January 2023

Nicks'n'Notches

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

Chicago Zoological Society

Inspiring Conservation Leadership

Sarasota Dolphin Research Program

50

1970–2020

A program of the Chicago Zoological Society

The mission of the

Chicago Zoological Society

To inspire conservation leadership by connecting people to wildlife and nature

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Sarasoa Dolphin Research

Individuals Make a Difference

My introduction to our January 2022 issue of Nicks'n'Notches focused on how we have come to appreciate the dolphins of Sarasota Bay as the individuals they are, through their long lifespans, family connections across generations, residency to core areas (neighborhoods) within the greater community range, individual behaviors, social association patterns, and their individual responses to the many dramas that may occur over the course of each individual's life. Through our observations and analyses, we have also demonstrated the population-level conservation benefits that can come from each individual that we are able to save. We have been making a concerted effort to help the public relate more readily to the dolphins by sharing our long-term findings, facilitating the development of an understanding of the animals as individuals, with the hope that greater appreciation will lead to greater motivation to protect them and their ecosystem. Individuals indeed make a difference – in the forms of both dolphins and humans.

We had the opportunity to reinforce and amplify our thoughts about the importance of considering these animals as individuals at the 24th Biennial Conference on the Biology of Marine Mammals, held in West Palm Beach in August 2022. The theme of the conference was "A Sea Change: Transforming Science into Stewardship." Our approach exemplifies this theme, and I was given the honor of presenting some of our thoughts in a plenary address on the first morning, "Individuals make a difference: 50+ years of lessons from Sarasota's dolphins," as I accepted the Society's Kenneth S. Norris Lifetime Achievement Award. The thread of recognizing cetaceans as individuals emerged in a number of conference presentations, including discussions of the plight of the highly endangered North Atlantic right whales, as described in an extremely compelling plenary talk the next day by our colleague Michael Moore of Woods Hole Oceanographic Institution.

The Norris Award was special to me for a number of reasons, not the least of which being the fact that it is named after my PhD advisor and boss while I was at the University of California, Santa Cruz (UCSC). Ken's influence on our field is pervasive and long-lasting as a force behind the creation of the U.S. Marine Mammal Protection Act, one of the founders of the Society for Marine Mammalogy, and a mentor who shared his amazing insights with many individuals who have guided the field to what it is today. His encouragement during the 12 years I worked with him at UCSC solidified the SDRP during our program's formative years.

Ken also helped me to appreciate the strength of a research team, and the value and synergy of what each individual can contribute to the overall effort. Our SDRP team's contributions were on display at the conference, in 23 oral or poster presentations. I am incredibly proud of the difference being made by these individuals, as well as our collective impacts, which you make possible!

Many thanks to all of you for caring about the dolphins of Sarasota Bay,

Director, Chicago Zoological Society's Sarasota Dolphin Research Program

In This Issue

Sarasota Dolphin Research Program staff and students at the Society for Marine Mammalogy's biennial conference in West Palm Beach, August 2022.

Our cover dolphins this year are nicknamed Eugenie Clark (female Atlantic spotted dolphin, above), and Sylvia Earle (female bottlenose dolphin, bottom). They were sampled and tagged during our first offshore health assessments. Both were named after pioneering women in marine science whose dedication and work have inspired many to pursue careers in marine biology and conservation.

Our approach toward helping dolphins

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 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. Dolphin Biology Research Institute, a Sarasota-based 501{c}3 non-profit corporation established in 1982, provides logistical support with its fleet of small research vessels, vehicles, computers, cameras, field equipment, etc. Since 1992, the program has been based at Mote Marine Laboratory, with office, lab, storage and dock space within the resident Sarasota Bay dolphins' home range. The SDRP maintains academic connections including providing graduate student opportunities primarily through the University of Florida, the University of California at Santa Cruz, and Duke University, and undergraduate opportunities through a number of schools, including New College of Florida.

All of our dolphin research in the United States is conducted under NOAA Fisheries Service Scientific Research Permit No. 20455 and Institutional Animal Care and Use Committee approvals through the appropriate institutions.

The Year in Review

Some of our accomplishments, over the decades and by the numbers

Randall Wells, Chicago Zoological Society's Sarasota Dolphin Research Program

The "natural laboratory" situation of Sarasota Bay facilitates cutting-edge work done by a diverse group of specialists who complement the expertise and interests of the SDRP. Over the decades, staff, students, and collaborators have produced more than 350 peer-reviewed publications (available at: https://sarasotadolphin.org/publications/), 4 books, and more than 100 technical reports, and we have made more than 825 presentations to scientific audiences, students, stakeholder groups, and the general public. Perhaps the most meaningful component of our legacy, though, involves training the next generation of conservation leaders. To date, 46 master's and 50 doctoral students have benefited from SDRP data collection opportunities, data, samples, or guidance. In addition, 469 interns have received multi-month training by the SDRP. Over the years, foreign participants in our training programs have come from more than 45 countries, and include 73 of the interns, 44 post-graduate scientists, and 113 health assessment project participants. A number of the alumni from our training programs have moved into key positions in wildlife management, at NOAA and the Marine Mammal Commission, or engaged in conservation activities elsewhere around the world. We have participated in or led 28 bottlenose dolphin rescues, and participated in responses to 12 mass strandings of: short-finned pilot whales, false killer whales, pygmy killer whales, Fraser's dolphins, clymene dolphins, and spinner dolphins. The accomplishments of the program over the decades reflect the efforts of many: staff, students, volunteers, and collaborators, and the long-term support of several key individuals and organizations.

Sarasota Dolphin Research Program project summary

Randall Wells, Chicago Zoological Society's Sarasota Dolphin Research Program

We have spent much of the past year trying to work through a back-log of research, education, or conservation projects postponed by the pandemic and the terrible destruction in coastal Louisiana from Hurricane Ida that interfered with our ability to engage in several projects based out of Grand Isle. These delays, along with some cancellations, have had adverse implications for program support, as we do not have access to the grant or contract funds until we do the proposed work. We appreciate the flexibility of funders who have allowed us to use alternative approaches to accomplish at least some of the goals of our field work in spite of COVID constraints, and to reprogram funds to address emerging issues. We are very appreciative of donor support to fill funding gaps, allowing our team to remain intact, and to put their non-field time to good use analyzing data and preparing scientific publications. This momentum has continued. As of September, we have been working on more than 25 different scientific manuscripts in 2022, including 14 already published.

The following list provides information on some of the funded projects in which we have been engaged over the past year, or will begin soon. We are very pleased to report that the Charles and Margery Barancik Foundation has provided a renewal grant of $1 million over three years to support our basic field operations, including monthly dolphin photographic identification surveys, seasonal fish surveys, listening network operations, and intern stipends. The projects listed below are either being led by CZS researchers, or in some cases, these are subawards to the Chicago Zoological Society's Sarasota Dolphin Research Program. The CZS researchers responsible for overseeing the SDRP portions of the projects are listed as Principal Investigators. Funding for the projects is being administered primarily through the Chicago Zoological Society. More details about some of these projects are presented in the pages that follow.

	Project Title	Funding Source	SDRP Principal Investigator	Start	End
1	Bottlenose dolphins as sentinels of ecosystem health	Charles and Margery Barancik Foundation	Wells	1-Aug-17	31-Jul-22
2	Bottlenose dolphins as sentinels of ecosystem health - continuation	Charles and Margery Barancik Foundation	Wells	1-Sep-22	31-Aug-25
3	Sarasota Dolphin Research Program operations	Batchelor Foundation	Wells	1-Dec-21	30-Nov-22
4	LCP Chemicals Georgia Natural Resource Damage Assessment, bottlenose dolphin injury quantification and restoration planning	NOAA/Natural Resource Damage Assessment	Wells	4-Aug-19	28-Aug-23
5	Health and movements of Florida's Gulf dolphins	Florida RESTORE Act Centers of Excellence Program (through Florida Institute of Oceanography and Mote Marine Lab)	Wells	4-Mar-20	28-Feb-23
6	Assessment of movement patterns and critical habitat for coastal and continental shelf small cetaceans in the Gulf of Mexico using newly developed remote satellite tagging techniques	NOAA RESTORE Act (through Woods Hole Oceanographic Institution)	Wells	1-Jul-21	30-Jun-24
7	Towards an understanding of the cumulative effects of multiple stressors on marine mammals – an interdisciplinary working group with case studies	DOD/Strategic Environmental Research and Development Program (through University of St Andrews)	McHugh, Wells	1-May-20	31-Jan-24
8	"VESOP II: Developing broadly applicable models to predict vital rates from remotely sampled health measures including epigenetics"	Office of Naval Research (through National Marine Mammal Foundation)	Wells	1-Apr-22	3-Sep-24
9	Rapid detection and response to cetacean strandings and small cetacean disentanglements in central western Florida and capacity building for large whale recovery, necropsy and disposal for greater Florida	NOAA John H. Prescott Marine Mammal Rescue Assistance Grant (through Mote Marine Lab)	Wells	1-Aug-20	31-Jul-23
10	Rapid detection and response to cetacean strandings in central west Florida and enhancement of the tools for small cetacean interventions and forensics	NOAA John H. Prescott Marine Mammal Rescue Assistance Grant (through Mote Marine Lab)	Wells	1-Aug-21	31-Jul-23
11	Continuation of a National Service Center for post-release monitoring of small cetaceans	NOAA John H. Prescott Marine Mammal Rescue Assistance Grant	Wells	1-Aug-20	31-Jul-23
12	Advancing the study of diet and vulnerability to disturbance for cetaceans	National Science Foundation Graduate Research Fellowship	Tatom-Naecker	1-Sep-20	31-Aug-23
13	Advancing the study of diet and disturbance vulnerability for cetaceans worldwide	Myers Oceanographic and Marine Biology Trust	Tatom-Naecker	1-Apr-21	1-Apr-22
14	Advancing the study of diet and disturbance vulnerability for cetaceans worldwide	PADI Foundation	Tatom-Naecker	1-Apr-21	1-Apr-22
15	Advancing the study of diet and disturbance vulnerability for cetaceans worldwide	American Cetacean Society Monterey Bay Chapter	Tatom-Naecker	1-Sep-21	1-Sep-22
16	A preliminary assessment of movement patterns of dolphin prey fish	Mote Scientific Foundation	McCabe	1-Aug-22	30-Jun-24
17	Marine megafauna project	Mote Scientific Foundation	Bassos-Hull	18-Sep-20	31-Dec-21
18	Kim Bassos-Hull research activities	Anonymous Donor	Bassos-Hull	1-Jun-21	31-Dec-23

19	William R. and Lenore Mote Early Career in Marine Sciences Fellowship: Trophic ecology of large coastal predators along the central west coast of Florida	Mote Scientific Foundation	Wilkinson	1-Jul-20	30-Nov-22
20	Eugenie Clark field research skills and leadership program	Mote Scientific Foundation	Wilkinson	1-Mar-21	30-Jun-22
21	Coastal shark presence at offshore artificial reef locations in the Gulf of Mexico: A preliminary assessment of shark movements and the potential for human-animal conflict	Mote Scientific Foundation	Wilkinson	1-Jul-21	31-Aug-23
22	Human-animal conflict stage 2: Shark behavior near commercial fishing activity	Mote Scientific Foundation	Wilkinson	1-Oct-21	30-Nov-22
23	Piney Point dolphin monitoring	Mote Scientific Foundation	Wells	1-May-21	30-Apr-22
24	Franciscana interactions with Argentinean fisheries	Disney Conservation Fund	Wells	1-Sep-18	30-Nov-23
25	Knowledge sharing for dolphin conservation	Disney Conservation Fund	McHugh	1-Sep-20	31-Aug-23
26	Sarasota Bay dolphin listening network	Disney Conservation Fund	McHugh	1-Sep-22	31-Aug-24
27	Sarasota Bay listening network	Mote Scientific Foundation	McHugh	1-Jan-23	31-Dec-23
28	Sarasota Bay dolphin health assessment	Dolphin Quest	Wells	1-Jan-22	31-Dec-22
29	Sarasota dolphin health assessment	Disney	Wells	1-Oct-21	30-Sep-22
30	Health assessment support - supplemental	Disney	Wells	1-May-22	31-Dec-22
31	Dolphin health assessment/biopsy dart sampling	Mote Scientific Foundation	Wells	18-Sep-20	31-Dec-22
32	Impacts of disturbance, disease and environmental degradation on estuarine and oceanic wild Florida dolphins	Harbor Branch Oceanographic Institution/ Florida Atlantic University	Wells	1-Nov-21	31-May-23
33	*In-natura* hearing measurements from moving Odontocetes	Danish Research Council (through University of Southern Denmark)	Wells	1-Aug-21	31-Jul-23
34	Investigating trophic exposure to marine microplastics and plasticizers in a sentinel species and the implications for seafood safety	National Institute of Environmental Health Sciences/NIH (through College of Charleston)	Wells	1-Jan-22	31-Dec-24
35	Sarasota Dolphin Research Program internships	Mote Scientific Foundation	McHugh	1-Jan-23	31-Dec-23
36	Sarasota Bay bottlenose dolphin abundance estimate for NOAA management	CZS Women's Board	Wells, Toms, Wilkinson, Allen	4-Jun-22	31-Mar-23

SDRP participation in the Society for Marine Mammalogy Biennial Conference

Randall Wells, Chicago Zoological Society's Sarasota Dolphin Research Program

Sarasota Dolphin Research Program staff and students participated in the 24th Biennial Conference on the Biology of Marine Mammals, in West Palm Beach, during August 2022. This international conference is the largest for our field. For the first time, this conference was held in a hybrid format, with more than half of the 1,800 participants attending virtually. SDRP staff, students, and interns were presenters or co-authors on 23 oral or poster presentations, including the opening plenary presentation by Randy Wells where he received the Society for Marine Mammalogy's Kenneth S. Norris Lifetime Achievement Award. The presentations are listed below, with additional details provided for some. We are very appreciative of the anonymous donation that allowed our staff to participate in the conference in-person.

Allen, J. B., A. Barleycorn, K. Bassos Hull, S. Brenneman, J. Crossman, A. Honaker, S. McBride-Kebert, K. McHugh, R. Perrtree, C. Toms, R. Tyson Moore, K. Urian, K. Wilkinson, and R. Wells. Ch-ch-changes: Dorsal fin mark acquisition rates in a community of bottlenose dolphins, *Tursiops truncatus*, in Sarasota Bay, Florida, USA. (oral presentation); We analyzed dorsal fin photographs from 20,000 sightings of the 183 calves born in the Sarasota community during 2004-2019 to learn more about when they acquired their nicks and notches. About 1/3 of the total and half of those that survived to age six became marked. This unique dataset will help population models quantify dorsal fin mark acquisition rates and, ultimately, provide more accurate estimates of population size and survivorship.

Bassos-Hull, K., G. N. Lovewell, J. L. Blackburn, A. L. D. Kincaid, K. A. Wilkinson, and R. S. Wells. Barbed! Stingray spine injuries to common bottlenose dolphins (*Tursiops truncatus*) in central west Florida, USA. (poster)

Beal, A. P., C. N. Toms, J. Kiszka, R. S. Wells, and J. M. Eirin-Lopez. We got the BEAT! Epigenetic aging tools for dolphins and beyond. (oral presentation)

Cush, C. C., R. S. Wells, J. Adams, E. Fujioka, and K. Urian. Gulf of Mexico Dolphin Identification System (GoMDIS) – A collaborative effort to better define bottlenose dolphin movements (poster); GoMDIS provides a centralized and standardized repository for ongoing and archived photo-ID catalogs housed online within OBIS-SEAMAP to track regional movements of bottlenose dolphins in the Gulf of Mexico and beyond. GoMDIS currently holds 43 catalogs encompassing 46,135 images of 25,511 animals with over 2,000 matches discovered between projects.

Dziobak, M., L. B. Hart, E. Wirth, and R. S. Wells. Who? What? Where? A demographic and spatiotemporal characterization of phthalate (DEHP) exposure in free-ranging common bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida, USA. (oral presentation)

Griffin, M. L., C. Bryan, B. C. Balmer, R. D. Day, A. M. Gorgone, J. Litz, T. K. Rowles, L. H. Schwacke, R. S. Wells, E. S. Zolman, and T. M. Cox. Quantifying mercury in the common bottlenose dolphin (*Tursiops truncatus*) in the Southeast, USA. (poster)

Hart, L. B., M. Dziobak, E. Pisarski, E. Wirth, and R. S. Wells. Sentinels of synthetics – a comparison of phthalate exposure between common bottlenose dolphins (*Tursiops truncatus*) and human reference populations. (poster)

Hyer, M. D., L. S. Sayigh, P. L. Tyack, V. M. Janik, K. A. McHugh, R. S. Wells, and F. H. Jensen. Stereotyped non-signature whistles are shared and exchanged between allied common bottlenose dolphin males (*Tursiops truncatus*) in Sarasota Bay, FL. (oral presentation)

Kincaid, A. L. D., G. N. Lovewell, J. B. Allen, K. Bassos-Hull, J. L. Blackburn, R. A. Hazelkorn, and R. S. Wells. Davian behavior in common bottlenose dolphins (*Tursiops truncatus*) in the Sarasota, FL area: It's just wrong. (poster)

Lovewell, G. N., J. L. Blackburn, A. L. D. Kincaid, and R. S. Wells. Covid-19 collateral damage: The pandemic's effect on common bottlenose dolphins in and around Sarasota, Florida. (poster)

McHugh, K. A., R. Byrskov, S. Brown, G. Hernandez Ramirez, V. Diaz, D. Mann, O. J. Isaac-Lowry, S. C. Alessi, and R. S. Wells. Enhanced monitoring of adverse human-dolphin interaction hotspots via continuous multi-view video and passive acoustic technology. (poster)

Moors, A., J. Ness, D. Ellisor, J. Trevillian, R. Pugh, J. Kucklick, R. Wells, and T. Rowles. Gaining Access to High-Quality, Archived Marine Mammal Samples; is it impossible? (oral presentation - virtual)

Mota, R., R. Genoves, P. Fruett, and S. Botta. Beyond the basics: using photo-identification as tool to assess social behavior and determine the sex of Lahille's bottlenose dolphins (*Tursiops gephyreus*). (poster)

Sayigh, L. S., V. M. Janik, F. H. Jensen, M. D. Scott, P. L. Tyack, and R. S. Wells. The Sarasota Dolphin Whistle Database: A unique long-term resource for understanding dolphin communication. (oral presentation)

Former CZS-SDRP students and interns reunited during the Society for Marine Mammalogy conference in August 2022.

Randy Wells during his talk "Individuals make a difference: 50+ years of lessons from Sarasota's dolphins." Randy was honored with the Kenneth S. Norris Lifetime Achievement Award from the Society for Marine Mammalogy. The award, named after the SMM's founding president, recognizes Randy for his exemplary lifetime contributions to science and society through research, teaching, and service.

Spiessl, M. P., R. M. Perrtree, R. F. Young, A. Fox, J. Conway, A. A. Hohn, A. M. Gorgone, J. H. Schacke, E. W. Montie, A. Marian, K. Urian, R. B. Tyson Moore, and T. M. Cox. Assessing management boundaries of the common bottlenose dolphin (*Tursiops truncatus*) by comparing multiple photo-identification catalogs. (poster)

Tatom-Naecker, T.-A., R. S. Wells, D. P. Costa, S. Trumble, and S. Budge. A fatty acid signature library of prey fish for common bottlenose dolphins (*Tursiops truncatus*) for use in quantitative fatty acid signature analysis (QFASA). (poster); Figuring out what Sarasota Bay bottlenose dolphins eat is critical if we want to understand their vulnerability to disturbances—like red tides and changing climate conditions—that impact the amount and variety of food available. Quantitative fatty acid signature analysis (QFASA) allows us to estimate a dolphin's diet by comparing the amounts of different fatty acids (the "fatty acid signatures") measured in the dolphin and a representative collection ("library") of prey fish. This presentation described the creation of the first Sarasota Bay prey fish fatty acid library, and explores how and why fatty acid amounts vary among different fish species.

