individual dolphins using the Cedar Keys. This project was also supported by a Fulbright scholarship, and the Seahorse Key Marine Laboratory and the Department of Zoology at the University of Florida. In one year of research, I identified a total of 233 dolphins in an area of approximately 67 square km. Of this large number of individuals, only 41 dolphins were considered residents. Resident and non-resident dolphins were observed to use all habitats including shallow waters, channels, and inshore waters of the Gulf of Mexico, throughout the year. Residents and non-residents were observed to associate during mating attempts, feeding, and traveling; however, the association between these two types of individuals was infrequent. In contrast and similar to other geographical regions, I found that associations among residents were frequent, especially among individuals of the same gender. Identified females with calves form groups that concentrate in the areas close to shore, particularly in shallow waters. Males also form groups or were solitary individuals. Nevertheless, males used wider areas within the study area than female groups. In fact, males were more commonly observed in the gulf waters of the Cedar Keys than females. These differences in habitat use are speculated to be related to differences in predation pressures on individuals with different reproductive conditions. Protection from predation may be more important for females with calves than for males, because females need to protect not only themselves but also their calves.

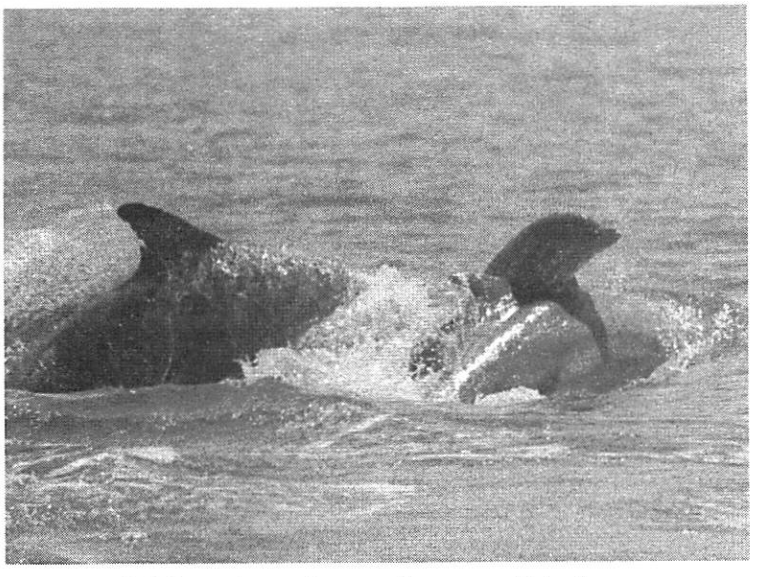
Echo and Misha Update: Nine Years after Release

Kim Bassos-Hull

April 21st, 1999 will be remembered as a special day in this ongoing project. The day started out balmy and clear, a beautiful spring day, as Randy (Wells), Michelle (Jeffries), and I headed north by boat from Mote Marine Lab towards the southeast coastline of Tampa Bay. We were in search of two particular dolphins, Echo and Misha, longtime friends.

For those of you who don't know these two special dolphins, they were part of a planned reintroduction experiment. Both dolphins were captured in Tampa Bay, Florida in July 1988, used for echolocation research in California at Long Marine Laboratory, and then in October 1990, released back into Tampa Bay after a brief acclimation period in a seapen at Mote Marine Lab. In the crucial years that followed, both displayed typical behavioral, ranging, and social association patterns similar to other wild dolphins in the Tampa Bay area.

Finishing up with our second dolphin group sighting of the day just off Cockroach Bay, we saw one lone fin in the distance close to shore. Could it be, one of our longtime friends? We headed towards that lone fin and what we saw next put a smile on our faces. A very familiar fin surfaced just off our bow. It was Misha, cruising along heading north. This marked his 68th sighting since release. We followed him until he joined up with some other dolphins, several of which were longtime associates with which he has often been seen since 1990. These dolphins included F126, SUMO, LBMN, ROOS, and KATT. We were amused as a socializing ruckus occurred and a small calf got gently tossed a few times. After a few hours it was time for us to head home with happy thoughts of a perfect day!



Misha and associate gently toss a calf during a socializing bout on 21 April 1999.

Professional Activity Summary 1999

One accepted measure of the productivity of a research program is its record of achievement for providing information to the scientific community, wildlife management agencies, and the public. The following list includes our program's products during the past year. Copies of specific papers can be obtained upon request for the cost of copies and postage.

