STRANDINGS

NEWSLETTER OF THE SOUTHEAST U.S. MARINE MAMMAL STRANDING NETWORK - DECEMBER 2003

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UNRAVELING THE MYSTERIES OF PYGMY AND DWARF SPERM WHALES

by Nélio Barros & Debbie Duffield

Little known and rare in most parts of the world, pygmy and dwarf sperm whales (*Kogia breviceps and K. sima*) are common in the southeastern United States. Along the Atlantic coast of the United States, they are second only to bottlenose dolphins in numbers of stranded animals. These species remain a mystery to scientists in the most basic aspects of their biology, ecology and distribution. There are many reasons why we know so little about *Kogia* whales. These whales are so similar morphologically that, prior to 1966, only one species was recognized (*K. breviceps*). Thus, the body of information gathered until then was of limited use, as it was often unclear which species the investigator was referring to. Unlike their larger relatives the sperm whales, *Kogia* were never commercially exploited, which in turn meant that fewer specimens were available for scientific study, except for a few strandings scattered throughout the world. Observations at sea were also rare, as these animals do not approach vessels and are difficult to observe at the surface. These problems continue, as often air- and boat-based surveys will group sightings of both species into a single category, due to the difficulty in assigning the observations to the level of species. In addition, identifying *Kogia* in the field (both live and dead strandings) has often posed a daunting task, due to the overlapping ranges of morphometric characters used to separate the two species. This is particularly a problem in young and juvenile animals.

A breakthrough happened a few years ago when, in the course of long-term studies on the biochemistry and genetics of various marine mammal species, we stumbled upon another level of differentiation between the two *Kogia* species. We analyzed the hemoglobin patterns of *K. breviceps* and *K. sima* and found

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Message from the Stranding Coordinator

Dear Readers,

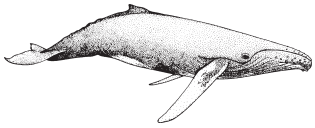
First and foremost I would like to thank everyone who contributed to this "come back" issue of *Strandings* newsletter. My hope is that this newsletter will not only be a source on information within the network but that it will foster communication between the network, NOAA Fisheries, the scientific community and the general public.

This year will be a busy one with the Biennial Southeast region stranding workshop which will be held in Wilmington, NC August 6-8. Please look for your invitation and registration form in the mail. Along with the basics, this year we will be offering both media and incident command training. Also, the Marine Mammal Health and Stranding Response Program will be hosting a national stranding meeting in October 2004. The meeting will be held at the National Conservation Training Center in Shepardstown, West Virginia. The goal of the meeting is to maximize stranded marine mammals as sources of data to answer health questions, address management & scientific welfare and to improve treatment of live animals. Space will be very limited but the hope is that each organization will be able to send one representative to this advanced workshop. Finally, we are in the process of planning a program review for the Southeast Regional Stranding program, which will cover all aspects of the SEUS Stranding Program.

As you read over the Prescott Grant section you will see that it has proved to be a valuable resource not only to the scientific community but also to the stranding response organizations. New pools, improved facilities, new equipment has and will greatly improve the efficiency of the network for years to come. Please be advised that the grants office is planning on posting the 'RFP' notice this June for 2005 awards. I encourage all LOA and Designee organizations to apply, as we do not know the future status of this grant program. Application guidelines are strict so please read the application instructions very carefully and if you have any questions please contact Michelle Ordono at the grants office in Silver Spring prior to submitting your proposal.

Finally, I would like to thank the entire SEUS stranding network for your continued efforts and dedication. They do not go unnoticed!

Sincerely, Blair Guthrie



Southeast Region Stranding Summary
July-September, 2003

Species	NC	SC	GA	FL	AL	MS	LA	TX	PR	VI	ALL
Delphinus delphis	1	0	0	0	0	0	0	0	0	0	1
Feresa attenuata	0	1	0	0	0	0	0	0	0	0	1
Kogia breviceps	2	0	0	7	0	0	0	0	0	0	9
Kogia sima	1	0	2	1	0	0	0	0	0	0	4
Mesoplodon europaeus	1	0	0	0	0	0	0	0	0	0	1
Peponocephala electra	0	0	0	2	0	0	0	0	0	0	2
Physeter macrocephalus	0	0	0	1	0	0	0	0	0	0	1
Stenella clymene	0	0	0	0	0	0	2	0	0	0	2
Stenella longirostris	0	0	0	1	1	0	0	0	0	0	2
Steno bredanensis	0	0	17	1	0	0	0	0	0	0	18
Tursiops truncatus	15	4	3	21	1	1	2	6	0	0	49
Could not be determined	3	0	0	1	0	0	0	0	0	0	4
TOTALS	**23**	**5**	**22**	**36**	**2**	**1**	**4**	**6**	**0**	**0**	**94**

