

Environmental Concerns

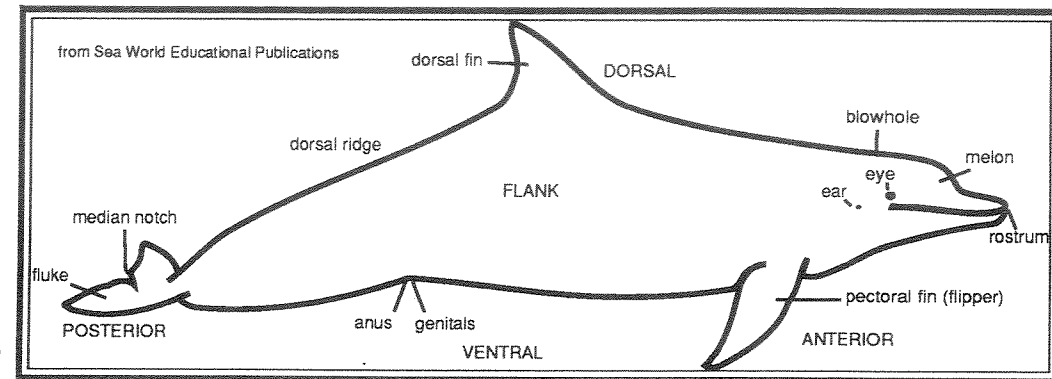
The vulnerability of dolphins to human-generated changes in their environment remains largely undetermined. All animals can potentially accumulate pollutants from food and their environment, which remain in their body tissues for life (called *biomagnification*). Pollutants have been implicated in immunosuppression and reproductive failures in some marine mammals around the world. Since pollutants collect in fat, these pollutants make their way into calves through the fatty milk.

Pollutants can also be released if the dolphin is sick or starving and the blubber fat is activated for food.

Dolphins in many areas around the world are known to have high levels of heavy metals, DDE (a breakdown chemical of DDT), and PCB's (created during production and disintegration of certain electrical transformers and related equipment). Dolphins can acquire high toxic levels in their blubber, kidneys, muscles and liver. Adverse effects of environmental impacts on dolphins may represent

similar effects on humans which regularly utilize the same marine resources. Therefore, dolphins may serve as biological indicators of chronic or point-source pollutant sources in the nearshore area. For that reason, dead dolphins stranded on the beach are carefully studied and tested to determine the level of toxic materials in body tissues. If any dead individuals are found that have previously been photo-identi-

however, the number of such strandings increases to indicate a clustered "die-off" of individuals occurring within a specific period of time. The causes of such "die-offs" often remain unknown. Various factors have been suggested, including sudden cold snaps, viral diseases (such as morbillivirus), pesticides, and industrial or human-waste contamination of the waters.



When viewing dolphins (or any species of marine mammal, including whales and manatees) from a boat or the beach, it is important not to ap-

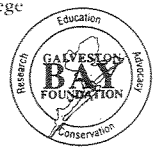
proach or harass them. Marine mammals in U.S. waters are protected by the Marine Mammal Protection Act. This act prohibits harassment in various forms, including swimming with, feeding, touching and approaching in boats. The law also protects stranded (dead or alive) dolphins, meaning if a stranded dolphin is found, it should be reported, and no body parts taken. To report a stranded marine mammal in Texas, call the Texas Marine Mammal Stranding Network at 1-800-9-MAMMAL.

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This fact sheet is one of a series produced through a cooperative agreement between the Galveston Bay Foundation and the U.S. Fish and Wildlife Service. The information in this series was developed by authors from the Galveston Bay Foundation, National Marine Fisheries Service, Sea Grant College Program, Texas Natural Resource Conservation Commission, Texas Parks and Wildlife Department, Texas Water Development Board and the U.S. Fish and Wildlife Service.

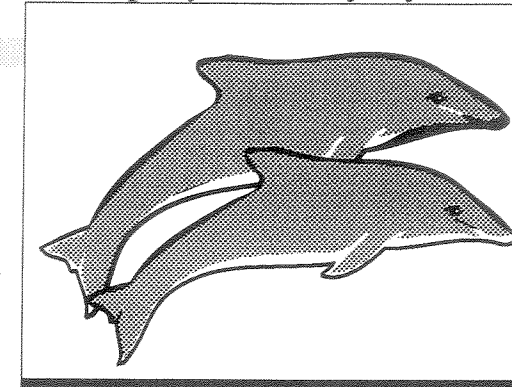
The Galveston Bay Foundation is a nonprofit organization whose mission is to preserve and enhance the Bay for its multiple uses through education, conservation, research and advocacy. The mission of the U.S. Fish and Wildlife Service is to conserve, protect and enhance the nation's fish and wildlife and their habitats for the continuing benefit of the American people.

For more information, contact the Galveston Bay Foundation at 17324-A Highway 3, Webster, Texas 77598, or call 713/332-3381.