Manuscripts In Press or In Review

Crissey, S.D. and R.S. Wells. In press. Serum alpha and gamma tocopherols, retinol, retinyl palmitate, and carotenoid concentrations in captive and free-ranging bottlenose dolphins (*Tursiops truncatus*). Comparative Biochemistry and Physiology, Section A.

Reynolds, J.E. III, R.S. Wells and S.D. Eide. In press. Biology and conservation of the bottlenose dolphin. University of Florida Press.

Duffield, D.A. and R.S. Wells. In press. The molecular profile of a resident community of bottlenose dolphins, *Tursiops truncatus*. *In*: C.J. Pfeiffer, ed., Molecular and Cell Biology of Marine Mammals. Krieger Publishing Company, Melbourne, FL.

Connor, R.C., R.S. Wells, J. Mann and A.J. Read. In press. The bottlenose dolphin, *Tursiops* spp: Social relationships in a fission-fusion society. *In*: P.L. Tyack, R.C. Connor, and J. Mann, eds., Dolphins and Whales: Field Studies of Behavior. University of Chicago Press.

Flamm R.O., E.C.G. Owen, C.F. Weiss, R.S. Wells and D.P. Nowacek. In press. Aerial videogrammetry from a tethered airship to assess manatee life-stage structure. Marine Mammal Science.

Quintana, E. and R.S. Wells. In review. Resighting and association patterns of resident and non-resident bottlenose dolphins in the Cedar Keys, Florida; Insights into social organization. Submitted to Marine Mammal Science.

Pabst, D.A., W.A. McLellan, A.J. Read, R.S. Wells, and A.S. Friedlaender. In review. Conservation plan for the Atlantic coastal stock complex of bottlenose dolphins, *Tursiops truncatus*. Draft report to National Marine Fisheries Service.

Nowacek, S.M. and Wells, R.S. In review. The effects of boat traffic on bottlenose dolphins, *Tursiops truncatus*, in Sarasota Bay, Florida. Submitted to Marine Mammal Science.

Nowacek, D.P., Wells, R.S., Tyack, P.L. In review. A platform for continuous behavioral and acoustic observation of free-ranging marine mammals: Overhead video combined with underwater audio. Submitted to Marine Mammal Science.

Peer-Reviewed Journal Articles and Book Chapters

Wells, R. S. 1999. Ken Norris: Dolphin society insights. Marine Mammal Science 15:931-932.

Wells, R.S., H.L. Rhinehart, P. Cunningham, J. Whaley, M. Baran, C. Koberna and D.P. Costa. 1999. Long-distance offshore movements of rehabilitated bottlenose dolphins. Marine Mammal Science 15:1098-1114.

Wilson, B., H. Arnold, G. Bearzi, C. M. Fortuna, R. Gaspar, S. Ingram, C. Liret, S. Pribanic, A. J. Read, V. Ridoux, K. Schneider, K.W. Urian, R. S. Wells, C. Wood, P. M. Thompson and P. S. Hammond. 1999. Epidermal diseases in bottlenose dolphins: Impacts of natural and anthropogenic factors. Proceedings of the Royal Society of London B. 266(1423):1077-1083.

Ackerman, B. B., T. D. Pitchford, B. L. Weigle, J. E. Reynolds III, R. S. Wells and M. A. Baran. 1999. Marine mammals. Chapter 11. Marine mammals. Pp. 11-1 - 11-11 *in* J. R. Pribble, A. J. Janicki and H. Greening, eds., Baywide Environmental Monitoring Report, 1993-1998, Tampa Bay, Florida. Tampa Bay Estuary Program, Technical Publication 07-99. St. Petersburg, Florida. July 1999.

Wells, R.S., D.J. Boness and G.B. Rathbun. 1999. Behavior. Pp. 324-422 In: J.E. Reynolds, III and S.A. Rommel, (eds.), Biology of Marine Mammals. Smithsonian Institution Press, Washington, DC. 567 pp.

Wells, R. S. 1999. Long-term perspectives from research with free-ranging bottlenose dolphins, *Tursiops truncatus*. Reproduction Workshop Report. European Research on Cetaceans 12:380-382.

Wells, R.S. and M.D. Scott. 1999. Bottlenose dolphin *Tursiops truncatus* (Montagu, 1821). Pp. 137-182 *In:* S.H. Ridgway and R. Harrison (eds.), Handbook of Marine Mammals, Vol. 6, the Second Book of Dolphins and Porpoises. Academic Press, San Diego, CA. 486 pp.