that the two species showed a clear distinction in their electrophoretic profiles, as had been previously discovered for inshore and offshore bottlenose dolphins from the same area. The ability to differentiate the two *Kogia* by analyzing their hemoglobins was extremely useful, and led us to examine the morphometrics of individual animals that had been confirmed to belong to each species by their hemoglobin profile. For all the animals with available blood data (54 *K. breviceps* and 14 *K. sima*), two morphometrics stood out; the distance from the snout to the center of the blowhole (snout-blowhole) in proportion to the animal's total length, and the height of the dorsal fin in proportion to the animal's total length. When used in conjunction, these two measurements diagnosed animals of both sexes *and* all size classes, as can be seen in the key provided in Fig. 1. These measurements are particularly useful in the case of living animals being transported to rehabilitation facilities, for they are dorsal in nature and can be taken with no additional stress to an animal laying on its ventral surface.

Since our initial finding of the differences in hemoglobin between the two *Kogia* species, we have developed an additional way to distinguish these whales. Mass spectrometry, an analytical technique which can be used to determine molecular weights, unambiguously distinguishes between *K. breviceps* and *K. sima*. Both hemoglobin (alpha-chain) and myoglobin yield diagnostic results (Table 1). Consequently, either blood or muscle can be used to confirm species identification among *Kogia*. The advantages of this technique are many. Very small samples are needed and these can be frozen or dried. In addition, samples can be collected from extremely decomposed animals (carcass codes 3-4). Given the difficulties with field identification of these whales, we strongly recommend that the collection of at least one of these tissues be a part of the information gathered during routine stranding events (even for Level A data). In cases where full necropsies are not feasible, blood can be easily collected from wounds or skin abrasions.

For the moment, analyses can be done at no cost. To have samples analyzed, please contact:

Dr. Debbie Duffield
Department of Biology
Portland State University
630 SW Mill
Portland, OR 97201
Phone: (503) 725-4078
Fax: (503) 725-4751
Email: duffieldd@pdx.edu

The definitive species identification of *Kogia* allows for the use of stranding data for ecological and distributional studies. To gain insight into the feeding ecology and habitat utilization of *Kogia* whales, we have analyzed stable isotopic ratios of carbon and

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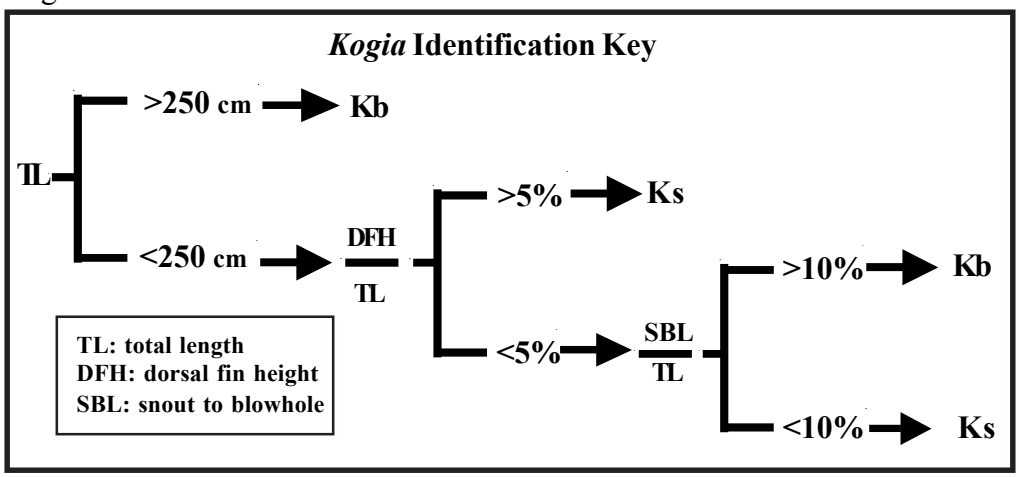
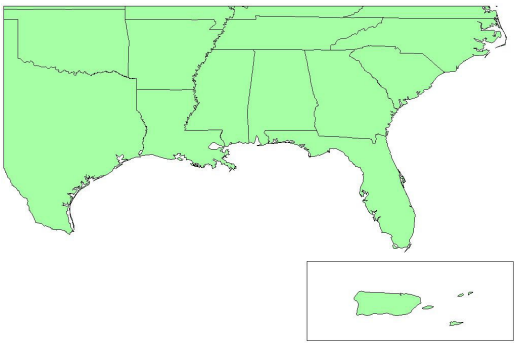
Figure 1.