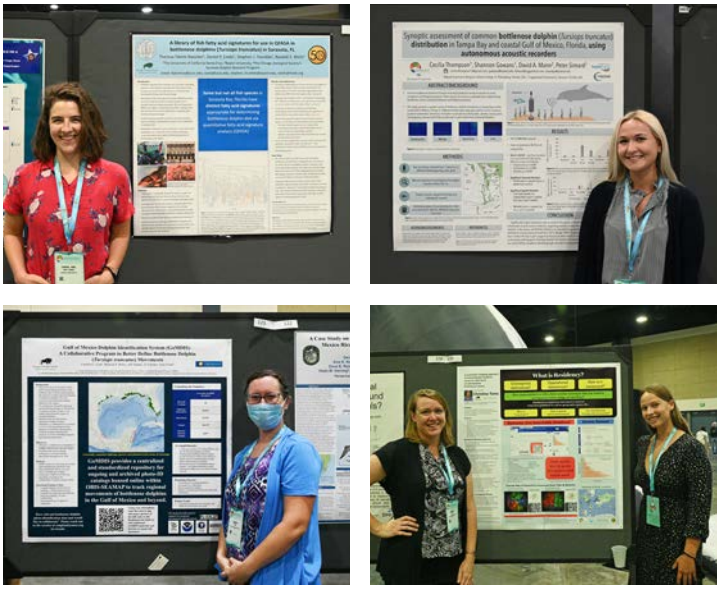
Thompson, C. R., S. Gowans, D. A. Mann, and P. Simard. Synoptic assessment of common bottlenose dolphin (*Tursiops truncatus*) distribution in Tampa Bay and coastal Gulf of Mexico, Florida, using autonomous acoustic recorders. (poster); This study presents a synoptic survey of bottlenose dolphin distribution in Tampa Bay and the coastal Gulf of Mexico, Florida using several autonomous acoustic recording stations. Detections of dolphin vocalizations were used to determine general distribution patterns across three different habitat types (bay, pass, gulf) and two seasons (summer and winter) and served as a proxy for behavior and habitat association.

Toms, C. N., K. McHugh, R. Tyson Moore, J. Slaathaug, and R. S. Wells. What is 'residency'? A systematic mapping approach to a review of the residency construct with focus on odontocetes. (poster); What is animal residency and how is it defined, measured, and different from other similar concepts (*e.g.*, site fidelity)? It's complicated, but understanding community structure and how long animals use specific areas are key parts of population management and mitigating negative impacts on animals. Christina Toms is leading a conceptual review on odontocetes to (1) evaluate how others in the marine mammal community have tackled these challenging questions over time and (2) to gather that information into one database that will be freely available to anyone online.

Van Horn, C., F. H. Jensen, V. Janik, E. Morrison, R. S. Wells, and L. Sayigh. Sex difference in non-signature whistle production in bottlenose dolphins. (poster - virtual)

Vivier, F., A. L. Bradford, M. C. Hill, E. M. Oleson, K. M. Yano, R. Wells, A. Pacini, E. Leunissen, C. G. Booth, J. Rocho-Levine, and L. Bejder. Sensitivity and precision of Unoccupied Aerial System-photogrammetry to assess the age structure of delphinid populations. (oral presentation - virtual)

Wells, R. S. Individuals make a difference: 50+ years of lessons from Sarasota's dolphins. Kenneth S. Norris Lifetime Achievement Award plenary presentation. (oral presentation)

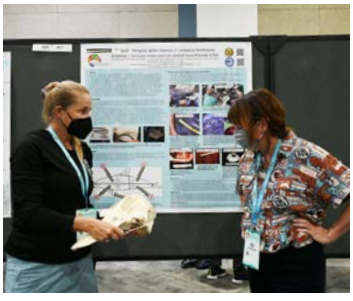


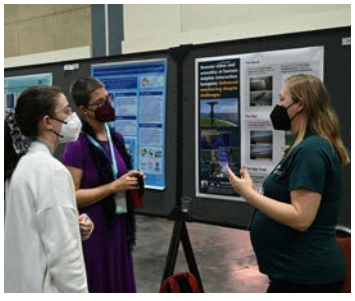
Top left (clockwise around): Theresa Tatom-Naecker, Cecilia Thompson, Christina Toms and Josie Slaathaug, and Carolyn Cush in front of their posters at the 24th Biennial Conference on the Biology of Marine Mammals.

Left to Right: Randy Wells with CZS-SDRP collaborators Frants Jensen and Austin Allen.

Wells, R. S. Tagging Franciscana dolphins off Argentina and Brazil: Considerations for Integrated Conservation Planning. Integrated Conservation Planning for Cetaceans Workshop. (oral presentation)

Wilkinson, K. A., R. S. Wells, R. E. Hueter, J. Morris, L. A. Hoopes, J. Bakker, M. P. M. van Zinnicq Bergmann, S. Rossman, T.-A. Tatom-Naecker, and V. Hagan. Food fight? Assessing the trophic overlap of resident common bottlenose dolphins (*Tursiops truncatus*) and coastal shark species off Sarasota, Florida. (oral presentation); The identification of shared prey resources among sharks and dolphins can help disentangle complex trophic interactions which may have profound implications for marine ecosystem structure and function. We used stable isotope, fatty acid, and DNA metabarcoding analyses to investigate the trophic position, as well as isotopic and dietary niche overlaps, between bull, tiger, sandbar and blacktip sharks and compared them to information available for the Sarasota Bay bottlenose dolphin community. Results suggest that Sarasota Bay resident dolphins are foraging in seagrass habitats while the four shark species are foraging in more open water habitats. Both the stable isotope and fatty acid analyses suggest there is dietary overlap in the shark species; however, there are significant differences in fatty acid composition which warrant further study.





Left: Kim Bassos-Hull discussing the interactions between stingrays and dolphins in Sarasota Bay. She used FB99's skull to show how stingray barbs can lead to dolphin deaths.
Right: Katie McHugh explaining the use of remote monitoring systems in human-dolphin interaction hotspots.

Piney Point wastewater spill in Tampa Bay

Randall Wells, Aaron Barleycorn, Jason Allen, Krystan Wilkinson, Chicago Zoological Society's Sarasota Dolphin Research Program

We continued monitoring the dolphins in the vicinity of the Piney Point wastewater spill through April 2022, with the support of Mote Scientific Foundation and the Charles and Margery Barancik Foundation. During the period March 30th to April 9th, 2021, 215 million gallons of nutrient-laden wastewater were released from a decommissioned phosphate mine at Piney Point, through Port Manatee in southeastern Tampa Bay. Given concerns about the health of the ecosystem and its inhabitants exposed to this discharge, we initiated photographic identification surveys for dolphins in the waters including and surrounding the discharge. This region comprises the next long-term resident dolphin community north of the Sarasota Bay community. We conducted photographic identification surveys sponsored by the National Marine Fisheries Service through all of Tampa Bay during 1988-1993, and dolphins were commonly found in this region. Few dolphins were seen in the region during April and May 2021, but no obvious health or respiratory issues were noted for these animals. By June, the wastewater had largely dispersed but a severe red tide developed in the area, believed to be exacerbated by the nutrients from the discharge. Preliminary analyses of data collected through December 2021 indicate that the densities of both dolphins and sightings remained below the mean values for 1988-1993 for inshore waters surrounding the discharge site, but we cannot say if this was due to the spill, or if there has been a longer-term change. A number of well-known resident dolphins from this community have been documented, with some having been first recorded as long ago as 1984, suggesting long-term residency of the community.

RP61, a long-term resident around Piney Point, was first seen in 1984. We were excited to find her with a new calf. The smaller picture above is from 2005. One can see her fin hasn't changed much over the last couple decades.

Sarasota Bay dolphin community status

Jason Allen, Chicago Zoological Society's Sarasota Dolphin Research Program

We keep track of the Sarasota Bay dolphin community through photographic identification (photo-ID) surveys conducted on 10 boat-days each month. One of the primary goals of our monitoring is to track additions, losses, and condition of the resident Sarasota Bay dolphin community members. We are happy to report thirteen new calves in 2022, all of whom appear to be doing very well as of this writing. Forty-four-year-old FB25 gave birth to her twelfth calf! While she is not the oldest observed mom, she has been observed with the most calves. It was a big year for FB05's (1963-2009) lineage. Two of her daughters, Murphy Brown and FB55, gave birth to their ninth and eighth calves, respectively, while two of her grandcalves also had new babies. Three first-time moms included Zoey, Poppy, and F249.

We have also lost community members since our last update, sadly some we have known for decades. Thirty-three-year-old F167 died in May, and her 2021 calf is now missing and presumed dead. Two other 2021 calves of F149 and F233, the 2018 calf of Tricia, and the 2017 calf of Murphy Brown have also disappeared. Well-known adult male Scoops Over Low Buck had been seen every year since 1991, but not since June 2021, and is also presumed dead. Noah, the 1996 calf of Saida Beth, was recovered in July though his body was heavily shark scavenged, which limited necropsy findings. We recovered Vespa's carcass in August. During her 43 years, she was observed more than 1,100 times and gave birth to at least 11 calves. Two of her daughters provided her with seven grandcalves and two great-grandcalves. Unfortunately, her body was too badly decomposed to investigate cause of death. Finally, thirty-year-old Thorn's body was found at the end of September. The cause of death was not immediately obvious and the necropsy results are pending. His buddy, F138, has been observed since and appears to be doing well.

Murphy Brown's ninth calf surfaces towards our research vessel in May. At only 1-2 days old, you can still see its rostral hairs and floppy dorsal fin.

Well-known community mom Vespa surfaces with her 11th calf. Sadly, she died this year at the age of 43. We will continue to monitor her calf as it learns to navigate life without her.

Our long-term, monthly photo-ID surveys are one of the core efforts of our program, supporting all other projects. More than 56,750 dolphin group sightings since 1970 have yielded more than 172,000 identifications of more than 5,600 individually distinctive dolphins. In support of these identifications, more than one million (!) dolphin photographs and videos are currently archived by the Sarasota Dolphin Research Program. Data from monthly monitoring surveys and all of our photo-ID efforts are archived in a relational Access database (FinBase) designed specifically for bottlenose dolphin photo-ID data and images. Work has begun to integrate this database with our focal animal behavioral follow database, which contains 2,722 follows on 225 individual dolphins from 27 projects dating back to 1989. This database now also includes current and historic opportunistic respiration data taken on potentially compromised individuals. We will begin integrating our dolphin health database in the near future as well. Many thanks to NOAA's Jeff Adams for his continued support as our database guru!

We have been able to continue our year-round, monthly monitoring of the Sarasota bottlenose dolphin community thanks to support from the Charles and Margery Barancik Foundation, as well as the continued dedication of our core local volunteers and undergraduate interns. Thanks to these efforts, this community remains one of the most thoroughly studied free-ranging dolphin populations in the world.

F225 almost catches a pinfish in Palma Sola Bay.

Microplastics in Sarasota Bay dolphins

Leslie Hart, College of Charleston, and Miranda Dziobak, University of South Carolina

The oceans are estimated to contain more than 5 trillion plastic particles, of which more than 90% are microplastics (<5mm [0.2 inches] diameter). Impacts to marine life may not be due just to the plastic particle itself (for example, gastrointestinal inflammation), but also due to chemicals that are added to plastic to enhance durability and flexibility (phthalate acid esters, "phthalates"). In fact, chemical additives can comprise more than 50% of some plastics, and the commercial market for chemical plasticizers is anticipated to grow. In recent years, via urine samples collected during routine health assessments, our team has detected prevalent phthalate exposure among Sarasota Bay dolphins (~75%). Unlike other environmental contaminants studied in Sarasota dolphins (for example, PCBs), phthalate exposure does not appear to be tied to age or sex, suggesting widespread susceptibility. While demographic characteristics may not influence phthalate exposure in dolphins, where the dolphins spend their time might. Exposed dolphins tended to be those who spent their time within closed embayments in the southern portion of Sarasota Bay, while unexposed dolphins were found in more open waters to the north.

The most commonly detected metabolites in Sarasota Bay bottlenose dolphin urine are monoethyl phthalate (MEP) and mono-(2-ethylhexyl) phthalate (MEHP), which are metabolites of parent compounds commonly added to personal care products and plastic. Phthalate exposure is also monitored in studies conducted by the U.S. Centers for Disease Control and Prevention (CDC), and comparisons to these human reference populations revealed significantly higher exposure to MEHP in Sarasota Bay dolphins. This finding is significant as this particular phthalate is common in polyvinyl chloride products, food packaging, wire covering, toys, and medical tubing.

The health consequences from phthalate exposure are currently unknown for bottlenose dolphins; however, rodent and human studies have demonstrated endocrine disrupting impacts leading to reduced fertility, abnormal reproductive organ development, increased breast cancer risk, and impacts on pregnancy outcomes. Using long-term health data collected during Sarasota Bay dolphin health assessments, we have begun studies to explore indicators of endocrine disruption in phthalate-exposed dolphins. While preliminary, we have evidence linking MEHP detection with increased free thyroxine (FT4) in both female and male adult dolphins. Impacts to thyroid hormone levels can cause significant adverse health impacts, especially for developing fetuses, warranting further investigations of phthalate-mediated effects in dolphins.

Leslie Hart and Miranda Dziobak prepare a "blank" sample to calibrate microplastic analyses.

Although the source of phthalate exposure in Sarasota Bay dolphins is currently unknown, we have evidence to suggest a plastic origin. Thanks to funding from the National Institute of Environmental Health Sciences (a branch of the National Institutes of Health), over the next three years, our team will explore the potential for microplastic and chemical plasticizer exposure via consumption of contaminated fish. This research will rely on examinations of microplastic and phthalate exposure in bottlenose dolphins and their preferred prey. As apex predators with a long lifespan, year-round resident bottlenose dolphins can serve as gauges to detect disturbances in their local environment. As such, bottlenose dolphins can serve as excellent sentinels of environmental contaminant exposure for human communities, particularly coastal communities that rely on seafood as a primary food source.

What does an approaching vessel sound like? Indications from vessels during controlled exposure experiments

Peter Tyack, University of St Andrews

The Sarasota Dolphin Research Program is a partner in a Strategic Environmental Research and Development Program project entitled "Towards an Understanding of the Cumulative Effects of Multiple Stressors on Marine Mammals - an Interdisciplinary Working Group with Case Studies." This project uses a bottlenose dolphin case study to test whether the health status of bottlenose dolphins affects the risk that they may collide with a vessel. Last year's *Nicks 'n' Notches* described how SDRP worked in Sarasota to test use of a drone to observe responses of dolphins to guided approaches of a personal watercraft (PWC) as "controlled exposure experiments" (CEEs). SDRP personnel then were part of a team that studied responses of dolphins in Barataria Bay, Louisiana, whose health was affected by exposure to oil from the *Deepwater Horizon* spill.

Analysis of these data led to the detection of responses at the onset of approach, around 300 m (328 yards) distance between the dolphin and the vessel. This led to recommendations that more baseline data are required prior to the vessel approach to have a better understanding of what the dolphins are doing prior to exposure and that the

noise signature of the approach vessel at different distances needed to be better understood. As a result, we conducted a further field trial in December 2021 in Sarasota Bay, to measure the underwater noise of the CEE vessel during different CEE approach protocols.

In this field trial, we moored an underwater recorder in shallow water in Sister Key Flats with a surface float to indicate its location. We then recorded the underwater sound from two vessels as they approached the recorder – a PWC and a center console outboard boat. Figure 1 shows a spectrogram, or plot of sound frequency over time, for the approach of the outboard boat which motored directly over the recorder at a constant speed. If you look carefully at the timing of the signal, you may be able to see sound starting to be visible between 1:00 and 1:30 (1 minute and 30 seconds) into the recording (the time axis is labelled on the top of the figure). This becomes clearer at 2:25 and steadily increases until the closest point of approach at 4:15.

Figure 2 shows the spectrogram from a recording of the approach of a PWC. Unlike the steady approach of the outboard, the PWC took a zig-zag path towards the underwater recorder. The sound of the PWC is less continuous than the outboard, with pulses of sound visible in the underwater recording. The start of one zig should be barely visible at 0:10, with another starting at 0:30 and the final one starting at about 0:53 before the closest point of approach at 1:03.

Comparing these two vessel approach signatures, you might think we would favor the louder and more continuous outboard approach. But the fainter signature of the PWC allows us to start the approach at 500 m distance where we can be pretty sure that the dolphin cannot hear it. And previous work showed that an erratic approach of the PWC is more likely to trigger responses such as changes in heading, while being a relatively realistic behavior of PWCs. Following analysis of the vessel approach signatures, the team agreed on a protocol for further CEE trials that aim to achieve a longer baseline observation period, an approach duration of approximately 3 minutes, used a PWC starting at 500 m (beyond dolphin detection range), and the PWC conducting an erratic but repeatable continuous zig-zag approach towards the animals.

Trials in Barataria Bay in April 2022 were limited due to poor weather. Additional trials are planned for 2023 in Barataria Bay.

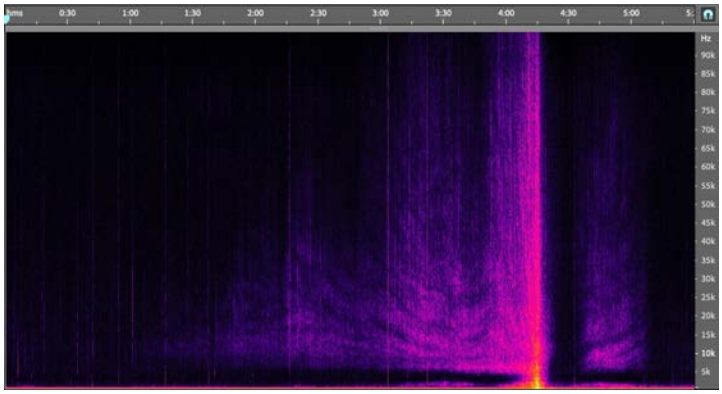


Figure 1. Sound spectrogram of the approach of a center-console outboard boat. Time in minutes:seconds is shown across the top, and sound frequency in thousands of cycles per second (Hz) is along the vertical axis.

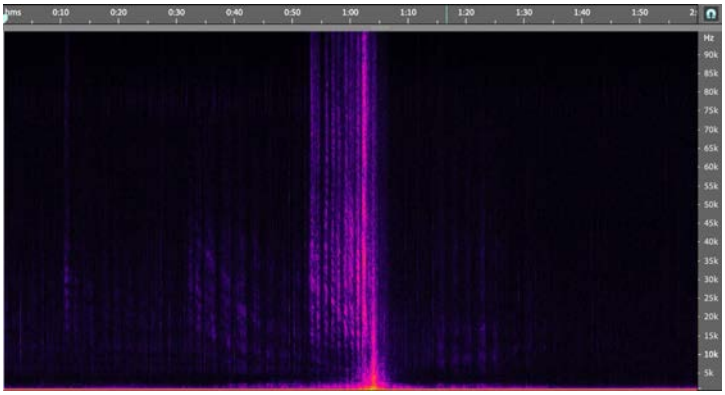


Figure 2. Sound spectrogram of the approach of a PWC that zigged and zagged towards the underwater recorder. Time in minutes:seconds is shown across the top, and sound frequency in thousands of cycles per second (Hz) is along the vertical axis.

Peter Tyack and Katie McHugh tracking dolphins during a focal follow in Barataria Bay, Louisiana.

Peter Tyack deploying a hydrophone alongside the R/V Naia *in Barataria Bay, Louisiana.*

International conservation efforts

Randall Wells, Chicago Zoological Society's Sarasota Dolphin Research Program

The pandemic delayed most of our planned international research activities, but we expect to be able to travel to work with colleagues again in 2023. One of the first planned activities will be for our database manager, Jason Allen, to travel to Cambodia in January to work with local World Wildlife Fund colleagues on their photo-identification field and laboratory research, including developing a database of sightings along the lines of that developed for the SDRP. This is following-up on the 2018 training trip to Sarasota by the Cambodian team.

We hope to finally get to apply the funding we received from the Disney Conservation Fund in 2018 to deploy satellite-linked tags on franciscana dolphins in open coastal waters off Argentina. This work will occur between the bays where we have worked previously, in an area where the dolphins are caught by artisanal gillnet fishermen, to learn about population structure and their behavior in the vicinity of fishing operations. This project also includes outreach efforts to increase awareness of threats to franciscanas. The field component of the project has been delayed, first due to the need to regroup following the loss of our Argentinian Principal Investigator, Pablo Bordino, and subsequently because of the pandemic. We now hope to conduct this work in February 2023, with Leo Berninsone stepping in as our Argentinean Principal Investigator, and a team of veterinary and small cetacean experts from Argentina, Brazil, Denmark, Mexico, and the U.S.

With the support of a generous donor through the Chicago Zoological Society, we plan to conduct collaborative research on bottlenose dolphins in Greece during summer 2023. The semi-enclosed Gulf of Ambracia, on the west coast of Greece, has one of the highest observed densities of bottlenose dolphins in the Mediterranean Sea. This population has been studied by Tethys Research Institute's (Tethys) Ionian Dolphin Project (IDP) for many years. The main threat to the survival of the bottlenose dolphin subpopulation in the Gulf, considered by the IUCN to be Critically Endangered, is the increasingly degraded condition of the Gulf's water quality. There is an urgent need for research to better understand the issues these dolphins are facing, and the SDRP has been asked by IDP Director, Joan Gonzalvo, to provide biopsy dart sampling expertise to help collect needed samples for analysis of health and life history parameters and environmental contaminant concentrations. In collaboration with the Greek Ministry of Environment, Energy and Climate Change, Tethys is actively involved in the development of the Conservation Management Plan for the Gulf of Ambracia Nat 2000 site and also on the Greek National Action Plan for the Conservation of *T. truncatus*. The evidence and information provided from analyses of samples from this project will help to define and propose the most appropriate and effective actions for the conservation of the species in this increasingly fragile coastal ecosystem.

Franciscana dolphin approaches a fishing boat off the coast of Argentina during project planning trip in 2019.