Sayigh, L.S., P.L. Tyack, R.S. Wells, A.R. Solow, M.D. Scott and A.B. Irvine. 1999. Individual recognition in wild bottlenose dolphins: A field test using playback experiments. Animal Behaviour 57:41-50.

Quintana-Rizzo, E. 1999. Associations and habitat use of resident and non-resident bottlenose dolphins, *Tursiops truncatus* (Montagu 1821), in the Cedar Keys, Florida: Insights into social organization. M. Sc. Thesis, University of Florida, Gainesville. 149 pp.

Fazioli, K. L. 1999. Distribution, relative abundance, and community structure of coastal bottlenose dolphins (*Tursiops truncatus*) in the Gulf of Mexico off Sarasota, Florida. M. Sc. Thesis, University of California, Santa Cruz. 106 pp.

Nowacek, S. M. 1999. The effects of boat traffic on bottlenose dolphins, *Tursiops truncatus*, in Sarasota Bay, Florida. M. Sc. Thesis, University of California, Santa Cruz. 42 pp.

Nowacek, D.P. 1999. Sound use, sequential behavior and ecology of foraging bottlenose dolphins, *Tursiops truncatus*. Ph.D. thesis, MIT/WHOI 196 pp.

Popular and Semi-Popular Articles, Book Reviews, Educational Videos

Wells, R.S. 1999. Human interactions with Florida's marine mammals. Videotape produced for Florida Fish and Wildlife Conservation Commission.

Wells, R.S. 1999. Mote newsletter article on SDRP.....

Wells, R.S. 1999. Mote scientists complete first year of state-funded manatee research and education program. Mote News 44(1):14-15.

Contract and Other Reports

Basssos-Hull, K. and R.S. Wells. 1999. Dolphins: Bottlenose dolphins: Experimental return to the wild of two bottlenose dolphins, Florida, USA. IUCN Reintroduction News 18: 22-23.

Fazioli, K. L. and R. S. Wells. 1999. Stock structure of coastal bottlenose dolphins, *Tursiops truncatus*, near Sarasota, Florida. Final Contract Report to National Marine Fisheries Service, Southeast Fisheries Science Center, Miami, FL. Contr. No. 40-WCNF701806. 27 pp + 5 tables, 23 figures, 3 appendices.

Presentations at Professional Meetings

Wells, R.S. 1999. Marine mammals: Minimizing disturbance. Keynote Address, National Watchable Wildlife Conference, Ft. Myers, Florida, 20 October 1999.

Wells, R.S. 1999. Reproduction in wild bottlenose dolphin populations. Bottlenose Dolphin Reproduction Workshop, June 3-6, 1999, San Diego, CA.

Wells, R.S. 1999. Social groupings in wild bottlenose dolphin populations: Effects on reproductive success. Bottlenose Dolphin Reproduction Workshop, June 3-6, 1999, San Diego, CA.

Wells, R.S. 1999. Rehabilitation and release of dolphins. Invited Speaker, Second Workshop on Cetacean Stranding Training, 30 January 1999, Kenting National Park, Taiwan.

Wells, R.S. 1999. Of what value is a dolphin hospital? Invited Speaker, 7th Symposium on Cetacean Ecology and Conservation, 27 January 1999, Taipei Zoo, Taiwan.