Southeast Regional News

Compiled from reports provided by the SEUS State Coordinators and the NOAA Fisheries Area representatives.

Southeast Region Including Puerto Rico & U.S. Virgin Islands



Alabama

There was one bottlenose dolphin *Tursiops truncatus* and one *Stenella longirostris* stranding during the third quarter (July-Sep). Both animals stranded on the same day, very soon after Tropical Storm Bill passed.

Florida

A total of thirty-one cetaceans stranded in Florida from July through September. These included 17 *Tursiops truncatus*; seven *Kogia breviceps*; two *Pepenocephala electra*; one *Kogia sima*; one *Physeter macrocephalus*; one *Stenella longirostris*; one *Steno bredanensis* and one unknown.

Five pilot whales, which stranded as part of a mass stranding in April, were rehabilitated and released on August10th, approximately fifteen miles off of Big Pine Key, Florida. All whales were freeze-branded and four of the whales were tagged with sattelite/VHF tags. Initial movements showed four whales traveling north along the eastern seaboard and one whale traveling in the opposite direction towards the Gulf of Mexico. Unfortunately, the youngest whale (a calf estimated to be less than one -year old) was attacked by sharks nine days after the release.

A *Kogia* workshop was hosted by Drs. Nelio Barros and Dan Odell on 13 December 2003 in Greensboro, NC, prior to the 15th Biennial Conference on the Biology of Marine Mammals.

A *Kogia* web site was developed as a part of a John H. Prescott grant: "Life History and Stranding Patterns of Pygmy and Dwarf Sperm Whales (genus *Kogia*) as Critical Tools in Interpreting Health Assessment Trends in Wild Populations." The purpose of the website is to examine *Kogia* stranding records for the southeastern United States and serve as the focal point for international cooperation in the study of *Kogia spp*.

A "Florida Strandings!" website has been created (www.kogia.org/flstrand) that summarizes stranding data by year, county, species and, for the current year, by month. Records are updated on an ongoing basis and are available to students and media as well as network members. This website was supported by Florida's Protect Wild Dolphins License plate.

The Southwest Florida Marine Mammal Stranding Network received a Prescott grant that will enable them to purchase a vehicle to assist with transport of live-stranded cetaceans.

Georgia

From July-September there were a total of six stranding events, including a mass stranding of seventeen *Steno bredanensis* (discussed below). The remaining stranding events included three bottlenose dolphins *T. truncatus* and two dwarf pygmy sperm whales, *K. sima.* On July 18, 2003 the Georgia Marine Mammal Stranding Network (GMMSN) responded to a mass stranding of seventeen Rough-toothed dolphins on Jekyll Island. The pod consisted of nine females, seven males and one unknown calf. The GMMSN

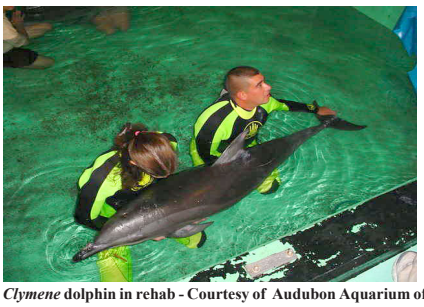
stranded rough toothed dolphins - courtesy of GMMSN

was able to release sixteen of the seventeen dolphins from site after a sick female was euthanized. The sick animal was unable to remain upright on her own and kept her eyes closed. We determined that she was attracting the other animals to shore because they oriented around her and followed her back to shore after the initial release. After she was out of the water the pod began to swim up and down the beach as if to reorganize their social structure. They came ashore two times after the initial release and were pushed off again. The animals remained close to shore for approximately six hours before heading offshore. Histopathology results show the female suffered a mild, diffuse eosinophilic enterocolitis and virology samples were all positive for herpesvirus.