Left to Right: Ionian Dolphin Project researchers Joan Gonzalvo and Carmen Andres Hervias along with Garrett Fraess, Jose Luis Crespo, and Aaron Barleycorn during Sarasota health assessments in May 2022.

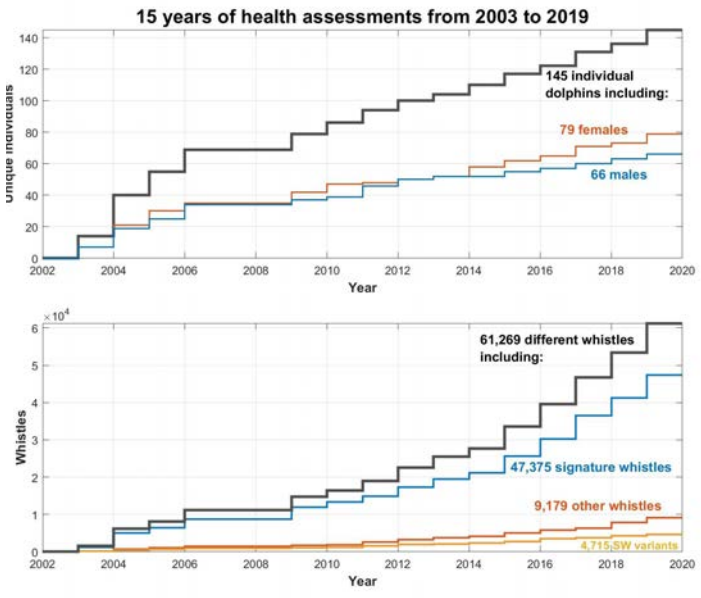
Behavior, Social Structure, and Communication

Dolphin communication studies

Laela S. Sayigh and Frants H. Jensen, Woods Hole Oceanographic Institution, and Vincent M. Janik, University of St Andrews

This year, we continued to make progress on our systematic database of whistles recorded during catch and release health assessments (the Sarasota Dolphin Whistle Database, or SDWD). We have committed more than 60,000 labelled, verified whistles to our database (See figure below), and these contributed to several student research projects. This year we had support from the Allen Institute for Artificial Intelligence, Dolphin Quest, and the Link Foundation, which supported students to extract data from recordings for the database while carrying out independent research projects. Two projects were completed this year and are currently being prepared for publication. One was carried out by Hampshire College undergraduate Campbell van Horn, who compared production of non-signature whistles (NSW) between males and females. He found that males produce significantly more NSW than do females, which opens the door to future studies on the roles of NSW in the dolphin communication system. He presented this work as a poster at the 24th Biennial Conference on the Biology of Marine Mammals.

Another study was carried out by Universita degli studi di Milano – Bicocca masters student Nicole el Haddad, who looked for evidence of "motherese", or infant-directed communication, in Sarasota dolphin females. "Motherese" is a form of communication that has been well documented in humans, but not in many non-human species. Given that dolphins have a flexible communication system enabled by vocal learning, like us, they seemed like good candidates to investigate for motherese. Two features of motherese



Progress on the Sarasota Dolphin Whistle Database (SDWD) to date.

are vocalizations with higher fundamental frequencies and shorter utterances. Nicole compared signature whistles produced by 19 females during catch-and-release events when they were with dependent calves to when they were alone. She found statistically significant differences in both parameters, with females producing whistles with higher maximum frequencies and shorter inter-loop intervals when with a calf vs. when alone. To our knowledge, this is the first evidence for motherese in a non-primate mammal!

In addition to these two projects, former WHOI guest student Matthew Hyer continued his work on NSW production by tagged male pairs in Sarasota, and he presented his work at the 24th Biennial Conference on the Biology of Marine Mammals. We also continued our collaboration with Drs. Athena Rycyk and Katie McHugh to use the SDWD while working with interns on data from the Sarasota Bay Listening Network (SBLN). We also used these datasets in a class for high-school age students called "Girls in Science", which was taught over two weeks in Woods Hole in August.

We anticipate expanding the linkages between the SBLN and the SDWD as we continue our collaborations toward developing deep-learning based methods of automatically classifying signature whistles. We made two conference presentations on these efforts, one at the 24th Biennial Conference on the Biology of Marine Mammals (with our collaborator at Allen AI Piper Wolter as lead author) and one at the Effects of Noise on Aquatic Life meeting. This avenue of work has strong conservation applications, as we hope to ground-truth methods for automated classification of signature whistles in Sarasota that can then be utilized in other areas.

We also started a new set of playback tests this year. Oxytocin is a hormone that helps to maintain social bonds. Together, with Kelly Robinson from the University of St Andrews, we found in a previous study that dolphin infants have long-term elevated levels of this hormone when they are with their mothers. A study on humans has shown that mothers talking to their children on the phone leads to oxytocin release in mothers. To investigate what causes oxytocin release in adults, we started to conduct playbacks of dolphins' calves to their mothers during catch-and-release sessions. We are hoping to find a similar oxytocin increase as demonstrated in humans. If the acoustic signal alone can lead to such a release, we can then test whether whistles from other preferred social partners lead to a similar increase in oxytocin levels. We would expect this to be the case, but so far the role of oxytocin in social relationships in dolphins is still unclear.

Forty-four-year-old FB25 alongside her 12th calf. She has now been observed with more calves than any other female in the community.

Dolphin personalities and conservation

Christina Toms, Chicago Zoological Society's Sarasota Dolphin Research Program

Evidence of consistent individual differences (IDs) in behavior, indicative of individual personalities (also referred as behavioral types or coping strategies), has been demonstrated across the animal kingdom from mollusks to mammals. 'Who' an individual is will impact how they handle challenges, react to stressors, select mates, and ultimately how successful they are in reproduction and survival. Given the heritability of personality traits and the ubiquity of personality in the animal kingdom, there is evidence for strong evolutionary selection pressures at the level of the individual. The existence of such IDs in behavior poses interesting behavioral and evolutionary questions regarding the mechanisms related to maintaining this variation and whether the existence of personalities reflects individual-level adaptive solutions to complex physical and social environments. A long-standing tenant of my research interests has been to understand the role that individual personality plays in social relationships, demographic processes (example: dispersal, survival, mortality, reproductive success), and ultimately in the functioning of populations.

In order to answer questions related to how personality influences demography, one must first identify reliable measures of personality traits. Personality is operationally defined as individual differences in animal behavior across context and across time. It's challenging to find rich datasets at the individual-level in cetaceans given the time it takes it acquire important demographic parameters in long-lived species. Individual bottlenose dolphins here in Sarasota have been observed in the wild for more than 50 years, with corresponding health data, demographic rates, and ongoing access to known individuals in a natural setting, offering the only dataset of its kind in the world.

We are in the early stages of developing a pilot project to capitalize on the historic data available, paired with ongoing sampling efforts, to identify measures that can be used to assess personality in wild dolphins. The shy/bold axis of behavior in the personality literature is regarded as one of the more distinctive, heritable, and stable sources of behavioral variation. The shy-bold axis is similar to what we think of as introversion and extroversion in humans. Animals may be really shy or really bold but can exist anywhere along a spectrum between these extremes. It's also the behavioral axis that is expected to be most relevant in how animals respond to environmental change. Past studies in other species have described proactive and reactive behavioral types, related the shy-bold axis of personality. These behavioral types have been shown to vary consistently in endocrine responses (cortisol) to stressors, which is directly measurable in dolphins through blood, blubber, fecal, and urine samples.

Dolphin catching a jack.

We aim to draw from multiple lines of evidence to explore measures that might be indicative of proactive and reactive behavioral types including: behavioral responses to novel sounds through acoustic playback experiments, behavioral responses to a stressful event such as being captured, and endocrine responses to the same stressors. The long-term goal of this research is to further highlight the role of the individual in how wild animals respond to their environment, supporting our ongoing efforts to inform management strategies and conservation actions from this perspective. In the future, I aim to expand on these ideas in collaboration with conservation breeding programs (not specific to marine mammals) to examine the role of personality traits in predicting survival and reproductive output of individuals after reintroduction into the wild.

Well-known community member F128 in New Pass.

Sarasota Bay dolphin health assessment: May 2022

Randall Wells, Chicago Zoological Society's Sarasota Dolphin Research Program

During May 16-19, the Sarasota Dolphin Research Program completed its first dolphin health assessment project in Sarasota Bay since 2019. We had 136 participants from multiple countries and institutions, and we used a new dolphin catcher for the first time since 1984, provided by the Florida Fish and Wildlife Conservation Commission. Many of the participants were involved because of a NOAA Prescott-funded component of the project, providing training and dolphin handling opportunities and experience to law enforcement officers, veterinarians, vet residents, vet interns, vet technicians, NOAA personnel, Marine Mammal Commission personnel, stranding response personnel from other organizations, our local volunteer rescue team members, international trainees (from Colombia, Slovenia, and Spain), and alternative dolphin catchers. Each of the five dolphins we sampled contributed to more than 40 research, monitoring, and training projects. One of the dolphins was the young male F316 for which we performed a disentanglement rescue in March 2019, where we found his fluke blade to be nearly severed from recreational fishing line. He is doing well, and his fluke has healed nicely. Three of the dolphins were first-time samplings.

We thank Dolphin Quest, Disney, Fundación Oceanogràfic, Mote Scientific Foundation, the Florida Fish and Wildlife Conservation Commission, NOAA's John H. Prescott Marine Mammal Rescue Assistance Grant Program, University of Southern Denmark, Harbor Branch Oceanographic Institution/Florida Atlantic University, and several generous donors for their support of this project.

Preparing two dolphins for health assessment on May 18th, north of Siesta Key. Photo by Mote Marine Laboratory.

Behind the scenes at health assessments: What it takes to prepare for sample collection and processing

Christina Toms, Chicago Zoological Society's Sarasota Dolphin Research Program

In May 2022, we completed our first capture-release health assessment effort since the start of the pandemic. As the sample processing coordinator, I manage all the tissue sampling requests, organize the supplies and medications required, run the vet lab in the field, and oversee all sample processing operations and subsequent sample distributions. For every type of sample that we collect (example: blood, urine, feces, etc.), we sub-sample to support multiple research projects, many of which you can read about in more detail in this volume. We thought our readers might be interested in learning more about what goes into the sample preparation for projects like this. Here, I'll walk you through what it takes to put it all together.

The Projects: Managing these projects is a massive undertaking requiring several hundred hours of planning, which begins months in advance each year. Preparations this year were unique both in terms of trouble with supply chain issues and because we planned two additional (albeit smaller in scale) health assessment efforts offshore later in the year. To get ahead, preparations began in February instead of March.

The first big step is to coordinate the needs for all of the project requests that come in. We need to know what type of sample is needed, how much, what supplies are required for collection, processing, and storage, how samples should be stored in the field, where samples are to be shipped and how (on ice, dry ice, room temp), to name a few details. This year, we incorporated 43 research projects from collaborators for the inshore work targeting Sarasota resident dolphins, 27 of which were requests were for biological materials in addition to the standard set of health panel-related samples that we collect. Plans for offshore efforts were somewhat scaled down to be manageable for a smaller crew, but still incorporated 21 collaborator requests for biological material.

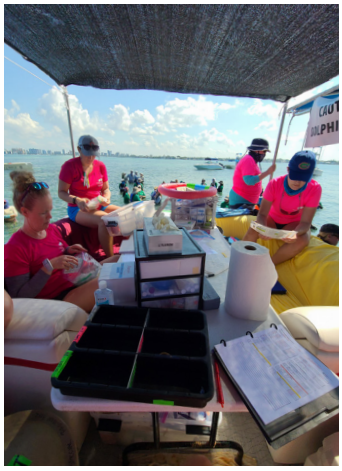
The Supplies: There are multiple steps taken to get samples to our colleagues. Plans require organizing supplies needed at each step: getting supplies from our team to the vets in the field, collecting the samples, returning samples back to the processing team, processing those collections in the field, sub-sampling into the respective project containers, vials, and slides for each project, proper storage containers in the field and in the lab to preserve the integrity of the samples, and subsequently shipping everything off to respective colleagues.

Across all three health assessments efforts in 2022, we planned supplies for 32 dolphins. The first major organization step is to generate a list of all the items needed for each project (with item totals), coordinate

collaborator shipments of supplies to us for their respective projects, and integrate those supplies into our storage systems. I also generate a list of the number of each supply required for the year, compare it to our inventory, convert those numbers to purchase lists, and order supplies. For 2022, for example, this meant arranging for nearly a thousand blood tubes of eight different kinds, hundreds of butterfly needles and syringes, hundreds of microscope slides, and thousands of sample storage containers, to name just a few of the kinds of supplies needed.

Supply chain issues in the U.S. this year made it challenging to track down many items for our projects. Blood tubes, in particular, were hard to find. Several of our orders were never filled as the manufacturers were out of stock and couldn't get materials to make more. Luckily, many of our collaborators pitched in with supplies already stocked. Many thanks to our Brookfield Zoo-based CZS veterinary hospital team, our collaborators at the National Institute of Standards and Technology (NIST), University of Florida, Georgia Aquarium, and the local animal hospital at Mote Marine Aquarium.

In the field, we typically work up an animal collecting one type of biological material at a time, so we have to have everything that might be sampled from a given individual ready to go in one place. The second major planning step then is to figure out how all of the sampling supplies should be organized on a per-dolphin basis to accommodate all of the projects. All blood tubes (32 for inshore efforts this year) for each animal are labeled and bundled together in particular order to accommodate the timing of various tests (for example, the blood tube used to test cortisol is always collected first since this measure changes over time). Those bundles are added to a 2-gallon Ziplock "animal kit" created for each animal, which additionally contains separate individually labeled collection kits for each type of biological material: urine, fecal, gastric, blow (*i.e.*, the exhalant when the animal breathes), milk, microbiome, and skin biofilm. Additional kits are made up to collect biopsy samples and occasional skin lesions, and containers are stocked with easy-to-access medications and medical supplies that might be needed. All of the required supplies, kits, tools, storage systems, trash cans, and equipment (for example, blood centrifuges and a cell battery to power it, i-STAT machines to run blood-tests in the field, etc.) have to fit on one pontoon boat along with 9 people!



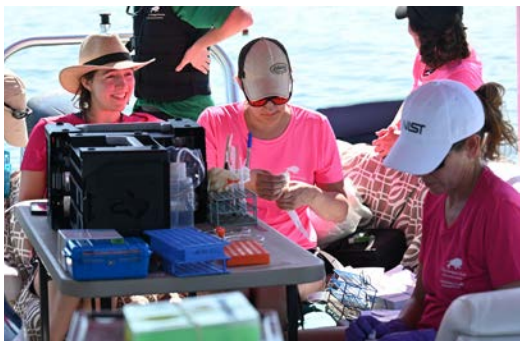
The front-half of our sample processing team hard at work.

There are a handful of documents to be prepared in advance to guide everything we do in the field and at the end of each field day. Our processing team doesn't know what needs to be done in advance, so I create cheat sheets with detailed instructions for processing and storing every sample for every project, organized by tissue type, so that the SDRP and all of our collaborators get their respective pieces. Every vial or container with a sample has to have a label on it, which are pre-printed for each project. Together with another label set created by our collaborators at the National Institute of Standards and Technology (NIST), we had a combined total of 199 labels per animal, with an additional 150 ready for collections which don't occur on every dolphin. We print 10 sets to have with us in the field each day, which means we prepared 2,140 labels to have at the ready in the field.

Sample checklists are made so I can track the number of vials and storage containers created for each project. Some samples must be shipped overnight to our collaborators and testing facilities. At the end of the day, we may be an hour away from the lab by boat but need to get back to the lab and package up samples in a hurry so our couriers can get everything to FedEx (which is another 30-40 minutes by car) by 6:30pm each day. Shipping labels and checklists for the week are made in advance to make sure the right samples go to the right people and with the proper storage system (example: stored on ice packs vs. dry ice). Finally, we must store samples, clean tools, clean out containers, and restock supplies at the end of each day, which requires checklists upon checklists to help guide a team of 9 colleagues to get the work done – a team from a variety of other institutions who don't know where things are stored in our lab and are just getting familiar with how things were organized in the field.

The Field Set Up: Organization and processing can get tricky since there are multiple steps to collecting any one tissue type. Sometimes the work happens in the water and other times it's happening on the boat next to us. We have to be prepared for both scenarios. Our vet techs are in charge of getting supplies from our boat to the vets (wherever they are) and assisting vets in sample collection, so all tools and supplies have to be in one place where they can access them and get back and forth. Sometimes, this involves putting boxes on their heads to keep supplies

The sample processing boat (right) rafts to R/V Flip *(left) for each set. Here, a dolphin is being lifted onto the deck for its exam. The processing team (under shade cover, in pink) exchanges information with the ultrasound team (on the front of sample processing boat, in blue).*



Blood processing team working on sub-sampling plasma and serum after blood tubes were spun.

dry as they walk out to the vet in the water. They must also get it back to us safely, often worming through the sea of people on board who are helping with a dolphin on deck, without dropping or contaminating precious tissues in transfer. We must then spin blood, cut tissues, create cytology and hematology glass slides, and carefully pipette liquids into storage vials all while on a moving platform that experiences frequent wakes from other boats that pass by. That is no easy feat! For any given set of animals that we work up, we might be sitting in one location for several hours. We must protect the samples from direct sunlight (which can degrade them), and protect the people processing them. Samples must be stored properly to maintain their integrity in the heat, and many must be frozen. We bring a large cooler with ice and for those that require extreme cold, liquid nitrogen dewars—a specialized insulated container that uses liquid nitrogen vapors to keep samples ultra-cold until we can get samples in our -80°C freezer in the lab.

The Processing Crew: In the field, I work with an incredible and highly-trained team that works carefully, collaboratively, and efficiently to execute the mountain of work required. The processing team typically is made up of colleagues with backgrounds in veterinary, health, medical, and/or biomedical science and has included faculty and program coordinators from collaborative institutions, vet techs, and grad students. I am the team's captain, coordinator, and manager, but I rely heavily on the varied expertise of my team to execute our work with the highest quality and safety standards possible. This year, we went with pink shirts! Sometimes, we have to stay behind and finish processing while the rest our fleet moves on to find more dolphins. The pink aids in quickly identifying the team of people with information regarding sampling efforts amongst a large number of people in the field who are not all familiar to each other. And let's be honest, it was fun!

Processing team 2022.

The Results: This year, we caught 5 dolphins inshore and 5 dolphins offshore, resulting in 662 blood samples and several hundred additional samples. This was a smaller number of animals than in some past years—these numbers can be doubled and tripled in other years. In the 2-3 weeks following health assessments, these data are entered into our databases, frozen batches of samples that weren't urgently needed and respective supplies are shipped to our colleagues, and remaining gear cleaned and unpacked. Adventures begin again in March of 2023.

Evaluating lung disease in dolphins through spirometry

Andreas Fahlman, Fundación Oceanogràfic

Dolphins are air-breathing mammals that use oxygen stored in the body to catch prey underwater. The time in between dives, when the dolphin can breathe, is used to renew the oxygen in the blood and tissues. Thus, ability to take up oxygen and to transport the available oxygen from the lung to the cell is crucial, and the lung plays a crucial role in the survival of dolphins. Problems with the respiratory system, such as pneumonia, may be especially challenging. It is therefore not surprising that respiratory disease is one of the most common causes of mortality among bottlenose dolphins, but its prevalence among different populations is not well established. While the reason for lung disease could have different origins (for example, bacterial, fungal), a reduced lung capacity may decrease the volume of air with each breath, increase the respiratory effort and reduce the ability by which the lungs exchange gas. Thus, any disease that reduces the capacity to exchange gas could decrease the available oxygen during diving, limiting diving capacity, time underwater, and thereby their chances to obtain sufficient food.

Methods to assess lung disease, such as radiography, computed tomography, ultrasound, bronchoscopy, bronchoalveolar lavage, blow and blood samples, are logistically challenging in large marine species. In addition, some have low sensitivity to detect certain types of diseases, and none provide information about the functional changes in lung function or gas exchange associated with the disease. For this reason, the Sarasota Dolphin

Research Program has been working with researchers during the past 10 years in an attempt to develop dolphin spirometry, a diagnostic technique also used in humans, that allows detection of lung disease and can assess how the illness affects function. Thus, dolphin spirometry will help to assess lung health, and for sick animals help to specify the type of disease. The Sarasota dolphin health assessments provide opportunities to collect lung function data from a dolphin population that has been extensively studied. The results from this research are aimed at providing important information about the health status of this population and about the functional changes related to lung disease. In addition, these data would increase our baseline to continue working on the development of this non-invasive and easy tool, to help improve our understanding and conservation efforts.

Strong exhalation by a dolphin coming up for oxygen.