Bolen, M.E., S.A. Rommel, T.J. Evans, D.M. Fagone, T.D. Pitchford, D.J. Szemer. 1999. A comparison of techniques used in determining ages of the Florida manatee (*Trichechus manatus latirostris*). Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Fazioli, K.L., R.S. Wells. 1999. Distribution and community structure of coastal bottlenose dolphins (*Tursiops truncatus*) in the Gulf of Mexico off Sarasota, Florida. Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Gauthier, J.M., H. Dubeau, E. Rassart, W.M. Jarmin, R.S. Wells. 1999. Biomarkers of DNA damage in marine mammals. Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Nowacek, D.P., R.S. Wells, P.L. Tyack. 1999. Sequential foraging behavior and ecology of bottlenose dolphins, *Tursiops truncatus*. Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Nowacek, S.M., R.S. Wells, D.P. Nowacek. 1999. The effects of boat traffic on bottlenose dolphins, *Tursiops truncatus*, in Sarasota Bay, Florida. Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Parks, S., P. Tyack, D. Nowacek, M. Johnson. 1999. Use of an archival recording tag to measure acoustic activity and behavior in North Atlantic right whales (*Eubalaena glacialis*). Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Quintana-Rizzo, E., R.S. Wells, J.F. Eisenberg. 1999. Association patterns of resident and non-resident bottlenose dolphins, *Tursiops truncatus*, in the Cedar Keys, Florida. Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Watwood, S., P. Tyack, R. Wells. 1999. Signature whistle sharing between allied male bottlenose dolphins, *Tursiops truncatus*. Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Wells, R., C. Manire, H. Rhinehart, D. Smith, A. Westgate, F. Townsend. 1999. Ranging patterns of rehabilitated rough-toothed dolphins, *Steno bredanensis*, released in the northeastern Gulf of Mexico. Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Westgate, A.J., D.A. Pabst, W.A. McLellan, T.M. Williams, R.S. Wells, M.D. Scott. 1999. An instrument to record heat flux and surface temperature from free-swimming dolphins. Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Wilkin, S.M., E.A. Forys, J.E. Reynolds III, R.S. Wells. 1999. Assessment of ranging patterns and habitat preference of the bottlenose dolphin, *Tursiops truncatus*, utilizing a geographic information system (GIS). Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Wilson, B., P.S. Hammond, R. Gaspar, R.S. Wells, P.M. Thompson. 1999. Differential rates of epidermal infection and healing in dolphins: Why some populations are better looking than others. Biennial Conference on the Biology of Marine Mammals, 28 November-3 December, Maui, HA.

Invited Public and University Lectures

26 Jun 99Conservation Matters, Brookfield Zoo, Brookfield, IL.
18 Jan 99 Cetacean rehabilitation and release, Shedd Aquarium, Chicago, IL.
16 Jan 99 Conservation Matters, Brookfield Zoo, Brookfield, IL.
7 Jan 99 Blue Planet Lecture Series, University of Miami, Miami, FL

Sarasota Dolphin Research Program 1999

Staff

Randall Wells, Ph.D.
Sue Hofmann, B.S, Field Coordinator
Stephanie Nowacek, M.Sc., Lab Manager
Kim Bassos-Hull, M.Sc., Research Associate
Howard Rhinehart, AHT, Veterinary Technician
Todd Speakman, B.S., Research Assistant
Ester Quintana-Rizzo, M.Sc., Research Assistant
Michael Scott, Ph.D.
Blair Irvine, Ph.D.
Kim Urian, B.S., Data Management Consulting

Graduate Research Assistants During 1999

Anna Sellas, B.S. (Master's program, UCSC)
Kara Buckstaff, B.S. (Master's program, UCSC)
Kristi (Brockway) Fazioli, M.Sc. (graduated June 1999, UCSC)
Stephanie Nowacek, M.Sc. (graduated June 1999, UCSC)
Douglas Nowacek, Ph.D. (graduated September 1999, WHOI/MIT)
Caryn (Weiss) Owen, B.A (Master's program, UCSC)
Edward Owen, B.S. (Doctoral program, UCSC)
Ester Quintana-Rizzo, M.Sc. (graduated January 1999, UF)
Stephanie Watwood, B.S. (Doctoral program, WHOI/MIT)
Meg Bolen, B.S. (Doctoral program, UCSC)

Interns

Todd Speakman
Brandie Littlefield
Nancy Griffin
Alexandria Leckliter
Jocelyn Hittle
Daniel Kaminstein
Carrie Merola
Stephanie Young
Sunah Kim

Education

Education is a major component of SDRP activities, directed toward the general public, students, colleagues, and wildlife management agencies. We work to educate the general public regarding bottlenose dolphins and conservation issues through public presentations at Brookfield Zoo and elsewhere, articles and interviews, and through volunteering opportunities through Earthwatch Institute (for volunteering information, call (617) 926-8200). This year, through the support of the Florida Fish and Wildlife Conservation Commission, we developed a 15 minute educational video tape, "*Human Interactions With Florida's Marine Mammals*" which describes how human activities can harm dolphins and manatees, and suggesting courses of action for improving the lives of these animals. This was first presented as part of the keynote address at the National Watchable Wildlife Conference in October, and has since been requested and used by wildlife management agencies, marine educators, and others. Copies of this video are available for the cost of copying and shipping ($10.00, check made out to "Mote Marine Laboratory"). We also expect publication during summer 2000 of a book by John Reynolds, Randall Wells, and Samantha Eide, *Biology and Conservation of the Bottlenose Dolphin*, through the University of Florida Press.