Stranded rough-toothed dolphin - courtesy of GMMSN

Louisiana

A total of four marine mammals stranded between July and September, 2003 including two *T. truncatus* and two *Clymene* dolphins. The two *clymene* dolphins were initially found alive in a boat marina and were observed ramming into docks and pilings at the marina. They were both transported to Audubon Aquarium of the Americas. One died on day four of rehabilitation and the second was euthanized on day 10 due to declining health.



Clymene dolphin in rehab - Courtesy of Audubon Aquarium of the Americas

Mississippi

Mississippi had one stranding between July and September, 2003. On July 28, 2003, a 235cm male *T. truncatus*, code 4, was found in Gulfport (Harrison County). The animal's belly was slit, indicating a potential human interaction.

Using teeth from bottlenose dolphins that stranded on the barrier islands off the coast of Mississippi between the mid-1980s and 2002, we are studying the age and growth curve of this population. We are using the 113 dolphins with sex and length data. The teeth are extracted from the skull, cut into thick sections (2-3 mm), decalcified, cut into thin sections (25 µm) and stained. Once the tooth section is stained and mounted in a slide, the age of the dolphin can be determined by counting the annual layers in the dentine. To date, tooth processing is 70% complete, with ages ranging from zero to thirty years.

North Carolina

Between July and September 2003, there were a total of twenty-three stranded cetaceans: Fifteen *T. truncatus*, two *K.breviceps*, one *K. sima*, one *Delphinus delphis*, one *Mesoplodon europaeus* and three species that could not be determined.

In northern North Carolina (Jacksonville to the Virginia border) there were three *Tursiops* human/fishery interaction strandings during the 3rd quarter. On 14-June-03, NOAA Fisheries Beaufort lab had a live stranded *Tursiops* that was held at the NOAA Beaufort lab for 3.5 days before dying spontaneously. The animal tested positive for morbillivirus and had histopathology consistent with toxoplasmosis. There were two interesting *Kogias* that stranded on Fort Macon. One was a *K. sima* that stranded 13-June-03. There were marks consistent with live stranding, however, calls were not received until the animal had died. This animal was pregnant with a near term male fetus. On 15-August-03, a male *K.breviceps* was reported as a live stranding. The animal died on the

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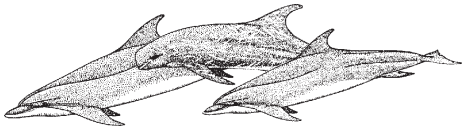
beach, unassisted. He was emaciated and had a heavy parasite load. The most unsual finding was large shrimp carapaces in his main stomach as well as many squid beaks, including one with soft tissue still attached.

In southern North Carolina, University of North Carolina at Wilmington (UNCW) has been working with the Virginia Marine Science Museum (VMSM) as part of their joint Prescott proposals. Specifically, VMSM transports euthanised or very fresh stranded carcasses, to either a transfer point or, all the way to UNCW where the necropsy is then conducted. Shared VMSM/UNCW research protocols are collected from the strandings and histopathology samples are then sent to the University of Tennessee and North Carolina State Veterinary Schools. Additional samples are run at UNCW for blubber and muscle histochemistry, buoyancy and thermoregulation studies. This collaboration has worked up three stranded cetaceans during July through September.

In the near future, all stranded *Tursiops* will be referenced against the reinvigorated Photo ID Catalogue to search for possible known animals and their sighting histories will be included in the stranding records housed at UNCW. We envision this will add greatly to the value of the contaminants, Human Interaction data and other samples collected. Interesting findings will be forwarded to the contributors to the *Tursiops* Photo ID Catalogue.

A recent *Tursiops* (WAM 591) presented as a severely emaciated animal with a large chronic wound through the blubber exposing muscle and vertebrae on the right peduncle. Histopathologic results are suggesting a systemic fungal infection with fungi suggestive of zygomycete found in hemorrhagic regions of the brain. Tests are currently being conducted to isolate the fungus from brain and lung tissue.