Understanding the role of D-dimers for blood coagulation in dolphins

Ashley Barratclough, National Marine Mammal Foundation, and Nicole Stacy, University of Florida

Since 2016, we have been analyzing D-dimers in the blood samples obtained during dolphin health assessments. D-dimers are produced when a blood clot has been broken down within the blood stream. Dolphins are naturally missing one of the coagulation factors compared to humans and most mammals. The advantage of this is to prevent blood clots from forming when they are surfacing from deep dives. From the samples obtained since 2016, it appears that dolphins have much higher levels of D-dimers than in other species. We are excited to explore this further in dolphins sampled through the offshore health assessments which are likely diving to deeper depths. This year we were able to obtain samples from 5 offshore dolphins, which is the first time this test has been performed in pelagic cetaceans. Improving our understanding of the dolphin coagulation system could help treatment of sick dolphins either in managed care or stranded individuals.

Applying epigenetics to distinguish between biological and chronological age in dolphins

Ashley Barratclough, National Marine Mammal Foundation

Epigenetic aging is a novel diagnostic tool to estimate the age of dolphins from a simple skin biopsy. To create an "aging clock" for dolphins it's really important to have dolphins of known age. The longevity of the studies of the dolphins in Sarasota allow us to sample known age dolphins into their 40s and 50s. Through funding with the Strategic Environmental Research and Development Program grant we have been able to expand our sample size of dolphins from Sarasota Bay. These dolphins are not only important with being known-age but they are also providing samples from a "control location" which is not experiencing environmental contamination. We can use this as comparison with other geographical locations which could be impacted, for example, by an oil spill or pollutants to try and learn more about the changes in environment impacts the dolphin's health. Epigenetics is an exciting area of marine mammal medicine and we are expanding our research to be able to age a dolphin from a remote skin biopsy sample and also to interpret their "biological age" or health status from the changes we can observe in their DNA. We are using this to understand the impact of cumulative stressors on different dolphin populations and whether they are aging at a faster rate than normal - a process known as "age acceleration". In humans, age acceleration may occur if, for example, you lead an unhealthy lifestyle, with a poor diet, smoking or lack of exercise. The body is likely to age faster under these conditions. Understanding this in dolphins will help us to comprehend the impacts of environmental stress on their health.

Veterinarians Ashley Barratclough and Forrest Gomez await their next patient during health assessments in May 2022.

Ecology, Population Structure and Dynamics

Health and movements of Florida's Gulf dolphins

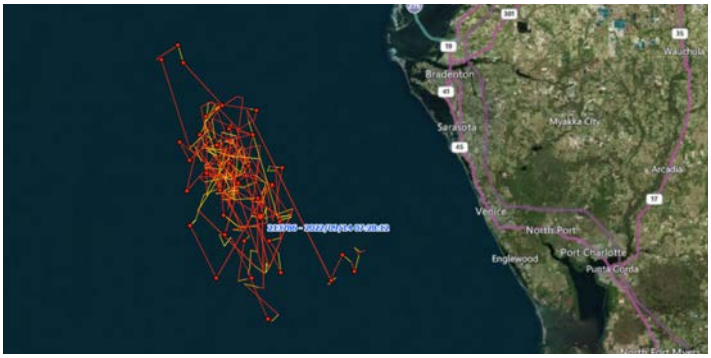
Randall Wells, Chicago Zoological Society's Sarasota Dolphin Research Program

The SDRP is leading a project involving a multi-institution team to conduct dolphin health assessment and tagging offshore of Sarasota. The project is funded by the Florida RESTORE Act Centers of Excellence Program, through the Florida Institute of Oceanography. The project involves hoop-netting individual dolphins (bottlenose or Atlantic spotted) up to 50 miles offshore, over the West Florida Shelf, performing a health assessment, and tagging them for monitoring movements and dive patterns. We conducted the first two of four planned field sessions this year, during May-June and September.

With the overarching goal of providing requisite information for conservation and management, the project is addressing critical information gaps for the two species of cetaceans that regularly inhabit Florida's Gulf coastal and shelf waters. Our specific objectives include:

1) Improve understanding of dolphin stock structure and habitat use through tagging, tracking, and genetic sampling,
2) Establish baseline data on environmental contaminant concentrations in dolphin tissues,
3) Obtain baseline dolphin health data,
4) Evaluate potential relationships between lung disease and respiration and diving patterns,
5) Investigate feeding patterns through stable isotope and fatty acid analyses, and
6) Maintain and expand the long-term Gulf of Mexico Dolphin Identification System (GoMDIS).

On June 1st, the team caught, sampled, and tagged its first dolphin, an adult female Atlantic spotted dolphin, 27 miles offshore in waters of 95 ft. depth. As a pioneer in helping us to learn about the Gulf of Mexico, she was nicknamed "Eugenie Clark," after the founder of Mote Marine Laboratory. During her health assessment and lung function tests, she was given both a satellite-linked time, depth, and location tag as well as a short-term digital archival tag, known as a DTAG.

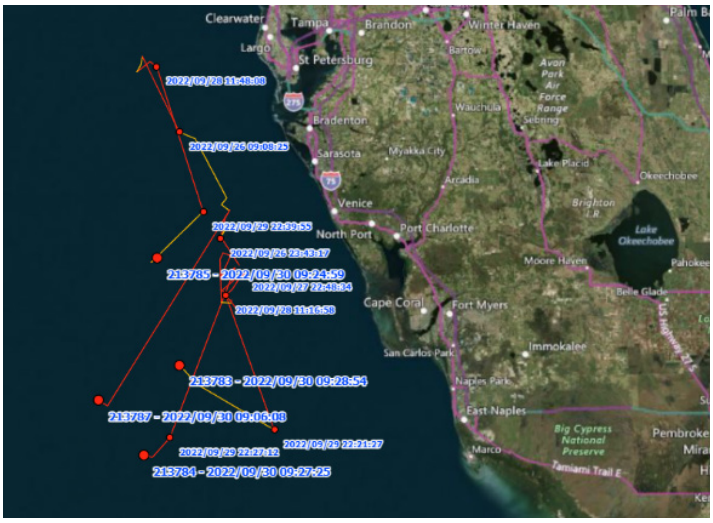


High quality locations for "Eugenie Clark" for the period June 1st through September 14th.

Health assessment and tagging of Atlantic spotted dolphin "Eugenie Clark" aboard Mote Marine Laboratory's R/V Eugenie Clark.

The DTAG was recovered after its programmed release the next morning, and provided evidence that Genie was feeding within 30 minutes of release and near the seafloor. The depth data were in accordance with those provided by the satellite-linked tag. Other dolphins were also in the area, based on recorded whistles. The satellite-linked tag was tracked for 106 days, until September 14th. During this time, she ranged 25-50 miles offshore of the region from Tampa Bay to Englewood, FL (see lower left map), diving to as deep as 147 ft. and for up to 4-5 minutes.

Building on our success in June, the team returned to the field during September 19-23, and tagged four more dolphins: two bottlenose (Sylvia and Ken), one rough-toothed (Sam), and one Atlantic spotted (Bill), continuing the theme of honoring highly influential marine scientists. The animals were caught ~20-41 nm offshore of the Sarasota area. All but Sam received both a satellite-linked tag and



High quality locations for the four tagged dolphins during September 26-30 (Hurricane Ian came ashore on September 28). From north to south 213785 = rough-toothed dolphin Sam; 213783 = bottlenose dolphin Sylvia; 213787 = Atlantic spotted dolphin Bill; and 213784 = bottlenose dolphin Ken.

a DTAG. The DTAG remained on the large adult male bottlenose dolphin, Ken, for the entire programmed period. Initial findings show all but Sam diving to the seafloor, while Sam remained at depths less than 52 feet. The dolphins transmitted while Hurricane Ian moved through the area and ashore south of their location. All moved S or SW, and 3 of the 4 dolphins moved in roughly parallel tracks following the landfall of the hurricane, suggesting that they may have been moving with following seas created by the storm (see previous page).

We are in the process of analyzing samples, movement, and dive data from all five dolphins tagged for this project. The lead organizations on the project, the Chicago Zoological Society and Mote Marine Laboratory, greatly appreciate the involvement of a number of programs in the fieldwork, including the National Marine Mammal Foundation Board of Directors' Grants Program for supporting involvement of their veterinarians, the University of Florida College of Veterinary Medicine, and Woods Hole Oceanographic Institution. The next field session is scheduled for May 2023.

High-resolution data-loggers reveal fine-scale movement and foraging behavior of offshore dolphins

Austin Allen and Jeanne Shearer, Duke University, and Frants Jensen, Aarhus University

During offshore health assessments in September, 2022, we deployed digital-acoustic archival tags (DTAGs) via suction cups on three dolphins—two bottlenose dolphins and one Atlantic spotted dolphin. One of the bottlenose dolphin tags stayed attached overnight, for a period of 17.5 hours. The DTAGs' acoustic sensors allow the detection of echolocation clicks, showing when the dolphins were searching for or homing in on prey, while the accelerometers and magnetometers reveal the animals' movements.

Both bottlenose dolphins resumed foraging soon after the health assessment, while the spotted dolphin re-joined its group and continued travelling. One bottlenose dolphin, Ken, resumed foraging 5 minutes after release. While the attachment durations are short compared to the satellite-linked tags, these fine-scale data help us understand their acoustic communication and give us a glimpse into their foraging behavior, including the depth, time of day, and body orientation and movement during feeding. These records help researchers interpret behavior from the longer-duration satellite-linked tag deployments.

"Bill," an Atlantic spotted dolphin, with a satellite-linked tag on his dorsal fin and DTAG on his back upon release in September 2022.

Status of fish populations in Sarasota Bay

Elizabeth J. Berens McCabe, Chicago Zoological Society's Sarasota Dolphin Research Program

The Sarasota Dolphin Research Program explores the relationship between wild dolphins and their prey by conducting seasonal multispecies fish surveys to monitor fish abundance, diversity, and size structure in Sarasota Bay, Florida. Data from this project enable us to investigate fine-scale habitat and prey selection in wild dolphins, and to explore the effects of *Karenia brevis* red tides on different fish species and community structure across the bay. Since 2004, this project has also facilitated a variety of novel research and new collaborations including developing fatty acid analysis techniques to examine the diet of bottlenose dolphins (with Theresa-Anne Tatom-Naecker, a PhD candidate at the University of California, Santa Cruz) and examining of effects of microplastics and phthalates in the diet of bottlenose dolphins (with Dr. Leslie Hart, of College of Charleston). Based on our 2022 fish survey data and *K. brevis* cell concentrations, we can conclude that fish abundance and community structure have fully recovered from last year's red tide bloom event!

Our standardized multi-species fish survey consists of a winter and summer fishing season (10 sets per month; Jan-Mar; Jun-Sept), during which we catch, measure, count, and release fish from the *R/V Flip* using a 183 m purse seine in seagrass habitats. Last winter we caught a total of 4,726 fish of 48 different species, an average of 175 fish overall per set, and 87 dolphin prey fish per set. This summer yielded 33,806 individuals of 55 different species, averaging just over 845 fish per set and 633 dolphin prey fish per set. To put these numbers into perspective, we caught our ninth highest average winter fish abundance and our eighth highest average summer fish abundance since sampling began in 2004. Preliminary analyses indicate healthy fish stocks and community structure consistent with previous years during non-red tide conditions. Notably abundant species included the Spanish sardine, Gulf toadfish, white grunt, and lane

Volunteer Mark Fishman helps to bring in and lay the fishing net on the R/V Flip *during winter fish surveys.*

snapper. There were higher percentages of larger pigfish (72% above average, or ≥74 mm) and pinfish (31% above average, or ≥96 mm) this year compared to most previous years as well. Ongoing efforts seek to examine the effects of red tide on fish, dolphins, and sharks in Sarasota Bay.

We thank the many interns and dedicated volunteers who have worked on this project. The work would not be possible without you! Funding for this project was provided by the Barancik Foundation. This research was authorized by the Florida Fish and Wildlife Conservation Commission (19-0809A-SR, current Special Activity License) and by Mote Marine Laboratory's Institutional Animal Care and Use Committee (21-09-RW2).

A preliminary assessment of movement patterns of dolphin prey fish

Elizabeth J. Berens McCabe, Chicago Zoological Society's Sarasota Dolphin Research Program

Understanding how organisms interact, such as in predator-prey systems, is central to the study of animal ecology. The bottlenose dolphins of Sarasota Bay, Florida, are piscivorous predators, typically foraging individually and feeding on individual fish rather than schools of fish, and consuming a variety of fish species including lower trophic level prey associated with seagrass habitat. Previous work using stomach content and stable isotope analyses have identified striped mullet as important prey for resident Sarasota dolphins. This economically important and numerically abundant forage fish facilitates energy transfer through the food web as a significant food source for many sport fish and other higher-order predators. In fact, individual dolphins are commonly seen feeding on mullet and exhibiting predatory chasing behaviors when mullet are present.

The objective of a new project seeks to collect baseline data on striped mullet movement patterns, space use, and residency in Sarasota Bay. These data are necessary to begin to assess the spatial ecology of dolphin-prey interactions in Sarasota Bay, and to monitor changes in movement and potential refuge areas associated with ecological disturbances, such as *Karenia brevis* red tides. We plan to internally acoustic tag 50 striped mullet during the spring and summer of 2023 and to utilize a combination of passive acoustic telemetry via the Sarasota Coast Acoustic Network (SCAN, consisting of 70+ passive acoustic receiver stations), and active acoustic telemetry (following the fish post-tagging with a research vessel) to document movement patterns. This combination of passive and active telemetry will allow the collection of short-term, fine-scale, precise movement data within the estuary, as well as longer-term, broad-scale movement data throughout the area. Funding for this project was provided by the Mote Scientific Foundation. The extent of this work is currently permitted under the State of Florida Special Activity License obtained by SDRP/CZS (Florida Fish and Wildlife Conservation Commission, SAL-19-0809A-SR).

Dolphin-shark diet overlap in Sarasota Bay

Krystan Wilkinson, Chicago Zoological Society's Sarasota Dolphin Research Program

Identifying shared diet and habitat resources between sharks and dolphins can help disentangle complex predator-prey and competitive interactions between these top predators. This information is necessary to understanding ecosystem structure and function. Bull sharks are thought to be the most frequent predator of the nearshore Sarasota Bay dolphin residents – the SDRP has, so far, detected 5 Sarasota resident dolphins with fresh shark bites in 2022. Other shark species are also found in the Sarasota area and may have predatory or competitive interactions with the resident dolphins. In collaboration with Mote Marine Laboratory's Shark and Ray Conservation Research Program, we have collected blood samples from four coastal shark species (bull, tiger, sandbar, and blacktip) for stable isotope and fatty acid analysis to identify diet overlaps among coastal sharks and the Sarasota Bay dolphin community.

Results from the stable isotope analyses suggest the sharks are generalist predators that feed in a range of habitats. The sharks seem to be feeding mostly in more open water habitats, such as coastal waters and open bay areas. In contrast, the Sarasota Bay bottlenose dolphin community are seagrass specialists. However, there are a few dolphin individuals that overlap with some of the shark species suggesting that dolphin individuals that primarily feed in more open water habitats are overlapping ecologically with the sharks.

Krystan Wilkinson tagging a bull shark in Terra Ceia Bay in August 2022.

Results from the fatty acid analyses showed significant differences in fatty acid composition between all shark species (58 fatty acids identified). Shark fatty acid results will be integrated with University of California, Santa Cruz Ph.D. candidate Theresa-Anne Tatom-Naecker's dissertation results assessing fatty acid signatures in the resident Sarasota dolphin community. Our preliminary findings were presented at the 24th Biennial Society for Marine Mammalogy Conference as an oral presentation.

Tagging bull sharks with acoustic tags to track their patterns of movement and habitat overlap with the Sarasota Bay dolphin community has continued throughout 2021-2022. We deployed six tags in 2022, bringing our total to 27 bull sharks tagged with 7-9-year acoustic tags. We will continue to monitor shark movements along the Sarasota coast with the SCAN array and neighboring array networks. Two female bull sharks (one tagged in March 2022, one in June 2022) were also tagged with a satellite-linked tag, which was donated to the project by the Smithsonian Institute. One of these sharks swam into the northern Gulf of Mexico and last transmitted on May 2nd, 2022, off of the Louisiana coastline. We have not heard from the satellite-linked tag deployed in June, but we hope to receive acoustic detections of this animal soon.

Funding for this research was provided by an anonymous donation to the Chicago Zoological Society, Mote Scientific Foundation, and Women's Board of the Chicago Zoological Society. Special thanks go to Jack Morris, Val Hagan, Dr. Bob Hueter, Dr. Demian Chapman, Capts. Dean Dougherty, Greg Byrd, and Cody Cole (Mote Marine Laboratory), Dr. Jayne Gardiner (New College of Florida) and Tonya Wiley (Havenworth Coastal Conservation) for their assistance with shark tagging and sampling. Many thanks go to Dr. Lisa Hoopes (Georgia Aquarium), Dr. Sam Rossman (Hubbs – SeaWorld Research Institute, Michigan State University) and Theresa-Anne Tatom-Naecker (CZS-SDRP and UC-Santa Cruz) for their assistance with diet analysis. We thank the Smithsonian Institute for donating four satellite-linked tags for this project.

Long-term mark-recapture efforts in Sarasota Bay help solve the mystery of whitespotted eagle ray age and growth

Kim Bassos-Hull and Krystan Wilkinson, Chicago Zoological Society's Sarasota Dolphin Research Program, and Atlantine Boggio-Pasqua, Aix-Marseille University

Whitespotted eagle rays can grow to over two meters (~6 ft) in disc width (wing tip to wing tip). Until recently, researchers did not have enough information to reliably determine the age of these rays, but new information is now available from our 2022 published study to aid in their conservation management.

Adult whitespotted eagle ray on board Mote's R/V Ono V *with Krystan Wilkinson for size comparison. These rays can grow to over 230 cm in disc width (wing tip to wing tip).*

Age determination is one of the most challenging aspects of investigating life history in sharks and rays. Typically, researchers use the vertebrae of these animals the same way we age trees, counting "rings" (calcified band pairs) which are assumed to be annual, or at least periodic, and thus reflect the age of the individual. With dolphins, researchers can age individuals by examining growth layers in teeth. Doing so with many animals allows modeling the average growth curve for the population, or in other words, a relationship between size and age. However, the periodicity of such band pairs has not been validated for most species of sharks and rays, which makes the age estimates uncertain. Alternative methods such as mark-recapture studies are less invasive and highly recommended to complement this traditional approach.

Through tagging efforts, we have learned that whitespotted eagle rays along Florida's west coast are travelers using large portions of the coastline from the Florida Panhandle to the Florida Keys, and are rarely recaptured (around 6% recapture rate). Fortunately, due to our long-term study, rarely is enough! In collaboration with Mote Marine Laboratory's Sharks and Rays Conservation Research Program, we were able to capture, measure, tag, and release 589 whitespotted eagle rays during 2009 - 2019, and 22 individuals were eventually recaptured and measured again after more than 90 days at liberty. Their growth was used to model the average growth curve for each sex, and crucial age-related life-history parameters were inferred. While previous studies relying on vertebral readings suggested a slow growth and late maturity, we found that whitespotted eagle rays grow much faster than anticipated: they reach maturity in 2 to 3 years only and are estimated to live up to 15 years. This information is critical to the conservation and sustainable management of this species, recently changed from "Vulnerable" to "Endangered" on the IUCN Red List.

Some of the rays (*n* = 19) captured during this study were not released, but transferred to Georgia Aquarium in Atlanta, GA where they were housed, and monitored during annual health exams. Although they apparently grow slower and reach smaller sizes, these rays still reach sexual maturity at similar sizes as their wild counterparts, suggesting whitespotted eagle ray maturation is dependent on size rather than age. We also conducted a survey among other aquariums affiliated with the AZA (Association of Zoos and Aquariums), which provided valuable information on the size at birth, sexual maturity and maximum sizes of their whitespotted eagle rays. Some individuals were even reported to have reached 20 years of age.

Our findings highlight the mutual benefits of combining *in-situ* and *ex-situ* data and were published in a new research topic of Frontiers in Marine Science, "Contributions of Zoos and Aquariums to the Advancement of Marine Science". Next steps include using the age and growth parameters in demographic models for wild populations subject to fishing pressures, and investigating the potential factors influencing growth in aquarium-settings.

Funding for this research was provided by Save Our Seas Foundation, Mote Scientific Foundation, Georgia Aquarium, the National Aquarium, and Disney Conservation Fund.

Whitespotted eagle ray pup being measured for disc width before release.