Students are a crucial element of conservation. 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 3 months at a time. As described throughout the newsletter, graduate students come to our program through the University of California at Santa Cruz, Woods Hole Oceanographic Institution, and the University of North Carolina, Wilmington. During 1999 we enhanced our support of student education through participation in the publication of one of the first comprehensive marine mammal textbooks, *Biology of Marine Mammals*, edited by John Reynolds and Sentiel Rommel (Smithsonian Institution Press), and through our involvement in a variety of marine mammal courses. We were part of a summer college-level course on the biology and conservation of marine mammals, sponsored by Eckerd College and Mote Marine Laboratory; the success of this initial course has led to it being offered again in 2000. Similarly, we were an integral part of a new marine mammal veterinary student course held at Mote Marine Lab; this course will be expanded and will be offered again next summer. High school students with Sarasota's Out of Door Academy participated in a spring "mini-mester" field session through our program, with the expectation that this will be repeated next year. We also taught a winter marine mammal behavior course through the University of Miami that will be repeated in January 2000.

Our efforts to provide information to our colleagues and wildlife management agencies continued during 1999, through publication of numerous scientific articles, through presentations at scientific conferences such as the Biennial Conference on the Biology of Marine Mammals held in Maui during December, and through participation in national/international panels such as the Atlantic Scientific Review Group, the Working Group on Unusual Marine Mammal Mortality Events, the Florida Manatee Recovery Team, and the IUCN Cetacean Specialist Group and Reintroduction Specialist Group. In addition, we participated in workshops such as "Planning Workshop to Develop a Research Programme to Investigate Pollutant Cause-Effect Relationships in Cetaceans - "Pollution 2000+'" sponsored by the International Whaling Commission and held in Barcelona, Spain, during 14-17 March, and the "Bottlenose Dolphin Reproduction Workshop," held June 3-6 in San Diego.

Intern Perspective

Todd Speakman

I was extremely fortunate for my internship opportunity with the Sarasota Dolphin Research Program during the spring and summer of 1999. I was given the opportunity to experience two internship terms, the first one primarily focusing on tasks involved inside the lab while the second one enabled me to spend time out in the field. Having been able to see both aspects involved in the research of bottlenose dolphins has given me a unique perspective of what it takes to succeed in this field as well as ideas in developing my own project.

During my first internship period, I focused on organizing and upgrading the assorted dorsal fin catalogs that are utilized for photo-identification in the lab. Through the completion of this project, I was able to become better acquainted with some of the dorsal fins of the different study regions, better understand the protocol involved in preparing and maintaining fin catalogs, get more familiarized with shooting slide duplicates, and gain the personal satisfaction of completing a long-term project.

My second internship period enabled me to assist two of Dr. Wells' graduate students in collecting data for their dissertations. While focusing on male pairs and looking at the mating system of the Sarasota dolphins, I got valuable first-hand experience in boat handling, understanding some of the parameters involved in collecting data on marine mammals, conducting focal animal follows, and learning some of the resident animals that comprise this community. In addition, due to the plethora of field research that takes place during the summer, I was able to witness different research methodologies in action such as radio tracking tagged dolphins, recording dolphin whistles through a hydrophone array, and looking at subsurface behaviors of dolphins and manatees through the use of a blimp airship and overhead video system.

Finally, I have ventured outside the lab by participating in shifts with the live-stranded dolphins that the animal care team has worked to rehabilitate, as well as assisting the manatee program with surveys conducted in Charlotte Harbor. This diversity has allowed me to meet and interact with many new people and broaden my scientific background. This internship is a great learning experience for anyone looking to pursue behavioral research or still deciding what to do after college, as well as a great way to get your feet wet in the field of marine biology.

We Need Your Help for 2000!

The staff and volunteers of the Sarasota Dolphin Research Program would like to be able to maintain our current ambitious level of field work, analyses, publishing, and presenting, but cutbacks in the availability of government research funds have made this difficult. In particular, we need your assistance in obtaining the following:

- **Support for stipends and field expenses for 2 graduate students, at $18,000/year/student.**
- **A newer 4WD vehicle to replace our aging Explorer, for boat towing, etc.**
- **18-20 ft center console boats to replace our current fleet of 1972-1973 vintage research boats.**

Dolphin Biology Research Institute (IRS-EI#59:2288387) is a 501{c}3 not-for-profit corporation; thus donations of funds and/or equipment are tax-deductible.