South Carolina

Five dolphins, including four *T. truncatus* and one *Feresa attenuata* stranded along South Carolina between July and September, 2003. Interesting stranding events in Charleston County include: SC0321 (July 26, 2003) a code 3 female, bottlenose dolphin 251 cm. The necropsy revealed a 3 inch metal barb, which penetrated the stomach causing extensive infection. SC0322 (August 17,2003), a code 1 male bottlenose dolphin 175 cm., was sighted alive and entangled in a crab pot line. Local residents tried to free the animal from the gear but were unsuccessful and the animal died. SC0314 (May 3, 2003) was an adult male bottlenose dolphin entangled in a crab pot line. The animal was successfully released from gear unharmed by NOS personnel and in August 2003 was recaptured during a live capture event in Charleston. Wounds from the crab pot entanglement were healed and the animal appeared to be doing well.

The NOS CCEHBR marine mammal stranding staff held a half day workshop for the new Charleston area marine mammal stranding response group made up of SCDNR employees. Topics included live animal and dead animal response, sample and data collection, and media issues.

NOS CCEHBR would like to acknowledge the efforts of Sally Murphy (SCDNR) for her contribution to marine mammal stranding research and data collection in South Carolina. Ms. Murphy, who recently retired, was the State Coordinator since the inception of the formalized marine mammal stranding network in 1991 and was collecting marine mammal stranding data and response for many years prior to 1991. Her collaboration with NMFS and NOS CCEHBR has allowed for the collection of valuable data on marine mammal strandings in SC. NOS CCEHBR would also like to welcome Al Segars (SCDNR) as the new SC State Coordinator and David Cupka (SCDNR) as assistant SC State Coordinator to the stranding network.

Texas

Six bottlenose dolphins *T. truncatus* stranded in Texas between July and September 2003. This has been a busy year for live animal strandings along the Texas coast, with seven reports to-date. We continue to see live and code 2 animals with meningitis. This year, we discovered the infection in a female *Tursiops* and a pregnant melon-headed whale. The *Tursiops* stranded in Galveston County, while the melon-head stranded in the Corpus Christi region.

For this quarter, we have had one live animal report. This involved an entanglement-release case reported by a couple out sailing. They had noticed a crab pot line attached to the end of its flukes and immediately contacted parks and wildlife, who contacted the Texas Marine Mammal Stranding Network (TMMSN). Upon consultation with National Marine Fisheries, we decided that the best scenario would be to disentangle and release, we were able to cut the line free and release the animal within a few minutes. The animal was slightly underweight but otherwise we did not see any obvious problems. The next day, we received a call from the Bolivar Ferry who reported a dead dolphin near the ferry landing. It was a Code 2 animal with rope marks on its peduncle, near the flukes. We are assuming that it was the animal from the day before.

TMMSN has one of the most resilient young dolphins in rehabilitation right now, Cupid, a young male *Tursiops* who stranded on Valentines Day in 2003. He has been deemed non-releasable due to a neurological condition that impairs his sleep/rest patterns. Cupid has been through so many changes with the TMMSN that he deserves the "Best Sport" award.

A bottlenose dolphin, "Cupid," stranded in TX
Courtesy of TMMSN

"Cupid" in rehabilitation
Courtesy of TMMSN

Tissue and Sample Exhchange

TMMSN has a very large collection of tissue samples that Dr. Cowan and Tammy Renaud have been trying to make available to the research community. Dr.Cowan does a very thorough necropsy and has many species of animals in his collection. Anyone interested in tissues may contact the TMMSN. tmmsn@tamug.tamu.edu

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NOS CCEHBR has numerous tissues archived from stranded animals. Contact Wayne McFee (wayne.mcfee@noaa.gov) for more information. Kogia hearts can be sent to NOS CCEHBR.