Gulf of Mexico Dolphin Identification System: A case for wayward dolphins

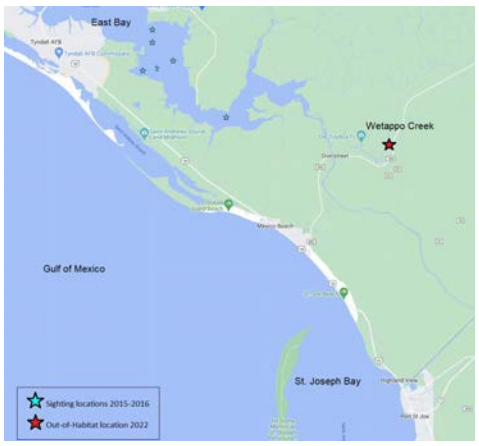
Carolyn Cush and Randall Wells Chicago Zoological Society's Sarasota Dolphin Research Program, Lauren Albrittain and Secret Holmes, Gulf World Marine Institute, Eric Zolman and Todd Speakman, National Marine Mammal Foundation, and Blair Mase, National Oceanic and Atmospheric Administration Southeast Fisheries Science Center

In February 2022, a bottlenose dolphin was found out-of-habitat in Wetappo Creek, near Wewahitchka, in northern Florida, and reported to the Gulf World Marine Institute. The animal was monitored to see if it would return to more saline waters on its own, but it did not leave the area. With a deteriorating body condition, and lesions developing due to low salinity, NOAA approved an attempt to herd the animal back to saltier water. Backup plans were simultaneously being made to capture, transport and release the animal, in case efforts to herd it proved ineffectual. But where? Its best chance of survival would be within its home range, but this could be difficult without knowing where it came from. Nevertheless, plans involving multiple groups and agencies were prepared in the event a catch-and-release became necessary. Efforts of this nature involve a sizable amount of both funding and forethought, stretching to include the travel of appropriately-trained staff and necessary equipment which can be difficult to come by in remote areas as it was in this case.

The Gulf of Mexico Dolphin Identification System (GoMDIS) is a collaborative effort between photo-identification (photo-ID) and stranding groups in the Gulf of Mexico, to standardize, archive, and curate bottlenose dolphin fin catalogs in one location—accessible online through the OBIS-SEAMAP photo-ID portal—thus allowing for ease of matching between different groups. Now, in its tenth year, GoMDIS includes representative images from 42 catalogs with approximately 26,700 animals and more than 47,000 images. Gulf-wide, 2,100 matches between groups have been made to date, strengthening and stitching together data from individual research groups.

After reaching out to the GoMDIS collaborative, it was determined through some sleuthing that the Wetappo Creek animal was a known male (SAB_6080) that was first observed 6-7 years earlier in St. Andrews Bay; 6080 had sufficient sightings to indicate its range at least included the eastern section of this bay. This was the best guidance to let us know that had a capture been attempted and the animal released elsewhere, the animal may not have fared well since it was not in familiar waters.

After multiple scouting trips and herding attempts, the Wetappo Creek animal seemingly re-oriented and was successfully herded down-creek using vessels and noise deterrents. Thus, a catch-and-release attempt proved unnecessary. This case provides supportive evidence that can be used to help influence decision-making for managers in determining release sites if/when similar situations come up in the future in order to ensure out-of-habitat animals are released as close to their original ranging areas as possible.



Historical sighting locations and out-of-habitat site for bottlenose dolphin SAB_6080.

Dolphin Rescues, Releases, and Follow-up Monitoring

Sarasota Dolphin Research Program involvement in interventions and stranding response

Randall Wells, Chicago Zoological Society's Sarasota Dolphin Research Program

We have worked in partnership with Mote Marine Laboratory's Stranding Investigations Program (SIP) for decades, helping to investigate reports and recover stranded dolphins to try to better understand the threats to Sarasota Bay's long-term resident dolphins, and leading rescue efforts for those for which interventions are recommended. Conservation is generally discussed at the population level. However, we have demonstrated the importance of individual contributions, and conversely, the value to conservation of saving individuals. Interventions can be expensive and logistically complex, and it is not unreasonable to ask if these efforts are worth it. In 2013, a group of colleagues and I published a paper that defined a threshold for determining short-term success of interventions, and suggested that the sooner the intervention is done, the greater the chance of success. Recently, a paper by Katie McHugh and colleagues built upon these findings and extended them based largely on our ongoing Sarasota dolphin monitoring program to evaluate long-term success. The results presented in this paper were modeled by population biologist Bob Lacy, and demonstrated the increased population growth that can be expected from saving individuals.

In addition, we receive support from NOAA John H. Prescott Marine Mammal Rescue Assistance Grants to: 1) provide tags and tracking services to stranding response programs around the country for follow-up monitoring of rescued and/or rehabilitated dolphins, 2) for consultations on responses to potential rescue cases, 3) for training personnel for tag attachment and monitoring, and 4) for assisting stranding programs with dissemination of information resulting from follow-up monitoring of their cases.

Bottlenose dolphin calf CMA 2115's entanglement as seen on December 29th, 2021.

CMA 2115's rescue on January 18th, 2022, near Clearwater, Florida. Her mother, "Matilda," is following the rescue team as they carry the calf to release the pair outside the net corral.

On November 12th, 2021, we consulted with NMFS about, and provided a satellite-linked tag for, an out-of-habitat bottlenose dolphin reported in a flooded cow pasture near Cut Off, LA, presumably as a result of Hurricane Ida. On December 10th, 2021, Audubon Nature Institute and partners (including SeaWorld, National Marine Mammal Foundation, Texas Marine Mammal Stranding Network, and local agencies), caught, tagged and released the female dolphin ("Dorothy") off Galliano, LA. Tracking through March 12th, 2022 exceeded the 42-day threshold we have identified for characterizing the intervention as a success.

On December 4th, 2021, Clearwater Marine Aquarium (CMA) observed a young bottlenose dolphin calf with a severe entanglement involving severing of much of the dorsal fin (CMA 2115), believed to be the 2021 calf of "Matilda," a mother with documented sightings since 2010. The pair was observed by CMA and reported by the public with increasing frequency during late December and into January (see entanglement photo left). The SDRP was called upon by the National Marine Fisheries Service (NMFS) to lead a catch-and-release rescue on January 18th 2022. The calf and its mother were caught, the calf was quickly disentangled, and both swam off strongly when released. It had been decided by NMFS and veterinary consultants that because of the young age of the calf and its compromised condition, tagging would not be done, in order to expedite release following disentanglement. Unfortunately, the carcass of this calf was recovered on July 4th, 2022. The entanglement wounds had healed.

As part of another John H. Prescott Marine Mammal Rescue Assistance Grant, through SIP, we are working with a team of veterinarians and DanInject to try to develop capabilities for sedating free-swimming dolphins in need of intervention. This capability, which already exists for pinnipeds and large whales, would allow rescuers to save many more dolphins when they are in situations where traditional catch-and-release techniques are not feasible or safe.

Updates from previous interventions

Jason Allen, Chicago Zoological Society's Sarasota Dolphin Research Program

Merrily: In summer of 1985, a young Merrily was removed from a commercial fisherman's net by the SDRP. Now 38 years old, Merrily has been seen more than 1,500 times, and she has produced 5 calves.

Scrappy: In July 2006, Scrappy, a juvenile male was observed entangled in a men's Speedo bathing suit. He had managed to put his head through the waist and one of the leg holes, and the suit had worked its way back to the point where it was cutting deeply into the anterior insertions of his pectoral fins. On August 3rd 2006, Scrappy was temporarily captured, and the suit was removed. Now 23 years old, he and C835 have been formed an adult male alliance. They have been seen together several times in 2022.

Ginger: In December 2008, Ginger, a recently independent juvenile female dolphin, stranded on Siesta Beach. She was taken to Mote Marine Laboratory, treated for complications from the stranding, and released two months later. The SDRP radio-tagged her and closely monitored her for two months post-release, until the tag transmissions ceased. She has since been regularly seen during our monthly population monitoring surveys. Ginger's story inspired SDRP volunteer Cathy Marine to write a children's book about her time at Mote called "No Dead Fish for Ginger." She and her two-year-old calf are seen often during our monthly surveys.

Nellie: In February 2010, the calf of resident dolphin FB25 was seen with plastic twine and a metal hook tightly wrapped around her head, embedding in the tissue. She was caught by the SDRP, disentangled and released on March 1st, 2010. She was named "Nellie" in honor of Dr. Nelio Barros, a great friend and colleague, who had recently passed away. We see her regularly during our surveys, often with her 2017 calf.

Lizzie: One of our Sarasota residents, Lizzie, had an eventful 2013. She was given a temporary satellite-linked tag during our health assessment project in May, and she and her 3-year-old calf were regularly followed to compare their behavior with and without the tag. During one of these follows SDRP staff noticed that Lizzie had become entangled with monofilament line around one of her flukes. Shortly after, her calf was struck by a boat propeller that left a large gash on his dorsal fin. Lizzie and her calf were caught briefly on July 20th to remove the fishing line and the tag. Lizzie and her current one-year-old calf (her 8th!) are doing well.

F314 and F279 swimming near Stump Pass where F314 was rescued in 2019.

F314: On March 11th, 2019, CZS led a team to rescue an entangled dolphin calf near Stump Pass in Englewood, Florida. We were able to catch him (now F314) and his mom, and remove the line that was cutting deeply though his mouth and approaching his eye, and through his fluke. They were both released after disentanglement. Despite their distance from Sarasota, we have been able to make occasional trips down to the area to check up on them. Both appear to be in good shape, but they still spend a lot of their time around fishing boats.

F316: On April 1st, 2019, we rescued F199's calf (now F316) who had braided monofilament fishing line cutting 85% of the way through his fluke blade, and was incredibly emaciated. Honestly, we did not have high hopes that he would survive. Veterinarians determined his best chance was to be released to recover in the wild. He has recovered nicely, and we continue to track him. In May 2022, we had the opportunity to give him a thorough checkup during a brief catch-and-release health assessment. F316 is indeed doing well and his fluke is well-healed.

Image on the left is of F316's fluke when he was rescued in April 2019. On the right is F316's fluke in May 2022 and one can see that it is well-healed.

Update on Bahamian Atlantic spotted dolphin Lamda

Randall Wells, Chicago Zoological Society's Sarasota Dolphin Research Program

Four years to the day after he stranded, an Atlantic spotted dolphin in the Bahamas known as "Lamda" was observed off Bimini, by one of the Atlantis veterinarians who first treated him. This ~14-year-old male was reported to the Bahamas Marine Mammal Stranding Network-Bahamas Marine Mammal Research Organization as being in distress near Great Stirrup Cay on August 24th, 2018, and after he was stabilized by Atlantis Animal Rescue Team, he left the bay on August 25th, 2018. He stranded on Great Stirrup Cay on August 26th, 2018 and was transported to Atlantis for rehabilitation.

Lamda was released on October 29th, 2018 off Bimini, near where he had been observed since 2013. The dolphin was tagged with a satellite-linked location-only tag provided by the Sarasota Dolphin Research Program. Tracking continued through February 14th, 2019. Over the first three months of tracking, the dolphin moved back and forth along the SW edge of the Great Bahama Bank, ending up in the waters near his release site, in his previous range. He has been subsequently seen repeatedly near Bimini, and he continues to appear to be in good condition. This case was published in the journal *Aquatic Mammals*.

Atlantic spotted dolphin Lamda, off Bimini on August 26th, 2022, 4 years to the day after his stranding. Photo credit: Dr. Michael Friefeld.

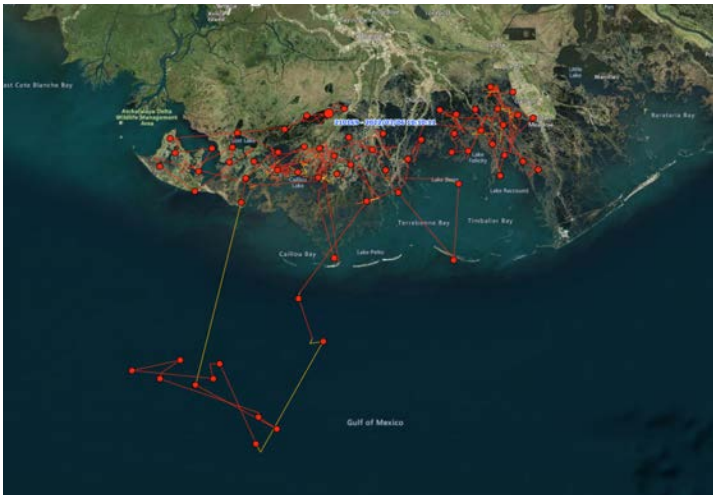
Out-of-habitat rescues in Louisiana following Hurricane Ida

Gabriella Vazquez, Audubon Nature Institute

Hurricane-related, out-of-habitat strandings occur in Louisiana when powerful storm surge and coastal flooding pushes bottlenose dolphins into undesirable locations. This includes creeks, ponds, canals, and ditches that do not have access to open water. During the 2021 Atlantic hurricane season, a powerful category 4 Hurricane Ida slammed into Southeastern Louisiana on August 29th, 2021. Less than 24 hours after Ida made landfall, a young male bottlenose dolphin was reported in a drainage ditch near the Louisiana-Mississippi border. On September 5th, 2021, a team including staff from Audubon Nature Institute, SeaWorld, Institute of Marine Mammal Studies, National Marine Mammal Foundation, and others caught the dolphin, transported it to Waveland, Mississippi, tagged it with a satellite-linked tag, and released it. The dolphin was tracked for five days before signals ceased. Among the possibilities for why transmissions stopped is the idea that the animal moved into very low salinity water closer to where it had originated, where the satellite-linked tag's seawater switch would not be able to function properly.

Sometimes, out-of-habitat dolphins are not reported until months later when property owners or residents begin to rebuild after a storm. In mid-November 2021, a single female adult bottlenose dolphin was reported to be in a flooded cow pasture caused by a levee breach that resulted in significant flooding. This female was a known Barataria Bay animal (BAR_6021, aka Dorothy) that had been observed with calves in 2012 and 2019 during photo-identification surveys. A rescue on December 10th, led by Audubon Nature Institute, SeaWorld Orlando, National Marine Mammal Foundation, and the Texas Marine Mammal Stranding Network with other collaborating institutions, moved the trapped dolphin from the cow pasture and returned her to suitable coastal waters. SDRP provided a satellite-linked tag and tracking services for this dolphin, through its Prescott grant. This dolphin was tracked for 91 days during which she used a variety of habitats, ranging from lakes to open Gulf of Mexico waters. This tracking duration was well beyond the 42-day threshold defining a successful intervention.

Adult female bottlenose dolphin Dorothy is being transported after being rescued from a flooded cow pasture in Cut Off, LA, nearly three months after Hurricane Ida made landfall. Photo Credit: SeaWorld Orlando.



Dorothy's track over 91 days after her rescue.

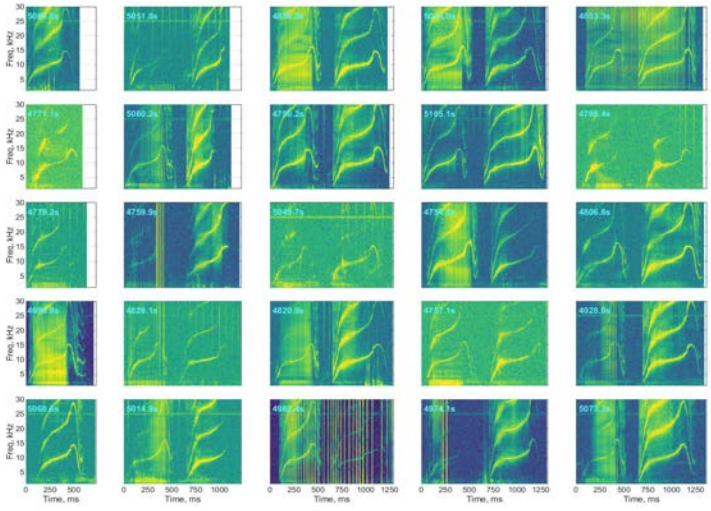
Sarasota Bay Listening Network: Eavesdropping on the soundscape of Sarasota Bay

Athena Rycyk, New College of Florida, Katie McHugh and Cecilia Thompson, Chicago Zoological Society's Sarasota Dolphin Research Program, Laela Sayigh, Woods Hole Oceanographic Institution, and David Mann, Loggerhead Instruments

In the past year, two new passive acoustic listening stations have been added to the Sarasota Bay Listening Network (SBLN)—located at New College of Florida and Anna Maria Elementary School. The SBLN now consists of 13 stations that allow us to study the soundscape, or acoustic environment, of Sarasota Bay. Dolphin whistles are commonly heard at both stations. One whistle in particular stands out at the New College of Florida station and Laela Sayigh was able to match the whistle to Sarasota Bay resident F213, also known as Maddie. Maddie is a young adult female born in 2007. She is a calf of resident FB55 and mom of six-year-old F308, three-year-old F320, and a new baby, 2133, as of summer 2022. This is an excellent example of how we can use dolphin whistles as a proxy for animal presence in a given area and how the SBLN serves as an additional tool, alongside visual survey methods, to track dolphin distribution throughout the area.

In addition to two new stations, the SBLN board welcomed two new members this year—Laela Sayigh of Woods Hole Oceanographic Institution and Frants Jensen of Syracuse University and Aarhus University. We also have been fortunate to officially welcome Cecilia Thompson on a contract basis to assist with SBLN stations and data analysis after many months of volunteering on the project.

Recordings from the SBLN contributed to a new peer-reviewed publication in 2022! Athena Rycyk and colleagues published "The influence of variations in background noise



Signature whistle of resident dolphin F213 (Maddie), fin to the right, recorded at the New College of Florida passive acoustic listening station. Maddie is often sighted along the seawall near the college and The Ringling Museum.

SBLN passive acoustic listening station located at New College of Florida, installed January 2022.

on Florida manatee (*Trichechus manatus latirostris*) detection of boat noise and vocalizations" in the journal *PLOS One*. This paper discusses the impact of background noise on the ability of manatees to detect the sound of an approaching boat with enough time to avoid a collision. In noisier parts of the region, manatees may have less than a 5 second warning of a boat's approach. Boats traveling quickly are particularly difficult to avoid as they are detected later than slow-moving boats. We also found that boat noise greatly limits how far manatee vocalizations travel and likely impacts acoustic communication between manatees.

In addition to manatees, the SBLN continues to expand our knowledge of dolphin communication and individual dolphin whistles. Students and interns from New College of Florida and various other institutions continue to assist with the Signature Whistle Project led by Athena Rycyk, Laela Sayigh, and Katie McHugh. This project investigates the use of signature whistles by bottlenose dolphins at the acoustic recording station located at the mouth of Palma Sola Bay (PSB) in Cortez. One whistle that is frequently found in files from PSB station is that of F243, who is often visually observed in this location as well during photo-ID surveys. The Signature Whistle Project and recent SBLN publication highlight how passive acoustic data can be used to answer relevant research questions and better understand the soundscape of Sarasota Bay.

Developments in remote tag attachment: Tag Attachment Device on a pole (TADpole) update

Randall Wells, Chicago Zoological Society's Sarasota Dolphin Research Program, and Michael Moore and Camrin Braun, Woods Hole Oceanographic Institution

With support from the NOAA RESTORE Science Program in collaboration with the National Marine Mammal Foundation, ongoing efforts are refining our pole-mounted Tag Application Device (TADpole). This approach for tagging small cetaceans, and now sharks, at the bow of a vessel, was conceived and developed by us initially for dolphin tagging, with prototypes designed and built by engineers Tom Lanagan and Jason Kapit at Woods Hole Oceanographic Institution, through initial support from Dolphin Quest, and Dolphin Biology Research Institute. The TADpole is designed to pneumatically apply and secure a satellite-linked tag to the dorsal fin with a single attachment pin, in a fraction of a second.

Although the tool has yet to successfully tag a dolphin, it is a proven conservation tool for two species of sharks. In 2021, the device was used to successfully deploy

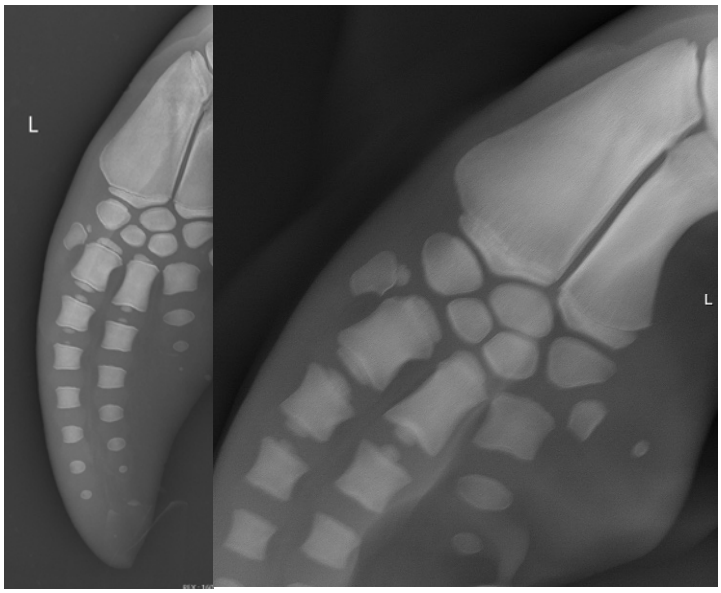
two satellite-linked tags on white sharks off coastal Massachusetts. During summer 2022, the world's largest fish was added to the TADpole target species list when researchers successfully deployed a satellite-linked tag on the dorsal fin of a whale shark in the waters offshore of Cape Cod. The successful deployment required some last-minute modifications to the TADpole that facilitated its use by freedivers to deploy the tag in the water. The satellite-linked tag has subsequently provided unprecedented, high-quality location data for the tagged whale shark. Modifications are underway over the winter to make the device more robust for in-water tagging and allow it to use other types and forms of electronic tags, making it broadly applicable to a number of other marine taxa.