We would like to acknowledge the generous support of our program activities during 1999 from:

Edward McCormick Blair, Jr.	British Airways Holidays	Wes and Pat Brockway	Dolphin Quest
Disney Wildlife Conservation Fund	Earthwatch Institute	Out-of-Door Academy	Linda Harden
The National Marine Fisheries Service	The John G. Shedd Aquarium	Ronnie and John Enander	Indianapolis Zoo

NEW!! Give the Gift of Conservation – Adopt a Dolphin NEW!!

As part of a new opportunity to help fund the Sarasota Dolphin Research Program (SDRP) and teach people about dolphin conservation issues, the Chicago Zoological Society (CZS) has developed a new component to its Parents Program: "Adopt a Sarasota Dolphin." Designed to spread the word about the important research being conducted in Sarasota while directly contributing to the program, all funds raised through adoptions will support the ongoing field work, analyses, and publishing undertaken by the SDRP.

Pumpkin is the first featured dolphin. She was born in 1984 to Ms. Mayhem, a long-term resident of Sarasota Bay. Pumpkin has several siblings in the community and has given birth to three calves of her own. Like 4% of Sarasota dolphin community members, she has survived a boat strike, and has provided SDRP researchers with invaluable information on how human actions affect dolphins. "Parents" will receive Pumpkin's biography (including sighting map, genealogy and natural history), conservation action information, a color photo, a mid-year update to learn about her recent activities, and the current issue of SDRP's newsletter, Nicks 'N' Notches.

Charter adoptions of Pumpkin are available for $50 through February 29, 2000 (great for Christmas and Valentine's Day gifts). Adoptions for student classes can also be arranged. The program may be expanded to include other dolphins after the February deadline. All funds raised through adoptions will support projects of the SDRP. To adopt Pumpkin or for more information, please call the Chicago Zoological Society at 708.485.0263, ext. 341 or fill out and send in the form below. **Thanks for your support!!**

1. Order Form to Adopt Pumpkin

_____
My name (Mr./Mrs./Ms./Miss)

_____
Organization/School name (if applicable)

_____
Address

_____
City/State/Zip code

(_____)_____
Daytime area code and phone

2. Payment

Cost of adoption is $50 (additional delivery charges may be necessary if your deadline is fast approaching - please call for details) made payable by check (please make check out to ChicagoZoological Society) or credit card:

__Visa __MC __Discover __AmEx

_____
Card Number Expiration date

_____
Signature (credit cards only)

3. Gift Adoption

If this is a Gift Adoption check here_____ and please provide the following information:

_____
Gift recipient's name (Mr./Mrs./Ms./Miss)

_____
Organization/School name (if applicable)

_____
Address

_____
City/State/Zip code

(____)_____
Daytime area code and phone

_____
Gift from

_____
Gift message

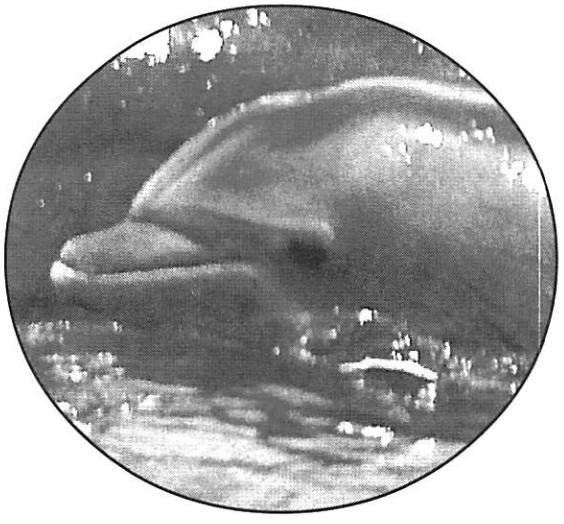
_____
Date of occasion

Please check one:
Mail packet to Me_____
Mail packet directly to gift recipient_____

Mail and Phone Orders:

Just fill out the form and mail it with your payment to: Brookfield Zoo Parents Program, 3300 Golf Road, Brookfield, IL 60513. Please call us at (708) 485-0263 ext. 341, with questions or to charge your contribution.

Adopt Me.....see page 15



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