Spring Hill College (AL) is willing to pay the shipping and handling for the long-term loan of a phocoenid tooth. It is very hard to explain the current meaning of "porpoise" without one to show. regan@shc.edu

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Dr. Nélio Barros from Mote Marine laboratory is requesting frozen stomachs (tie off both ends – esophagus and intestines), and a frozen piece (~ > 20 g) of (epaxial) muscle from all odontocetes. The tissues will be used in long-term studies of trophic ecology of odontocete cetaceans from the southeastern United States.
Contact: nbarros@mote.org

Drs. Daniel K. Odell and Nélio B. Barros from Hubbs-SeaWorld Research Institute and Mote Marine Laboratory are requesting intact reproductive organs, teeth, stomach contents from dwarf and pygmy sperm whales to support their Prescott grant (see Florida News section). Contacts: dodell@hswri.org or nbarros@mote.org

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Dr. Greg Bossart from HBOI is requesting whole *Kogia* hearts preserved in formalin. Please contact Dr. Bossart: Gbossart@HBOI.edu

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Dr. Carlos Romero from University of Florida College of Veterinary Medicine is requesting various frozen tissues for his cetacean virology study. Please contact him for a sampling collection protocol, at:
Romeroc@mail.vet.ufl.edu

Prescott Grant News

The Prescott Grant Program provides federal assistance to eligible stranding network participants for (a) recovery or treatment of live stranded marine mammals, (b) data collection from living or dead stranded marine mammals for scientific research regarding marine mammal health, and (c) facility operation directly related to the recovery or treatment of stranded marine mammals and collection of data from living or dead stranded marine mammals.

The Southeast Region stranding network collectively was awarded $1,670,615 in 2001-2002 and $1,077,431 in 2003.

The Prescott Grant Program is administered through the NOAA Fisheries Marine Mammal Health and Stranding Response Program. For more information on the program, award recipients, and application deadlines, visit: http://www.nmfs.noaa.gov/prot_res/PR2 Health_and_Stranding_Response_Program/Prescott.html

Prescott Grant- Southeast Region Funded projects for 2003

Project	Organization
Facilities of Southwest Florida Cetaceans Rescue and Recovery	Florida Fish and Wildlife Conservation Commission
Facility expansion for the Dolphin and Whale Hospital	Mote Marine Lab
Enhancing live animal stranding response, necropsy procedures and tissue archiving capabilities along the central and northeast coast of Florida	Hubbs-Sea World Research Institute
Request for equipment to help facilitate large animals and to make moving of all animals easier, safer, and faster, and for financial assistance with stranding facility operations	Gulf World
Poxvirus Infections in North American Pinnipeds	University of Florida
Improve MARS' impact on live stranding events in South Florida while nurturing existing outreach channels with a better presence	Marine Animal Rescue Society
Enhancement of data collection from stranded marine mammals by Louisianna Marine Mammal Rescue Program	Audubon Nature Institute
Evaluation of trends and possible causes of marine mammal strandings in the Mississippi sound and adjacent waters	Institute for Marine Mammal Studies
Enhanced tissue collection and health monitoring of stranded marine mammals in North Carolina and Virginia	University of North Carolina Wilmington
Enhancing response to and necropsy of stranded large whales in North Carolina and Virginia	University of North Carolina Wilmington
Continuation of South Carolina's Marine Mammal Stranding Network	South Carolina Department of Natural Resources
Improved recovery and treatment of live stranded animals - rescue, rehabilitation Stranding and release	Texas Marine Mammal Stranding Network
Improved data collection from living and dead marine mammals	Texas Marine Mammal Stranding Network

Q and A:
What is the best way to pack and ship specimens?

No matter how your specimen is preserved, there are several overall things you can do to ensure that researchers are able to make the most of the samples you've worked hard to collect. Sampling protocols for different analyses will have different packaging and storage requirements.

- Label, label, label. Samples that do not have legible, accurate labels are useless.
  - **Double label everything.**
  - If possible, use plastic bags with white "write-on" labels. Anything you write on a clear plastic bag will come off in the freezer.
  - Include an internal label written on waterproof paper inside the plastic bag.
  - All labels should include:
    - Animal field ID number (use the original field ID)
    - Type of sample
    - Date collected, species and location are useful, but not necessary

- Shipping
  - **Double bag everything.**
    - When samples are placed in a box, make sure that everything is double-bagged and leak-proof.
    - If you use plastic containers, put them in sealed plastic bags, or wrap in parafilm.
  - **Enclose an inventory sheet** that includes the following
    - Field ID number(s)
    - Species
    - Type of samples enclosed
    - Copy of the Level A data sheet for each animal's sample(s) enclosed.
    - It is helpful to put the inventory sheet in a plastic bag to keep it dry and legible, or provide a second inventory sheet that is not inside the box.
    - Label your box properly (e.g. this side up) and according to shipping regulations.