Freedivers using the TADpole system (without the pole) to tag a whale shark off Massachusetts in 2022. Photo by Tom Burns.

Age determination from pectoral flipper radiography

Ashley Barratclough, National Marine Mammal Foundation, and Daniel Garcia Parraga, Fundación Oceanogràfic

In 2022, we were fortunate enough to perform a health assessment on F316. This dolphin was a known-age animal having been observed as a neonate in 2017. We performed a radiograph (x-ray) of his pectoral flipper to confirm that his bones were developing at the rate we would expect for his age. What was particularly interesting about this case was that this individual was previously caught in 2019 and had a pectoral flipper radiograph performed during his health assessment too. This made him the first wild dolphin to have sequential flipper radiographs to assess ageing. The two images can be compared to see additional growth plate development; however while his 2019 radiograph was representative for a 2-year-old dolphin, his 2022 radiograph showed that his growth rate had actually slowed down. With the extensive work of the SDRP photoidentification team we are able to understand what events over the last three years could have influenced this. We hypothesize that this reduction in growth could be linked to the early weaning from his mother in 2019 and/or entanglement in



Flipper x-rays of F316 in 2019 (left) and 2022 (right).

fishing gear. Fortunately, the SDRP was able to intervene and disentangle him from fishing gear, and he made a full recovery. Now he is fishing-line-free hopefully his growth rate can get back on track! The 2022 health assessments allowed us to perform radiographs on four dolphins in the field, demonstrating our translational medicine approach of developing new techniques on managed care dolphins and applying these to wild dolphin conservation.

Expanding the Sarasota Coast Acoustic Network (SCAN) to offshore artificial reef locations

Kim Bassos-Hull and Krystan Wilkinson, Chicago Zoological Society's Sarasota Dolphin Research Program

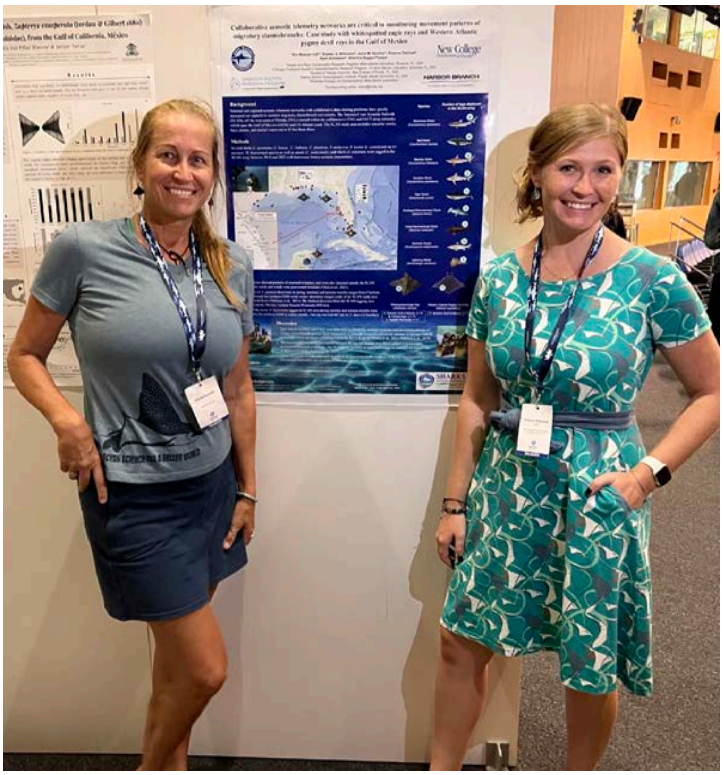
In July 2021, we expanded the Sarasota Coast Acoustic Network (SCAN) to include four artificial reef locations further offshore in the Gulf of Mexico (range 18.16 - 45.88 nautical miles (nm)). Prior to deploying these four receivers, SCAN consisted of 70 receivers covering inshore and nearshore areas of Sarasota Bay and ranged approximately 13 nm offshore. Our objective was to determine whether marine species tagged with a passive acoustic tag in coastal waters were traveling further offshore than the SCAN array was able to detect.

Over the course of this offshore expansion project, acoustic tags were deployed on three bull sharks, nine sandbar sharks, one scalloped hammerhead shark, five tiger sharks, four devil rays, and 22 whitespotted eagle rays to monitor their movements from coastal to offshore areas in the Gulf of Mexico.

Of the tags deployed in the last year, five – all on sandbar sharks – were detected at the offshore reef locations. Sandbar sharks are common to coastal Florida Gulf waters during winter to early spring; interestingly, two of

these sharks were detected at one of the reef locations (~33 nm offshore) during June and July 2022. We also detected additional shark and fish species tagged by SCAN participants for other projects and by researchers throughout the Gulf of Mexico, Florida Atlantic coast, and the Caribbean. Thirteen detected acoustic tags have not yet been identified, but these tag identification numbers were sent to iTAG and FACT – collaborative acoustic telemetry networks – to identify the tagged species and the tagging researcher. All animal detections were distributed to the respective tag owners to be included in their individual movement analyses.

Compared to the rest of the SCAN network, these offshore reef sites were visited by fewer animals (sharks and other tagged species) than the nearshore artificial reef sites Alan Fisher, Silvertooth, M1, and M8 collectively (ranging approximately 1.6 to 13 nm offshore; the M7 receiver unfortunately could not be found during the most recent data download) which detected 50 unique individuals in 2021-2022, versus 38 at the offshore locations. No rays were detected at the offshore reef locations. When comparing just the number of known shark individuals, the locations are comparable (18 shark individuals nearshore vs. 13 offshore). The offshore locations detected considerably fewer animals (sharks and other species) as compared to the coastal receiver line off of north Siesta Key (receivers were placed at 100 m, 500 m, and 900 m perpendicular to the coast), which detected 81 unique individuals in 2021-2022. When comparing just the number of known sharks from the offshore area to the coastal receiver line, the number of individual sharks visiting offshore areas are slightly less than the coastal lines (22 shark individuals detected). This may suggest that movements to offshore locations are species-specific, with larger shark species making coastal as well as offshore movements. However, we have not yet compared the amount of time spent in each of the areas; this analysis may provide some additional insight regarding frequency of use in coastal areas versus offshore. We have elected to keep these four receivers deployed for an additional year of monitoring to support ongoing studies of marine species movements along the Florida Gulf coast.



Kim Bassos-Hull (left) and Krystan Wilkinson (right) presenting a poster about the SCAN array at the Sharks International conference in October 2022.

Most recently we presented our summarized SCAN tagging and detection data at the Sharks International conference in Valencia, Spain in October 2022. We would like to thank Mote Scientific Foundation for their generous support throughout the development of the SCAN network.

Eye in the sky - SDRP Drone research

Jonathan Crossman, Chicago Zoological Society's Sarasota Dolphin Research Program

SDRP has a long history of taking to the skies to study dolphins. In the 1990s and early 2000s, a video camera suspended from a tethered blimp was used to get overhead behavioral records of dolphins and manatees. Today, given the sharp rise of technology, we are using unmanned aerial vehicles (UAVs) in the form of drones. Thanks to the support of Mote Scientific Foundation, we now have a fleet of 4 drones. These integrated UAV systems allow us to quickly deploy and capture images and video with high efficiency. Although the Sarasota-Bradenton International Airport straddles the east side of Sarasota Bay, making it a no-fly zone for UAVs, the majority of our study area is open to drone use.

The ability to get an overhead view opens up a new world for research. Conducting focal animal behavioral follows on dolphins using drones allows us to detect fine-scale movements and responses to events with a higher level of detail and accuracy compared to vessel based observations. In combination with boat-based observations, acoustic recordings, and data from hydrophones or digital acoustic archival tags (DTAGs), the approach can be even more powerful. We have implemented drone use in our collaborative Strategic Environmental Research and Development Program project entitled "Towards an Understanding of the Cumulative Effects of Multiple Stressors on Marine Mammals - an Interdisciplinary Working Group with Case Studies" (see Tyack article pg. 12). Although the turbid waters of Barataria Bay, Louisiana, make it challenging to view animals from above, we are still able to use this technology to observe their behavioral responses to approaching vessels.

In May 2022, we were joined by Fabien Vivier, studying under Lars Bejder at the University of Hawaii, to investigate the health and pregnancy status of individual dolphins through drone photogrammetry. This involves launching the drone from a boat and flying directly over top (at a safe and federally permitted altitude) to record video of the animals surfacing. Post-field work, the videos are analyzed and lengths can be determined via mathematical formulas. In Sarasota Bay, calibration of this technique is possible because of measurements obtained during health assessments. The results obtained will allow us to inform management agencies and implement conservation strategies on these populations more rapidly.

Kyleigh Fertitta, from University of Hawaii, catching the UAV during Sarasota health assessment.

Using tags to measure auditory evoked potentials in free-swimming wild dolphins

Adam B. Smith and Magnus Wahlberg, University of Southern Denmark, and Mark Johnson and Peter Madsen, Aarhus University

Hearing is a vital sensory modality for dolphins. They use their sense of hearing to gather information about the environment which can be used for orientation, predator and prey detection, and social or reproductive communication. Thus, auditory research is an important component of understanding dolphin biology and behavior and has been an important component of cetacean conservation efforts. For example, studying the hearing of dolphins helps us better understand how man-made noise can have negative impacts on them.

One of the primary ways we can study dolphin hearing abilities is to measure specific auditory brain signals, called Auditory Evoked Responses (AEPs), using non-invasive electrodes embedded in suction cups that are attached to the surface of a dolphin's skin. Typically, AEPs are collected from animals under direct human care, either as subjects trained in facilities or subjects that have stranded and are undergoing rehabilitation. Such circumstances allow us to measure these auditory brain signals from individuals that are lying still or motionless, which makes it easier to separate the neural responses of the hearing system from neural signals generated by other parts of the body. Yet such stationary circumstances don't fully reflect the natural and complex acoustic scenes encountered by dolphins in the wild. Thus, to better understand how the hearing system of dolphins performs within the complexities of the natural environmental soundscape, we are developing new methods to measure AEPs from freely-moving individuals in the wild.

A promising direction from which to approach this is using on-animal tags. Tags are widely used to collect data from wild individuals, and non-invasive, suction cup electrodes are a relatively recent addition to the suite of sensors that have been mounted on cetacean tags. Recent research using trained harbor porpoises and dolphins has provided proof-of-concept results that tag-AEPs can be successfully measured if the electrodes are placed in very precise locations around a dolphin's head. Our collaboration with the Sarasota Dolphin Research Program and participation in the Sarasota Bay dolphin health assessments provide us an important opportunity to test if tag-based AEP measurements can also be used to collect similar hearing measurements from dolphins that are freely swimming and behaving in the wild.

Adam Smith attaching an AEP tag in Sarasota Bay in May 2022.

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 and displays at the Chicago Zoological Society's Brookfield Zoo and elsewhere, articles and interviews, and through volunteering and citizen scientist opportunities. We also produce books for the general public and students. For more information on our program's books and publications, please visit www.sarasotadolphin.org.

In response to an increase in dolphins taking bait, catch and discarded fish from anglers, we worked with NOAA Fisheries Service, Hubbs-Sea World Research Institute, Disney Conservation Fund, and fishing guides and anglers to develop an educational card displaying 10 tips intended to improve the experience of the angler or boater while enhancing protection for dolphins. The cards are available in English and Spanish as downloads at through the SDRP website at: sarasotadolphin.org/sources-of-information/videos/#more-581

As a complement to the cards, we helped to develop a 30-second public service announcement (PSA), "Don't Feed Wild Dolphins." This animated PSA highlights the dangers of feeding wildlife along with ways that members of the public can interact with wild dolphins in a more responsible manner. This PSA, along with brief (2-8 min) educational videos we have produced about dolphin conservation and biology are available through the SDRP website, at sarasotadolphin.org/sources-of-information/videos/#more-581

We are now participants in the Science and Environment Council of Southwest Florida's Watershed Audio Tour. This program features stops at sites across Sarasota and Manatee Counties, where stands with interpretive materials provide phone numbers that lead to more detailed descriptions. Each stop delivers watershed highlights, interesting facts, and suggestions for easy ways to help protect watersheds. While the tour can be accessed free from anywhere, visiting the featured locations at outdoor sites provides listeners an up-close and personal experience. Stops describing the dolphins of Sarasota Bay have been installed at Nora Patterson Park at the north end of Siesta Key, and at Historic Spanish Point. More information is available at: http://watershedtour.org/

If you have not visited our website sarasotadolphin.org recently, you should take a look (and listen). Links to our publications are now provided (sarasotadolphin.org/publications). The dolphins that have been featured as "Fin of the Month" in our e-newsletters over the years are compiled on the website, and in addition to photos and background information, recordings of their signature whistles have also been provided by our collaborator, Laela Sayigh (sarasotadolphin.org/meet-dolphins). Check out sarasotadolphin.org/learn/fun-facts!

Sharing Scientific Findings and Participation on International and Governmental 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 working groups and panels such as the U.S. Marine Mammal Commission Committee of Scientific Advisors on Marine Mammals, the NOAA/USFWS Atlantic Scientific Review Group, the NOAA/NMFS Bottlenose Dolphin Take Reduction Team, the U.S. Animal Telemetry Network, the Florida Marine Debris Reduction Guidance Plan Working Group, and the IUCN Cetacean Specialist Group.

International training opportunities

We provide training opportunities for scientists and students from outside of the United States. These training opportunities allow foreign scientists and students 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. We were pleased to be able to have international involvement in our work again, after the constraints imposed by COVID. During the past year, we were joined by colleagues and students from Brazil, Colombia, Denmark, England, France, Scotland, Slovenia, Spain, and Sweden.

Veterinary students and early career veterinarians gather around to observe an ultrasound examination.

Eugenie Clark Field Research Skills and Leadership Program

In May 2022, we welcomed four participants for the 9-week Eugenie Clark Field Research Skills and Leadership Program. The goal of this fellowship program was to help early-career scientists from under-represented groups gain hands-on experience in shark, ray, and fish science. With support from Mote Scientific Foundation, we were able to provide a scholarship-based course designed to train participants in a variety of commonly-used field research techniques, including purse seining during dolphin prey fish sampling surveys. CZS-SDRP Post-Doc, Krystan Wilkinson, was one of the co-founding program mentors, along with Jayne Gardiner (New College of Florida), Jasmin Graham (Minorities in Shark Science), and Tonya Wiley (Havenworth Coastal Conservation).

Meet the 2022 Clark Fellows (from left to right): Jahnita DeMoranville, Naomi Scott, Karson Burton-Reeder and Jade Salis!

Graduate Students

As described throughout this newsletter, graduate students from a variety of institutions, especially the University of California-Santa Cruz, Duke University, and the University of Florida, involve the resources of our program as they conduct their thesis or dissertation research. To date, 50 doctoral dissertation and 46 master's thesis projects have benefited from association with our program, through field research opportunities or access to data, samples, or guidance. Over the past year eight doctoral students and three Master's students have been making use of resources provided by the SDRP:

Masters Theses - Completed

DiMaggio, Kylee. 2022. The fitness consequences of human-wildlife interactions on common bottlenose dolphins in Sarasota Bay, Florida. Master's thesis. University of Florida.

el Haddad, Nicole. 2022. Infant-directed communication in female Sarasota bottlenose dolphins. Master's thesis. Universita degli studi di Milano – Bicocca.

Masters Research Projects - Underway

Bankhead, Kyra. In progress. The diffusion dynamics of human-induced food provisioning on Sarasota dolphins. Master's thesis, Graduate Program in Wildlife Sciences, Oregon State University.

Doctoral Dissertations – Completed

Allen, Austin S. 2021. Estimating the cost of locomotion in common bottlenose dolphins: Calibration, validation, and application to study the impacts of disturbance. Doctoral dissertation. Duke University.

Beal, Andria P. H. 2021. Exploring epigenetics as a tool for population assessment and conservation in large marine predators. Doctoral dissertation. Florida International University.

Doctoral Dissertations – Underway

Adamczak, Stephanie. In progress. A dynamic state model for assessing the population-level consequences of acoustic disturbance on oceanic dolphins. Doctoral dissertation. University of California, Santa Cruz.

Asplanato, Natalia. In progress. Abundance, spatial, and temporal distribution and trophic ecology of Burmeister's porpoise, *Phocoena spinipinnis*, at the Beagle Channel, Argentina. Doctoral dissertation. Universidad de Buenos Aires, Facultad de Ciencias Exactas y Naturales, Departamento de Ecología, Genética y Evolución.

Casoli, Marco. In progress. Mating strategies in bottlenose dolphins: Fine-scale behaviour and acoustic during male-male and male-female interactions. Doctoral dissertation. University of St Andrews, Scotland.

Dziobak, Miranda. In progress. Investigating trophic exposure to microplastics and phthalates in bottlenose dolphins: Could seafood consumers be at risk? Doctoral dissertation. University of South Carolina.

Tatom-Naecker, Theresa-Anne. In progress. Quantitative fatty acid analysis in bottlenose dolphins; Technique validation and application. Doctoral dissertation. University of California, Santa Cruz.

Young, Jordann. In progress. Maternal bioenergetics and reproductive success in bottlenose dolphins. Doctoral dissertation. University of California, Santa Cruz.

Jeanne Shearer and Austin Allen tracking a DTAG while offshore in the Gulf of Mexico.

Grad Student Update – Where are they now?

Jessica Powell, University of South Florida, College of Marine Science (M.S. 2009); NOAA Fisheries Southeast Region, Marine Mammal/Fisheries Biologist

Thanks to my time as a student with SDRP, I learned how to think about conservation problems in a multi-faceted way which has served me well in my career at NOAA Fisheries.

Inspired after reading "Lady with a Spear" (the autobiography of the late and great Eugenie Clark), I applied to an internship at the Dolphin and Whale Hospital at Mote Marine Lab. From this first internship, continued college classes, and studying abroad, my love for marine mammal conservation and in particular, complex human/animal conflicts grew by leaps and bounds. After my undergraduate studies, I returned to Mote as a dolphin trainer. At that time, the SDRP offices were just down the hall from the animal care team. Following some conversations with Dr. Wells, I transitioned to SDRP as a University of South Florida Master's student. In 2006, SDRP had documented an increase in dolphins entangled in recreational fishing gear. In 2007, I studied recreational fishing interactions with bottlenose dolphins and examined the influence of different contributing factors like sex/age class, behavior, habitat usage, and environmental changes (such as red tide). I loved the challenge and opportunity of this project and was grateful to be studying the dolphins in Sarasota Bay. SDRP has such a rich, historical database that I was able to explore aspects of this problem that would have been difficult or impossible anywhere else in the world.

Jessica Powell assisting in photo-ID surveys in NC to support a greater understanding of dolphin populations in this area to inform the Bottlenose Dolphin Take Reduction Team.

Jessica Powell and interns studying dolphin and recreational fisheries interactions in Sarasota Bay in summer 2008.

After completing my Master's degree in 2009, I began my career at the NOAA Fisheries Southeast Regional Office. I coordinated the Dolphin SMART program, which aimed to reduce dolphin harassment from commercial tour operators through training, education, and responsible advertising. I helped expand this program in Key West, Ft. Myers, and the greater Tampa Bay area of Florida as well as in Alabama and the Hawaiian Islands. I now support Southeast fisheries/marine mammal management and Marine Mammal Protection Act programs like the List of Fisheries, Marine Mammal Authorization Program, as well as the Bottlenose and the Atlantic Large Whale Take Reduction Teams. I liaise with the Sustainable Fisheries Division to work collaboratively on initiatives like rope-less fishing to reduce large whale entanglements and increase our understand of dolphin depredation with both commercial and recreational fisheries. I also engage in efforts to minimize protected species conflicts with emerging industries like wind energy and aquaculture. I continue to collaborate with Dr. Wells and the SDRP staff on various partnerships, outreach efforts, and workshops in my role with NOAA. SDRP consistently brings a high standard of scientific integrity and creative thinking to solving conservation challenges.

While conservation management is complex and challenging, it is also rewarding. Progress can be slow and sometimes the victories feel minor, but with persistence and help from great partners like SDRP, the little victories add up and improve our oceans for dolphins and all protected species. I still hold close a conversation I had with Dr. Wells early in my graduate studies. He told me: our responsibility is to help make things better for these animals through our work. I strive to continue working hard to find creative solutions to enhance conservation and feel fortunate to have Dr. Wells and a great team like SDRP as a partner in that effort.

Intern Program

During 2022, 21 full-time interns contributed more than 7,000 hours towards our research in Sarasota Bay, while learning field and lab techniques for monitoring dolphins and their prey via photographic-identification, purse seining, and passive acoustic methods. These included two Office of Naval Research Diversity Program Interns and four Clark Fellows.