- **Call your carrier** for specific requirements they may have for shipping dry ice, formalin, alcohol or other substances. Make sure your box is packed and labeled according to shipping regulations.

- **Call ahead**
  - It is always a good idea to call the person you're sending the sample to, to make sure they are ready to receive your samples. This is especially important for frozen samples.
  - When calling or emailing ahead, it is helpful to provide tracking numbers to locate any wayward shipments.

Recent Scientific Publications
From the Southeast U.S. Marine Mammal Stranding Network

Barco, S.G., McLellan, W.A., Allen, J. A., Asmutis-Silvia, R.A., Mallon-Day, R., Meagher E.M., Pabst, D.A., Robbins, J., Rosemary E., Seton, R.E., Swingle, W.M. Weinrich, M.T., and P. J. Clapham. 2002. **Population identity of humpback whales, *Megaptera novaeangliae*, in the waters of the U.S. mid-Atlantic states.** *Journal of Cetacean Research and Management* 4: 135-141.

Bossart, G. D., Meisner, R., Verela, R., Mazziol, M., McCulloch, S., Kilpatrick, D., Friday, R., Murdoch, E., Mase, B and Defran, R.H. 2003. **Pathologic Findings in Stranded Atlantic Bottlenose Dolphin (*Tursiops truncatus*) From the Indian River Lagoon.** *Florida Scientist* 66: 226-238.

Duffield, D.A., N.B. Barros, E.O. Espinosa, S. Ploen, F.M.D. Gulland and J.E. Heyning. 2003. **Identifying pygmy and dwarf sperm whales (genus *Kogia*) using electrospray ionization mass spectrometry of myoglobin and hemoglobin.** *Marine Mammal Science* 19: 395-399.

Dunn, D.G., Barco, S.G., Pabst, D.A,. W.A. McLellan. 2002. **Evidence for infanticide in bottlenose dolphins of the western North Atlantic.** *Journal of Wildlife Disease* 38:505-510.

Fertl, D., A.M. Landry and N.B. Barros. 2002. **Sharksucker (*Echeneis naucrates*), on a bottlenose dolphin (*Tursiops truncatus*) from Sarasota Bay, Florida and a review of other remora-cetacean associations in the Gulf of Mexico.** *Gulf of Mexico Science* 2002: 151-152.

Friedlaender, A.S., McLellan, W.A., and Pabst, D.A. 2002. **Characterizing an interaction between coastal bottlenose dolphins and the spot gillnet fishery in southeastern North Carolina, U.S.A.** *Journal of Cetacean Research and Management.* 3: 293-303.

Janech, M.G, Chen R., Klein J., Nowak W., McFee W., Paul R.V., Fitzgibbon W.R., and D. W. Ploth. 2002. **Molecular and functional characterization of a urea transporter from the kidney of a short-finned pilot whale.** *American Journal of Physiology: Regulatory, Integrative and Compatvie Physiology* 282: R1490

Kipps, E.K., McLellan, W.A., Rommel, S.A. and D.A. Pabst. 2002. **Skin density and its influence on buoyancy in the manatee (*Trichechus manatus latirostris*), harbor porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*).** *Marine Mammal Science* 18: 765-778.

Koopman, H.N., Pabst, D.A., McLellan, W.A., Dillaman, R.M. and A.J. Read. 2002. **Changes in blubber distribution and morphology associated with starvation in the harbor porpoise (*Phocoena phocoena*): evidence for regional differences in blubber structure and function.** *Physiological and Biochemical Zoology* 75:498-512.

Marino, L.,Sudheimer, K., Pabst, D.A., McLellan, W.A., Filsoof, D., and J.I. Johnson 2002. **Neuroanatomy of the common dolphin (*Delphinus delphis*) as revealed by magnetic resonance images (MRI).** *The Anatomical Record* 268:411-429.

Marino, L., Sudheimer, K., Pabsta, D.A., McLellan, W.A. and J.I. Johnson. 2003. **Magnetic resonance images of the brain of a dwarf sperm whale (*Kogia simus*).** *Journal of Anatomy* 203:57-76.

McFee, W.E. and C.A. Osborne. 2003. **Struvite calculus in the vagina of a bottlenose dolphin (*Tursiops truncatus*).** *Journal of Wildlife Diseases*, 40: accepted for publication 10/5/03.

McFee, W.E. and S. Murphy. 2002. **Bottlenose dolphin (*Tursiops truncatus*) strandings in South Carolina, 1992-1996.** Fishery Bulletin 100: 258-267.

McLellan, W.A., Friedlander, A.S., Mead, J.G., Potter, C.W., and D.A. Pabst. 2002. **Analyzing 25 years of bottlenose dolphin (*Tursiops truncatus* Montagu 1821) stranding records along the U.S. Atlantic coast: Do historic records support the coastal migratory stock hypothesis?** *Journal of Cetacean Research and Management* 4: 297-304.

McLellan, W.A., Koopman, H.N., Rommel, S.A., Read, A.J., Potter, C.W., Nicolas, J.R., Westgate, A.J., and D.A. Pabst. 2002. **Ontogenetic allometry and body composition of harbour porpoises (*Phocoena phocoena,* L.) from the western north Atlantic.** *Journal of Zoology, London* 257:457-472.

Meagher, E.M., McLellan, W.A., Westgate, A.J., Wells, R.S., Frierson, D., Pabst, D.A. 2002. **The relationship between heat flow and vasculature in the dorsal fin of wild bottlenose dolphins, *Tursiops truncatus*.** *The Journal of Experimental Biology*. 205:3475-3486.

Stolen, M. K. and J. Barlow. 2003. **A model life table for bottlenose dolphins *(Tursiops truncatus)* from the Indian River Lagoon System, Florida, U.S.A.** *Marine Mammal Science* 19: 630–649.

Struntz, D.J., McLellan, W.A., Dillaman, R.M., Blum, J.E., Kucklick, J.R. and D.A. Pabst. (in press). **Blubber development in bottlenose dolphins (*Tursiops truncatus*).** *Journal of Morphology.*

Thayer, V. G., Read, A. J., Colby, D. R., Friedlaender, A. S., Hohn, A. A., McLellan, W. A., Pabst, D. A., Dearolf, J. L, Bowles, N. I., Russell, J. R. and K.A. Rittmaster (2003) **Reproductive seasonality of western Atlantic bottlenose dolphins off North Carolina, USA.** *Marine Mammal Science* 19: 617-629.

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nitrogen in muscle tissues of stranded animals. The principle of this technique is that the elemental composition of tissues of a predator is similar to, or differs by a certain amount from, that of its prey. Whereas the carbon isotopic levels in tissues of the two species were similar, a reflection of similar primary producers in the feeding grounds of *Kogia*, nitrogen levels were significantly different, suggesting that these whales feed at different levels of the food chain. Using a relative scale comparing data from other cetacean species, we calculated that the two species differed in about 22% of their diet. The values obtained for *K. sima* were

Table 1. Hemoglobin and myoglobin molecular weights of pygmy and dwarf sperm whales. Values are presented in atomic mass units, and shown as mean ± one standard deviation. R is the range of values and n refer to sample sizes.

	Hemoglobin Alpha-Chain	Myoglobin
Kogia breviceps	15,249 ± 0.78 (r= 15,248-15,250) n= 23	17,267 ± 0.95 (r= 17,265-17,269) n= 28
Kogia sima	15,188 ± 0.66 (r= 15,187-15,189) n= 13	17,239 ± 0.79 (r= 17,238-17,241) n= 16

closer to species that typically inhabit deeper, offshore waters (e.g, the pan-tropical spotted dolphin, *Stenella attenuata*, and the Clymene dolphin, *S. clymene*), and those of *K. breviceps* were more similar to species that typically occupy waters over or near the continental shelf (the bottlenose dolphin, *Tursiops truncatus*, and the Atlantic spotted dolphin, *Stenella frontalis*). Detailed analyses of stomach contents of *Kogia* are being carried out to help understand the feeding ecology of both species, and further quantify the overlap in their diet. If you would like to contribute to this project by collecting samples from stranded animals (entire stomachs), please contact:

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We have only begun to unravel the mystery of pygmy and dwarf sperm whales. With dedicated studies, we hope to understand how these intriguing animals make a living in their natural environment and ultimately produce the scientific information necessary for their conservation and protection.