2022 Intern Perspective

Listening in on Sarasota Bay

Cecilia Thompson, Graduate of Eckerd College

In one way or another, I was bound to cross paths with the Sarasota Dolphin Research Program (SDRP). I grew up in Oak Park, Illinois, just over 800 miles from the nearest ocean but only 6 miles from the Chicago Zoological Society's Brookfield Zoo. As a child, I spent every summer there attending Zoo Camp. I aspired to be a dolphin trainer until I first visited the underwater viewing area of Seven Seas – the zoo's bottlenose dolphin exhibit – and came across a room that simulates the experience of being on a boat with the SDRP for a photo-ID survey. At seven years old, I sat on the prop boat at the edge of my seat. My eyes were glued to the screen where a video of Dr. Randy Wells talking about the SDRP played on a loop. I was hooked. On the last day of Zoo Camp that week, I dragged my family to Seven Seas, showed them to the simulation room, and then proudly announced that was what I was going to do when I grew up.

Cecilia Thompson on R/V Flip during a fish monitoring survey, with a tiny brown spiny sea star.

Flash forward about 16 years, I am standing at the bow of survey boat *Martha Jane* on my first dolphin survey with the SDRP, focusing the camera in anticipation of capturing a photo of resident FB25 the next time her dorsal fin breaks the surface. My fascination with the ocean led me to Eckerd College in St. Petersburg, Florida – the alma mater of SDRP's Jason Allen, Aaron Barleycorn, Carolyn Cush, and many interns – where I earned a degree in Marine Science and studied the bottlenose dolphins of Tampa Bay as a research student with the Eckerd College Dolphin Project. Upon graduating from Eckerd and completing an internship with the Galveston Bay Dolphin Research Program, run by long-term SDRP volunteer and former Master's student Kristi Fazioli, I contacted with Dr. Katie McHugh and joined the SDRP community.

My experience as an intern was invaluable. I not only further developed my photography skills and experience conducting photo-ID surveys, but gained relevant skills in boating, trailering, catch-and-release purse seine fishing methods, and focal animal follows, to name a few. In the lab, my experience as an intern was somewhat unique in that I mainly focused on acoustics work rather than photo-ID analysis. I investigated the use of signature whistles by bottlenose dolphins in Sarasota Bay using acoustic recordings from the Sarasota Bay Listening Network as a part of the Signature Whistle Project led by Athena Rycyk (New College of Florida), Laela Sayigh (Woods Hole Oceanographic Institution), and Katie McHugh (SDRP). In the field, I was fortunate to assist with a number of projects, including both the inshore and offshore dolphin health assessments, biopsy dart sampling, purse seine fish surveys, and even made my way back up to the Tampa Bay area to monitor dolphins around Piney Point following a devastating wastewater spill in April 2021. Additionally, I worked with Krystan Wilkinson, Kim Bassos-Hull, and their colleagues on both shark and eagle ray research and assisted the Stranding Investigations Program at Mote in a necropsy on a resident dolphin. These experiences have solidified my interest in marine mammal research and provided a strong foundation for a future career in this field.

I was recently hired by CZS to continue to work with the Sarasota Bay Listening Network in a contract position with the SDRP. I am excited to further study the soundscape of Sarasota Bay and be a part of this incredible program. The knowledge and skills that I have gained will certainly guide me towards success throughout the rest of my career, but it is the people who have made my experience with the SDRP unforgettable. The SDRP staff and community at-large is a group of exemplary scientists and dedicated individuals, but more importantly, wonderful human beings. I cannot thank them enough for all that they have done – and continue to do – for me.

Intern update – where are they now?

Carmen Andres Hervias, Ionian Dolphin Project

My childhood was surrounded by some of the tallest mountains in Spain; nevertheless I always felt a special connection with the sea and their inhabitants which got me irremediably hooked on them.

While studying Biology in Granada (south Spain) I would always have these visions of me doing research in marine science. It was during my last year in college when I finally had my first approach to marine ecology, leading me to do my BSc thesis studying the macro-invertebrate populations of the intertidal zone of Granada's rocky shores. After graduating I moved to Barcelona to do a MSc in Oceanography and Marine Environmental Management, which provided me the opportunity in 2017 to participate for two weeks in the Ionian Dolphin Project (IDP), run by Tethys Research Institute in Western Greece. The IDP opened its doors to me, resulting in the development of my MSc thesis studying the effect of fish farming on the behavioral ecology of the bottlenose dolphins in the Gulf of Ambracia. By the end of 2017, I was deeply in love with Greece and the work Tethys was doing to study and preserve the species of marine mammals in the area; so, when they asked me to join them as a research assistant in 2018, I could not be more thrilled.

From all the memories I have from summer 2018 there will always be a special spot for the week that Randy and Martha Wells, Remi Gonzalez, and Ramsey Frangie came to visit the IDP. There I was a 24-year-old Carmen, who had just started in the field of marine mammalogy, passionately

Carmen Andres Hervias (maroon hat) helping during an ultrasound exam.

Joan Gonzalvo and Carmen Andres Hervias looking on during Sarasota health assessments in May 2022.

and nervously teaching them some of the different tools we use to study bottlenose and common dolphins, as well as Mediterranean monk seals, in coastal waters of the Ionian Sea. I found myself in the surreal situation of trying to explain to Dr. Wells how we do photo-identification and collect behavioral data on bottlenose dolphins. Despite his extensive knowledge and experience in dolphin research, Dr. Wells was extremely humble and always ready to listen to all the things I wanted to share with him. That certainly was the beginning of a beautiful friendship, which eventually led me to join the SDRP as an intern four years later.

When thinking about my three-month internship with the SDRP in spring 2022, I have the feeling I am still recovering from the countless incredible moments I had there. Different country and language, different people, different research protocols and yet, they managed to make me feel at home every step of the way. My experience with the SDRP really gave a good perspective of its metabolism. I was able to explore all research aspects by being involved in monthly dolphin monitoring and fishing surveys, data handling, and helping prepare and participate in my first health assessment. Jason Allen trained me on the basics of FinBase, the dolphin fin database that the SDRP uses, in order to facilitate the implementation of the same methodology in the IDP. Additionally, I also participated in a couple of biopsy-sampling surveys. This allowed me to get key experience for the project planned by the IDP, on the Critically Endangered bottlenose dolphin subpopulation of the Gulf of Ambracia (Greece) in summer 2023, in collaboration with SDRP.

Without any doubt, I can say that my time working at SDRP has been a game changer in the way I perceived myself as a scientist and a human being. It has filled me up with numerous useful professional skills and tools that will continue to sprout along my career, and by having the opportunity to work with such an incredibly diverse group of people, I became more aware of the extraordinary power of cooperation and recognition among us. I will be forever grateful for being a small part of this historic program and of the great family they have created.

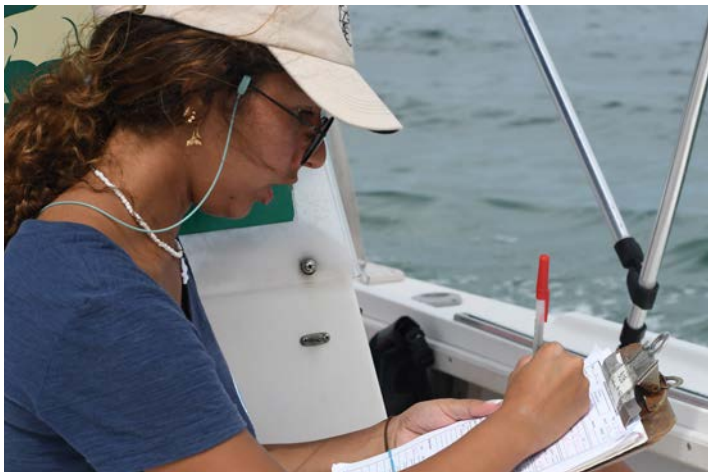
International trainee perspective

Raphaela Mota, Projeto Toninhas do Brasil

Surely August of 2022 was one of the best months of my entire life. Since the beginning of my academic journey, the SDRP has been one of my greatest references and knowledge sources about bottlenose dolphins, as well as it is for people all over the world. I am from Brazil, where I studied bottlenose dolphins at 'Prof. Eliezer de C. Rios' Oceanographic Museum and the Megafauna Ecology and Conservation Lab during all my undergraduate years at Federal University of Rio Grande (FURG). I have always had the dream of experiencing cetacean research abroad, while living a cultural exchange beyond geographic barriers. However, as an undergraduate student from a developing country, thinking about having a trainee opportunity at the - so famous! - SDRP was a daring goal. Even so, as soon as I got my Bachelor's degree in Oceanography in Brazil, I tried a chance in SDRP and I was surprised by Randy Wells, who kindly opened the doors for me to do an internship with them. For that purpose, Yaqu Pacha sponsored me with a grant that covered my travel costs and made this big dream possible to come true. I cannot find enough words to thank them for that!

My time at SDRP was unbelievably better than everything I had imagined—and I had huge expectations!

Raphaela Mota participating in photo-ID research in Sarasota Bay.



Raphaela Mota recording data during photo-ID research.

In three weeks, I participated and collaborated in many intensive field research activities: dolphin, fishing, and even shark surveys, as well as in laboratory activities. I had the pleasure of seeing how dolphin research is done there, which gave me new perspectives, tools, and insights. Every day, I learned new knowledge, acquired new skills, improved my photo identification abilities and met wonderful people, who encouraged me so much. Having the opportunity to get closer to such big references to me, see their routine, know their histories, share my experiences and—the most exciting part—meet so many amazing women researchers, definitely were an enormous inspiration. In addition, I could also daily challenge myself to work in a non-mother language, and how I grew up with that! I came back to Brazil full of motivation, enthusiasm, energy, and ideas to put in the new beginning of my professional career, in which I am starting to work as researcher at Projeto Toninhas do Brasil for the franciscana dolphin conservation. My time at the SDRP was a remarkable chapter in my life, which will certainly reflect in all my following professional steps. I am eternally grateful for everyone who made this happen!

Each time we put the fishing net in the water, anything could happen. Scallops, red fish, and bonnethead sharks were just some of the exciting species found and quickly returned to their home. Back in the lab, I learned the importance of data management, teamwork, and photo identification. The many hours spent hunting for a fin match in the SDRP catalog with the staff and other Summer 2022 interns provided as much learning as our time in the field. I will cherish the experiences and skills gained from my SDRP internship for the rest of my life. After I graduate in May 2023, I intend to enroll in graduate school to continue learning more about the world's ecosystems and how I can make an impact. From the day I found out about my acceptance to the program to now, my excitement about the research performed by the SDRP has only grown. I am so grateful for my time spent in Sarasota and the connections I have made with the SDRP staff and fellow interns, and I hope that our paths cross again!

Citizen Science

Listening station opportunities

As our passive acoustic listening station (PALS) network grows around Sarasota Bay (see pages 29 and 36), we encourage local coastal residents, educational, and public institutions to become involved! You can contribute by providing waterfront locations for deployment of listening systems and/or support opportunities to use data and sounds from these systems in educational and outreach programming. We are particularly seeking educational and public outreach partners who will help us to grow our network and its impact together, while monitoring our shared coastal underwater environment.

Volunteer perspective

Cathy Marine

I loved my thirty-five years as a librarian because no two days were ever the same. New ideas, new activities, new people, new information – I was always learning. As I planned my retirement, I wanted to make sure I continued to learn. I had started scuba diving in college, and had had a brief introduction to marine biology through an organization called Earthwatch. My Earthwatch trips included coral reefs of Fiji, Thailand and Jamaica, and giant clams of Tonga. What a surprise, when I started doing dolphin surveys with Jason Allen, to find that some of the initial volunteers had been part of Earthwatch groups doing dolphin studies with SDRP! These were my kind of people!

Now I feel like the grandmother of the group. Yes, I'm even older than Randy. He lost that bet a decade ago when we were both much younger.

While I volunteer at Mote in education, at the sea turtle hospital, and as a docent, my favorite assignment is dolphin surveys with SDRP. Friends are always envious of my survey days – unless the days are 90 degrees, 40 degrees or 10 hours long. Me? I love them all!

I try to keep the first week of the month free of appointments so when the email from SDRP arrives—"what days are you available for dolphin surveys?"—I can hope for multiple days. It's hard to beat the excitement of seeing YOYs (young of year – the babies) in Palma Sola Bay in June, July and August, but whether the route is north, south, or mid-bay, just talking with staff and interns about their projects, their goals and their work at SDRP is always interesting. Not only do I learn about dolphins, but also about computer programs, geography, restaurants in Sarasota, and I hear the latest puns and riddles.

The ability of staff to identify individual dolphins by the nicks and notches on their dorsal fins continues to amaze me! Jason says, "it's just like you recognize your friends." But I don't have 170 friends! From the first shout of "dolphin" to the tracking, recording behaviors, weather and water quality, to photographing the dorsal fins for identification, it's always an adrenaline rush. A day of more than ten sightings means a feeling of accomplishment and a good night's sleep afterwards.

The staff continues to grow and change. Shortly after I started volunteering, the now "old timers" all celebrated their 30th birthdays. They have taught new staff and interns how to drive the boats, navigate while photographing dolphins, anticipate weather changes. Interns have gone on to join marine mammal research projects around the world.

I love telling friends, family, and basically anyone who will listen, everything I have learned about the world's longest study of a dolphin population. I truly feel that my work as a citizen scientist is important. Humans, birds, fish, and marine mammals—we all share this planet. We need to understand that "earth" is really a misnomer. This little BLUE ball is 70% water. SDRP's research provides the groundwork for studies around the world on cetaceans and the aquatic environment they call home. The importance of the oceans, fishes, sea grasses and marine mammals cannot be underestimated if we hope to see humans on this planet in the future.

So, I thank SDRP for giving me an opportunity to volunteer in their efforts to understand dolphins, their behaviors, and the marine environment in which they live. With the SDRP staff, I continue to learn and to share what I have learned. THANK YOU!

Long-time SDRP volunteer Cathy Marine recording data during a photo-ID survey.

Volunteer update – where are they now?

Susana Caballero, Universidad de los Andes, Colombia

A couple of months ago, I had the chance to meet Dr. Randy Wells at the 24th Biennial Conference on the Biology of Marine Mammals, that took place in West Palm Beach, Florida, from the 1st to the 5th of August. At the conference, Dr. Wells got an award for his life achievements and dedication with the Sarasota Dolphin Research Program (SDRP), that has been developing research on the bottlenose dolphins in the Sarasota area for more than 50 years. The prize and the talk by Dr. Wells brought to my mind memories of my time volunteering with the project for almost three weeks in 1996, when I was a Biologist student, fascinated with dolphins.

My SDRP experience, volunteering with Earthwatch, was my first time having a real "hands on" experience learning how research on aquatic mammals worked. At that time, I was a third-year biology and microbiology student at Universidad de los Andes in Bogota, Colombia. Having been born in a city in the mountains I had always been in love with the sea, and I clearly remember enjoying discovering the ocean by taking long walks on the beach with my grandmother in the Colombian coastal city of Cartagena. However, precisely because I had always lived in the mountains, visiting the sea for just a few weeks every year, I never considered it a real possibility to be able to study marine mammals.

Luckily, thanks to the support from my parents, I was able to participate as a volunteer in the SDRP in 1996. During those weeks, I had the chance to participate on boat surveys, record behavior, learn about habitat use, and familiarize myself with different techniques to study dolphins. I got used (and became more resistant!) to being under the sun for hours while looking patiently for dolphins. I also had the chance to help in taking care of two manatees at Mote Marine Laboratory. But perhaps the most amazing experience was to hear, for the first time in my life, the potential use of molecular and genetic techniques to understand various aspects of the secret life of dolphins; for example, how much it helped to determine the sex of individuals, their relatedness, and also in understanding their association patterns. I think at that time part of myself decided that that was exactly what I would like to do in the future!

I am now an Associate Professor at Universidad de los Andes in Colombia. I went back to my old University in my country after getting my Ph.D. at the University of Auckland in New Zealand, where I had the opportunity to learn cetacean genetics and molecular ecology with one of pioneers in the field of genetics applied to cetacean conservation, Dr. Scott Baker (who was also a volunteer with the SDRP many years ago). I arrived in his lab after working for my undergraduate honors thesis on the population structure of humpback whales from the Pacific coast of Colombia, the first research on this subject to ever be conducted in the country.

Susana Caballero near here home in Columbia.

Over the last 13 years, I have been able to start a research laboratory on conservation genetics of aquatic vertebrates of Colombia. I have been able to work with fantastic students in amazing project on genetics of a variety of aquatic species, from river dolphins to manatees and from freshwater turtles to sharks. For many species, our research is the first step to understand their genetic component and its relevance in conservation planning in the country.

I had the great honor to be one of the Plenary Speakers at the 24th Biennial Conference on the Biology of Marine Mammals. It was a great opportunity to present some of our work of many years and show how to work in places that may be logistically challenging and with small budgets, but still get very interesting results. Being the plenary speaker, at the same conference in which the SDRP and Dr. Wells got the award was a beautiful life coincidence… and a reminder of how, with hard work and lots of effort, dreams can come true. It reminded me that while working in the field and in the lab may be fun and incredibly interesting, our work as biologist and conservationists must be accompanied by working and exchanging information with the local communities, the direct sentinels of the species we care for and want to continue studying for many more years.

Products

Professional Activities Summary: November 2021 through October 2022

One accepted measure of the productivity of a research and conservation 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 annual report, including the relevant work of our collaborators from partner institutions. Copies of specific papers are available through our website (sarasotadolphin.org) or they can be obtained upon request, as electronic pdf files.

Published Peer-Reviewed Journal Articles and Book Chapters

Boggio-Pasqua, A., K. Bassos-Hull, W. H. Aeberhard, L. A. Hoopes, D. A. Swider, K. A. Wilkinson and M. Dureuil. 2022. Whitespotted eagle ray (*Aetobatus narinari*) age and growth in wild (*in situ*) versus aquarium-housed (*ex situ*) individuals: Implications for conservation and management. Frontiers in Marine Science, Marine Megafauna, Special topic: Contributions of Zoos and Aquariums to the Advancement of Marine Science 9:960822. https://doi.org/10.3389/fmars.2022.960822

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Allen, J. B., A. Barleycorn, K. Bassos Hull, S. Brenneman, J. Crossman, A. Honaker, S. McBride-Kebert, K. McHugh, R. Perrtree, C. Toms, R. Tyson Moore, K. Urian, K. Wilkinson and R. Wells. 2022. Ch-ch-changes: Dorsal fin mark acquisition rates in a community of bottlenose dolphins, *Tursiops truncatus*, in Sarasota Bay, Florida, USA. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (oral)

Products

Bassos-Hull, K., G. N. Lovewell, J. L. Blackburn, A. L. D. Kincaid, K. A. Wilkinson and R. S. Wells. 2022. Barbed! Stingray spine injuries to common bottlenose dolphins (*Tursiops truncatus*) in central west Florida, USA. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

Bassos-Hull, K. 2022. Tagged animal detections at clam restoration sites in Sarasota Bay, Florida. Sarasota Bay Watch Scallopalooza. 12 February 2022. (poster)

Beal, A. P., C. N. Toms, J. Kiszka, R. S. Wells and J. M.Eirin-Lopez. We got the BEAT! Epigenetic aging tools for dolphins and beyond. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (oral)

Cush, C. C., R. S. Wells, J. Adams, E. Fujioka and K. Urian. 2022. Gulf of Mexico Dolphin Identification System (GoMDIS) – A collaborative effort to better define bottlenose dolphin movements. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

Dziobak, M. K., Wells, R. S., Balmer, B., Pisarski, E. C., Wirth, E and L. B. Hart. Who? What? Where? A demographic and spatiotemporal characterization of phthalate exposure in free-ranging common bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida, USA. 24th Biennial Conference on the Biology of Marine Mammals. Palm Beach, FL. 1-5 August 2022. (oral)

Griffin, M. L., C. Bryan, B. C. Balmer, R. D. Day, A. M. Gorgone, J. Litz, T. K. Rowles, L. H. Schwacke, R. S. Wells, E. S. Zolman and T. M. Cox. 2022. Quantifying mercury in the common bottlenose dolphin (*Tursiops truncatus*) in the Southeast, USA. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

Hart, L. B. Sentinels of synthetics: bottlenose dolphins as gauges of marine plastic pollution. Keynote Address, College of Charleston Research Expo. 7 April 2022

Hart, L. B., Dziobak, M. K., Wells, R. S., Pisarski, E. C. and Wirth, E. Sentinels of synthetics – a comparison of phthalate exposure between common bottlenose dolphins (*Tursiops truncatus*) and human reference populations. 24th Biennial Conference on the Biology of Marine Mammals. Palm Beach, FL, 1-5 August 2022. (poster)

Hyer, M. D., L. S. Sayigh, P. L. Tyack, V. M. Janik, K. A. McHugh, R. S. Wells and F. H. Jensen. 2022. Stereotyped non-signature whistles are shared and exchanged between allied common bottlenose dolphin males (*Tursiops truncatus*) in Sarasota Bay, FL. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (oral)

Kincaid, A. L. D., G. N. Lovewell, J. B. Allen, K. Bassos-Hull, J. L. Blackburn, R. A. Hazelkorn and R. S. Wells. Davian behavior in common bottlenose dolphins (*Tursiops truncatus*) in the Sarasota, FL area: It's just wrong. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

Lovewell, G. N., J. L. Blackburn, A. L. D. Kincaid and R. S. Wells. 2022. Covid-19 collateral damage: The pandemic's effect on common bottlenose dolphins in and around Sarasota, Florida. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

McHugh, K. A., R. Byrskov, S. Brown, G. Hernandez Ramirez, V. Diaz, D. Mann, O. J. Isaac-Lowry, S. C. Alessi and R. S. Wells. Enhanced monitoring of adverse human-dolphin interaction hotspots via continuous multi-view video and passive acoustic technology. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

Moors, A., J. Ness, D. Ellisor, J. Trevillian, R. Pugh, J. Kucklick, R. Wells and T. Rowles. 2022. Gaining access to high-quality, archived marine mammal samples; is it impossible? 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (oral)

Mota, R., R. Genoves, P. Fruett and S. Botta. Beyond the basics: Using photo-identification as tool to assess social behavior and determine the sex of Lahille's bottlenose dolphins (*Tursiops gephyreus*). 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster).

Parsons, M. J., T. H. Lin, T. A. Mooney, C. Erbe, F. Juanes, M. Lammers, S. Li, S. Linke, A. Looby, S. L. Nedelec, I. Van Opzeeland, C. Radford, A. Rice, L. Sayigh, J. Stanley, E. Urban and L. Di Iorio. 2022. A global library of underwater biological sound: An online platform with multiple passive acoustic monitoring applications. Effects of Noise on Aquatic Life conference, Berlin, Germany, July 2022. (poster)

Pirotta, E., A. Barleycorn, M. Casoli, J. Crossman, C. Harris, K. McHugh, M. Moore, T. Photopoulou, B. Quigley, L. Schwacke, L. Thomas, C. Toms, P. Tyack and R. Wells. 2022. Vessel approaches in Barataria Bay: Ways forward. Towards an understanding of the cumulative effects of multiple stressors on marine mammals - an interdisciplinary working group with case studies. SERDP Working Group Meeting. 23 February 2022. (oral)

Sayigh, L., V. Janik, F. Jensen, M. Scott, P. Tyack and R. Wells. 2022. The Sarasota Dolphin Whistle Database: A unique long-term resource for understanding dolphin communication. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, 1-5 August 2022. (oral)

Sayigh, L., P. Wolters, L. van Zeeland, E. Morrison, G. Ermi, S. Smith, P. Tyack, R. Wells, S. McKennoch, V. Janik and F. Jensen. 2022. Using a long-term database of bottlenose dolphin signature whistles to develop deep-learning based classification models. Effects of Noise on Aquatic Life conference, Berlin, Germany, July 2022. (poster)

Spiessl, M. P., R. M. Perrtree, R. F. Young, A. Fox, J. Conway, A. A. Hohn, A. M. Gorgone, J. H. Schacke, E. W. Montie, A. Marian, K. Urian, R. B. Tyson Moore and T. M. Cox. 2022. Assessing management boundaries of the common bottlenose dolphin *Tursiops truncatus* by comparing multiple photo-identification catalogs. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

Tatom-Naecker, T.-A., R. S. Wells, D. P. Costa, S. Trumble and S. Budge. 2022. A fatty acid signature library of prey fish for common bottlenose dolphins (*Tursiops truncatus*) for use in quantitative fatty acid signature analysis (QFASA). 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

Thompson, C. R., S. Gowans, D. A. Mann and P. Simard. Synoptic assessment of common bottlenose dolphin (*Tursiops truncatus*) distribution in Tampa Bay and coastal Gulf of Mexico, Florida, using autonomous acoustic recorders. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

Toms, C. N., K. McHugh, R. Tyson Moore, J. Slaathaug and R. S. Wells. 2022. What is 'residency'? A systematic mapping approach to a review of the residency construct with focus on odontocetes. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (poster)

Van Horn, C., F. Jensen, V. Janik, E. Morrison, R. Wells and L. Sayigh. 2022. Sex difference in non-signature whistle production in bottlenose dolphins. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida, 1-5 August 2022. (poster)

Vivier, F., A. L. Bradford, M. C. Hill, E. M. Oleson, K. M. Yano, R. Wells, A. Pacini, E. Leunissen, C. G. Booth, J.Rocho-Levine and L. Bejder. Sensitivity and precision of Unoccupied Aerial System-photogrammetry to assess the age structure of delphinid populations. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (oral)

Wells, R. S. 2022. Dolphin community life. Sea Island Creativity Conference. Sea Island, GA. 15 January 2022. (oral)

Wells, R. S. 2022. Health and movements of Florida's Gulf Dolphins. Florida Centers of Excellence Research Program All Hands Meeting. 20 January 2022. (oral)

Wells, R. S. 2022. Sarasota Dolphin Research Program Update. Chicago Zoological Society All-Staff Meeting. 16 February 2022. (oral)

Wells, R. S. 2022. Lessons from Sarasota's dolphins. Invited keynote presentation. European Association for Aquatic Mammals. 31 March 2022. (oral)

Wells, R. S. 2022. Lessons from Sarasota's dolphins. Alliance of Marine Mammal Parks and Aquariums Annual Meeting, Orlando, FL. 4 May 2022.

Wells, R. S. 2022. CZS Sarasota Dolphin Research Program. Chicago Zoological Society Master Planning Symposium No. 5, Brookfield, IL. 21 June 2022. (oral)

Wells, R. S. Individuals make a difference: 50+ years of lessons from Sarasota's dolphins. Kenneth S. Norris Lifetime Achievement Award plenary presentation. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (oral)

Wells, R. S. Tagging Franciscana dolphins off Argentina and Brazil: Considerations for integrated conservation planning. Integrated Conservation Planning for Cetaceans Workshop. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (oral)

Wilkinson, K. A., R. S. Wells, R. E. Hueter, J. Morris, L. A. Hoopes, J. Bakker, M. P. M. van Zinnicq Bergmann, S. Rossman, T.-A. Tatom-Naecker and V. Hagan. 2022. Food fight? Assessing the trophic overlap of resident common bottlenose dolphins (*Tursiops truncatus*) and coastal shark species off Sarasota, Florida. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida. 1-5 August 2022. (oral)

Wolters, P., L. van Zeeland, F. Jensen, L. Sayigh, E. Morrison, G. Ermi, R. Wells, S. McKennoch and S. Smith. 2022. Deep learning-based recognition of bottlenose dolphin signature whistles. 24th Biennial Conference on the Biology of Marine Mammals, Palm Beach, Florida, 1-5 August 2022. (poster)

Public, University, School Lectures

Bassos-Hull, K., K. McHugh and D. Henderson. 2021. Knock Knock...Who's there? Audio and video research technologies to better understand marine animal presence in our oceans. Youth Ocean Conservation Summit. Host: Mote Marine Laboratory, Sarasota, FL. 4 December 2021.

Products

Bassos-Hull, K and Mote High School Research Experience Interns. 2022. BRUVS Posters (3) - “Build-A-BRUVS! Methodologies of baited video surveys in Sarasota, FL.”, “Sounds in Sarasota Bay collected with GoPros on Baited Remote Underwater Video Systems (BRUVS)”, and “Fish and Invertebrate Species Identified at Baited Remote Underwater Video Systems (BRUVS) in Sarasota Bay”. Mote Marine Lab. 9 February 2022.

Bassos-Hull, K. 2022. Connecting For Conservation: Research on Dolphins and Marine Rays in the Gulf of Mexico, Western Atlantic and Caribbean Sea. Universidad San Francisco de Quito, Galapagos Science Center, San Cristobal, Galapagos. 24 February 2022.

Bassos-Hull, K. 2022. Ray research and conservation in the Gulf of Mexico, Caribbean and Western Atlantic. Discovery Cove staff presentation, Orlando, FL. 18 April 2022.

Cush, C. 2021. Gulf of Mexico Dolphin Identification System. Gulf Coast of Florida Stranding Meeting. 10 November 2021.

McHugh, K., A. Barleycorn, M. Casoli, J. Crossman, C. Harris, M. Moore, T. Photopoulou, E. Pirotta, B. Quigley, L. Schwacke, L. Thomas, C. Toms, P. Tyack and R. Wells. 2022. Pilot study summary and protocol trials. Towards an Understanding of the Cumulative Effects of Multiple Stressors on Marine Mammals - an Interdisciplinary Working Group with Case Studies. SERDP Working Group Meeting. 23 February 2022.

McHugh, K. 2022. The dolphins of Sarasota Bay: Lessons from more than 50 years of research and conservation. Florida Master Naturalist Program Coastal Systems Class, Mote Marine Laboratory. 12 students. 14 February 2022.

McHugh, K. 2022. The dolphins of Sarasota Bay: Lessons from more than 50 years of research and conservation. Sarasota Wellesley Club joint luncheon with Mt. Holyoke and Smith Alumnae. Sarasota Yacht Club. 08 April 2022.

McHugh, K. 2022. Sounds in the sea: Listening to learn. Dolphin Communication Project dolphin lesson webinar. 11 May 2022. https://youtube.com/watch?v=p_PvGhKctsU

McHugh, K. and Bassos-Hull, K. 2022. Bite sized science: Reporting dolphin-fishing interactions. Florida Sea Grant Webinar. 4 August 2022. https://www.youtube.com/watch?v=NRmOePdC8yQ

Pittman, C. and R.S. Wells. 2021. Welcome to Florida, Podcast Episode 79: Dolphins. 28 December 2021. https://www.buzzsprout.com/1169570/9784745-episode-79-dolphins28

Robertshaw, J. and R. S. Wells. 2021. Community of learning/Thanksgiving in the ocean. Center for Interactive Learning and Collaboration (with Mote Marine Laboratory and Aquarium). 19 November 2021.

Sayigh, L. 2022. Dolphin communication. Osher Lifelong Learning Institute, University of North Carolina, Wilmington. January 2022.

Sayigh, L. 2022. Dolphin communication. Perkins School for the Blind, Watertown, Massachusetts. February 2022.

Sayigh, L. 2022. Dolphin communication. KapKa Cooperative School, Seattle, Washington. February 2022.

Sayigh, L. 2022. Dolphin communication. Norfolk Agricultural School, Walpole, Massachusetts. March 2022.

Sayigh, L. 2022. Dolphin communication. Acton-Boxborough Public Schools, Acton, Massachusetts. May 2022.

Sayigh, L. 2022. Dolphin communication. Duke University, Durham, North Carolina. July 2022.

Tatom-Naecker, T. 2022. You are what you eat: Investigating diet and vulnerability to disturbance in common bottlenose dolphins. Scotts Valley High School, presentation for 40 marine biology high school students. 2 May 2022.

Wells, R. S. 2021. Dolphins. Hibernation Radio Station Podcast, SciencesPo School of Journalism, Paris, France. 12 December 2021.

Wells, R. S. 2022. Factors influencing wild bottlenose dolphin health and survival. SEAVET, U. of Florida, College of Veterinary Medicine, Gainesville, FL. 28 June 2022.

Wells, R. S. 2022. Tagging, ranging patterns, and behavior of franciscana dolphins off Argentina and Brazil. SMM Seminar Editor’s Select Series. 21 April 2022.

Wells, R. S. 2021. The dolphins of Sarasota Bay - Lessons from 50 years of study. Beneath the Surface – Marine Mammal Care Center, San Pedro, CA. 15 November 2021.

Randy Puckett sculptures available

The Sarasota Dolphin Research Program has received donations of several bronze whale and dolphin sculptures produced by renowned artist Randy Puckett: 1) **Encounter**, and 2) **Humpback and Dolphins**. These life-like sculptures are very accurate representations of these animals engaged in typical activities. As much as we appreciate their beauty, we lack space and opportunity to appropriately display these sculptures. We are considering offers from interested parties who could provide them with a good home. If you are interested, please contact Randy Wells at (941) 374-0449. Please see the following descriptions of the artwork from the Whales of Randy Puckett website: (https://www.randypuckett.com/gallery/?Category=Larger%20Groupings)

Title: Encounter
Year Released: 1997 **Edition:** 20 **Price:** $42,000.00
Dimensions: 32"H 60"W 24"D

ENCOUNTER shows a meeting between Bottlenose Dolphins and a Blue Whale mother and calf. It happens in Monterey Bay, and in a few other places on earth where deep waters close to shore create nutrient rich upwelling which cause the tremendous blooms of krill upon which the Blue Whales feed, and the near shore water is warm enough for the bottlenose. Juxtaposing the Bottlenose Dolphins, which are fairly large as dolphins go at 8-12 feet, gives some human perspective to the sheer size of the Blues.

Title: Humpback & Dolphins
Year Released: 1987 **Edition:** 95 **Closing Price:** $8,500.00
Dimensions: 23"H 20"W 18"D

Program Operations

As the lab turns...

Krystan Wilkinson, Chicago Zoological Society's Sarasota Dolphin Research Program

We have had quite a few additions to the SDRP family this past year! In December, Reny Tyson Moore and Jason Moore kicked off the 2021 holiday season by welcoming their second child, Brooks Roy Moore. Katie McHugh and Aaron Barleycorn celebrated the birth of their second child, Carina Ryan McHugh Barleycorn in August. Summer of 2022 was also busy welcoming two new staff members to our team. Former CZS-SDRP intern and graduate student, Kylee DiMaggio started in June – after defending her Masters thesis and graduating from the University of Florida this spring – as our newest research assistant. In August, we welcomed former CZS-SDRP intern, Cecilia Thompson, into a contract position assisting Katie McHugh with the Sarasota Bay Listening Network.

Sadly, Reny Tyson Moore resigned in May to focus more time on her growing family and her job with NOAA. While we certainly miss Reny, she will always be part of the SDRP family and we hope to work with her again in the future.

Cecilia Thompson showing off the inside of the Historic Spanish Point listening station.

Big sister, Harper, holding Carina Ryan McHugh Barleycorn.

Kylee DiMaggio joined as a research assistant in June 2022.

Many congratulations go to CZS-SDRP lab manager, Jason Allen, and long-time SDRP friend and collaborator Robyn Faulkner Trainor. The couple said "I Do" surrounded by friends and family in early October on Anna Maria Island, with Randy Wells presiding.

Congratulations also go to Kim and Pete Hull who celebrated their 30th wedding anniversary in 2022. In case you didn't know, Randy also married these two love birds! And Randy and Martha Wells celebrated their 20th anniversary in 2022.

Jason Allen and Robyn Faulkner Trainor on Anna Maria Island.

Kim and Pete Hull celebrating their 30th anniversary at the beach.

Program Operations

Chicago Zoological Society Staff

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Aaron Barleycorn, BS, Field Manager, Senior Researcher
Elizabeth Berens McCabe, MSc, Senior Researcher
Jonathan Crossman, BA, Staff Researcher
Carolyn Cush, BS, Research Assistant
Kylee DiMaggio, MSc, Research Assistant
Allison Honaker, MPS, Research Assistant
Katie McHugh, PhD, Senior Scientist, Deputy Program Director
Cecilia Thompson, BS, Contractor
Christina Toms, PhD, Staff Scientist
Reny Tyson Moore, PhD, Staff Scientist
Randall Wells, PhD, Program Director
Krystan Wilkinson, PhD, Staff Scientist

Affiliated Mote Marine Laboratory Staff

Kim Bassos-Hull, MS, Research Associate

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Bill Tiffan
Robyn Faulkner Trainor
Martha Wells

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Wellesley Club of Sarasota
Randall and Martha Wells
Cathy Williama
Laura Yachimski

Opportunities for You to Help Dolphin Research and Conservation

Show Your Support for the Chicago Zoological Society's Sarasota Dolphin Research Program

Each year, it costs approximately $1 million to fund the Sarasota Dolphin Research Program's important work. The generous support from our partners ensures the continuation of the world's longest-running study of a wild dolphin population and provides our scientists the necessary resources 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.

Your support makes a critical difference for dolphins and their ecosystems. With your help, our team can continue the development of an unparalleled base of knowledge about wild dolphin populations and maintain the SDRP's position as a unique dolphin conservation resource worldwide. For more information on how you can help, or to make a contribution, contact Melissa Obrock, Director of Philanthropic Partnerships, at 708.688.8394 or Melissa.Obrock@CZS.org.

Special Thanks

The Chicago Zoological Society is honored to recognize the following donors and funding organizations for their generous contributions from October 1, 2021 – September 30, 2022 to its Sarasota Dolphin Research Program through donations, research grants, and/or contracts.

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Dr. Randy and Martha Wells
Cindy and Bill Zeigler

SDRP welcomes equipment donations in addition to funds

Donations, including boats, computers, cameras, and vehicles, greatly help with our efforts, and can be made to Dolphin Biology Research Institute (dba Sarasota Dolphin Research Program). DBRI is a Sarasota-based 501{c}3 not-for-profit organization, incorporated in 1982, and dedicated to continuing our research and conservation of dolphins and their habitat. For more information on how you can help, please contact Randall Wells at (941) 374-0449.

Aaron Barleycorn out on a birthday photo-ID survey.

Team picture for offshore health assessment project in September 2022.

Jason Allen recovering the DTAG while offshore in the Gulf of Mexico.

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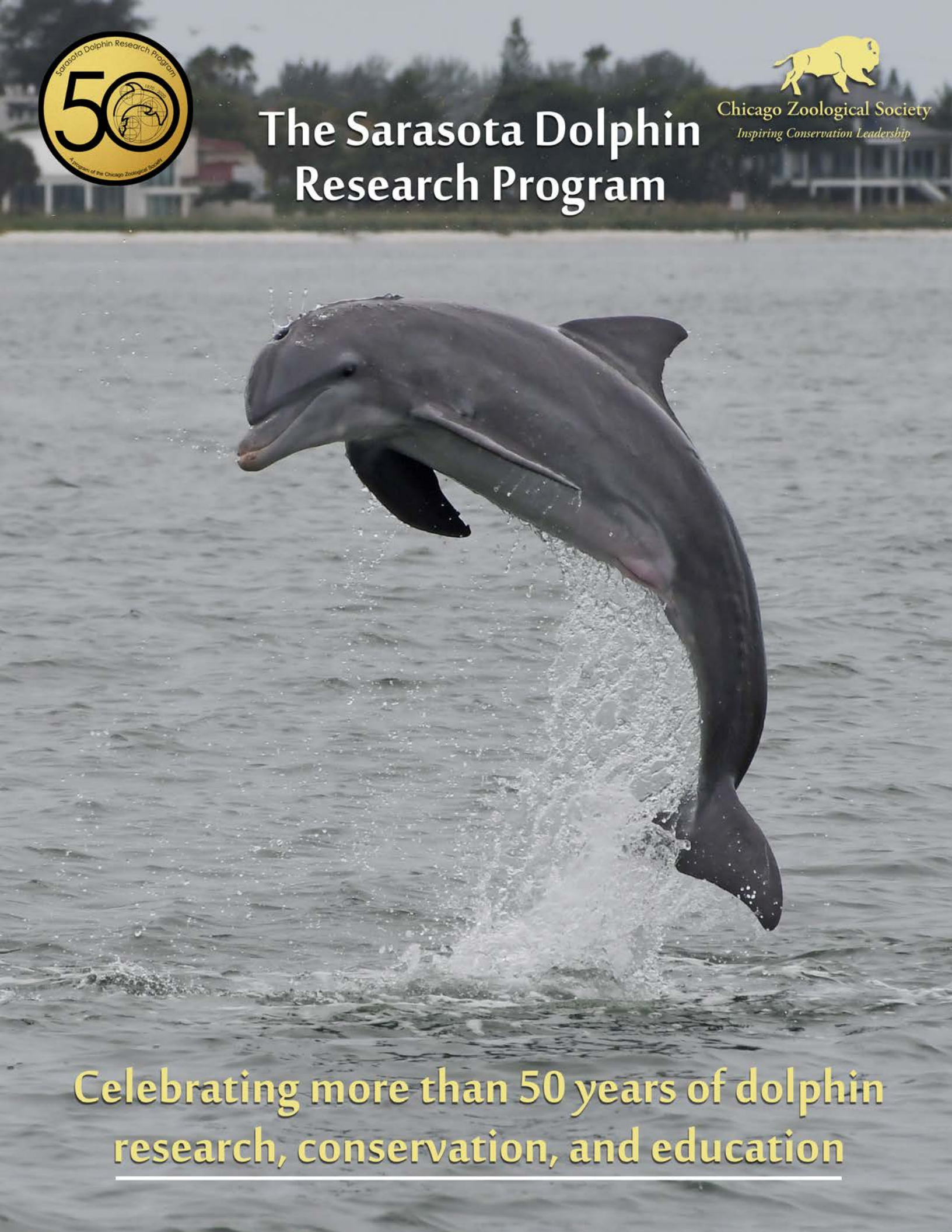

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