Bottlenose Dolphins of Galveston Bay

At the top of the Bay's food web



Playful, "grinning" dolphins are a frequent sight along Galveston's beaches, in Bolivar Roads Pass and the Galveston and Houston Ship Channels, where they chase ships and the Bolivar Ferry in order to "body surf" in ship wakes. These much-loved "gymnasts" of the sea are important biological indicators of the health of our coastal resources. Like birds, turtles and humans, dolphins are at the top of the food web.

Dolphins—Mammals not Fish!

Whales, dolphins, and porpoises are not fish, but mammals which make up the order Cetacea (suh-TAY-shuh). Over thousands of years these animals have adapted to a wholly aquatic lifestyle. Common characteristics of these marine mammals are their torpedo-shaped bodies, lack of external ears, and the presence of a thick blubber for insulation. Infant dolphins lose their neonatal hair early on, but some maintain "sensory hairs" on their snouts

throughout life. Hind limbs are absent, and their forelimbs have been modified into flippers to be used for steering and balancing in water. The dolphin's tail is made up of two *flukes*, which are horizontally flattened and used for propulsion. The *dorsal fin* is the curved fin, made of cartilage, rising perpendicular to the spine, that is the most visible part of a dolphin's body when surfacing. They have lungs, like humans, but breathe through a *blowhole* (similar to a nose) on top of the head.

The dorsal fin of a dolphin acts somewhat like a radiator. A complex network of blood vessels in the fin allows the animal to expel heat in warm weather, which is one explanation for how these animals, with a thick blubber layer, can survive in the warm waters of the Gulf of Mexico and Galveston Bay during the summer.

Approximately 79 cetacean species occur throughout the world. At least 28 cetacean species (including seven baleen whale species) have been reported in the Gulf of Mexico. Among the dolphin species documented along the upper Texas coast, *bottlenose dolphins* (*Tursiops truncatus*) are the most common.

Many dolphin species are offshore, deep-water forms that rarely venture into inshore waters. In contrast, bottlenose dolphins are the most common marine mammal resident of coastal waters of the Gulf of Mexico and Galveston Bay. They seem to prefer the shallow bays and lagoons of the Gulf Coast, and are attracted to the food-rich riverine and estuarine areas, as well as shallow marine waters from the coastal boundary to the continental slope. They appear to be most abundant in and near the channels and passes connecting larger bays (including Galveston Bay) with the ocean. In the Gulf itself, bottlenose dolphin numbers generally decrease as the water depth increases, and they are seldom found more than 100 miles from

shore or in waters deeper than 1000 meters.

Population in Galveston Bay and Coastal Texas

Bottlenose dolphins in the Gulf of Mexico appear to be organized into several local populations, each occupying a small region of the coast, with some movement to and from inshore and offshore areas and along the coastline as well. The exact number of dolphins occurring within Galveston Bay at any one time is difficult to determine.

Variations in water temperatures, migration of food fish, and feeding habitats may account for seasonal movements of dolphins. Some coastal animals stay within a limited home range, which may overlap with the home ranges of other dolphins.

This constant movement makes identifying and tracking dolphins difficult.

Researchers can identify individual dolphins by the distinctive shapes and patterns of the trailing edge of their dorsal fins. These patterns are caused by normal wear

and tear as well as encounters with sharks and other dolphins. High-resolution photography aids researchers in identifying and tracking dolphins. A 1990 study of Galveston Bay resulted in an estimate of 1,000 individual dolphins in the Bay and its surrounding Gulf waters. However, only about 200 appeared to be continual residents of the Galveston Bay area.

Biology and Social Structure

Female bottlenose dolphins reach sexual maturity around 8 years of age--males about 10-12 years of age. Mating behavior and newborn calves are observed in the Galveston Bay area year-round, with calving peaks in spring and fall on the Texas coast. Gestation is about 12 months, with an interval of 2 to 3 years between calves. Like all mammals, dolphins

produce milk and nurse their young, usually for about a year. At birth the calf is more than a third as long as its mother, and may remain with its mother for four years or more. During this period, young dolphins learn how to recognize other dolphins, where to look for food, how to catch food, how to use *echolocation* (detection of an object by means of reflected sound, similar to sonar), and other survival and social skills.

Bottlenose dolphins in our area generally do not grow to more than 10 feet in length or 600 lbs. in weight. In other parts of the world, a maximum of 12 feet and 1,430 lbs. is possible, usually in colder climates. Dolphins have been recorded swimming up to 22 miles per hour while "bow-riding," but 5-12 miles per hour is more common. Dolphins come to the surface regularly to breathe, but 95% of

their time is spent beneath the surface, feeding, playing, mating and resting.

Dolphins produce a variety of sounds that remind the human listener of whistles, barks, moans, clicks and squeaking doors. Dolphins use echolocation to locate food, identify objects, and maintain orientation.

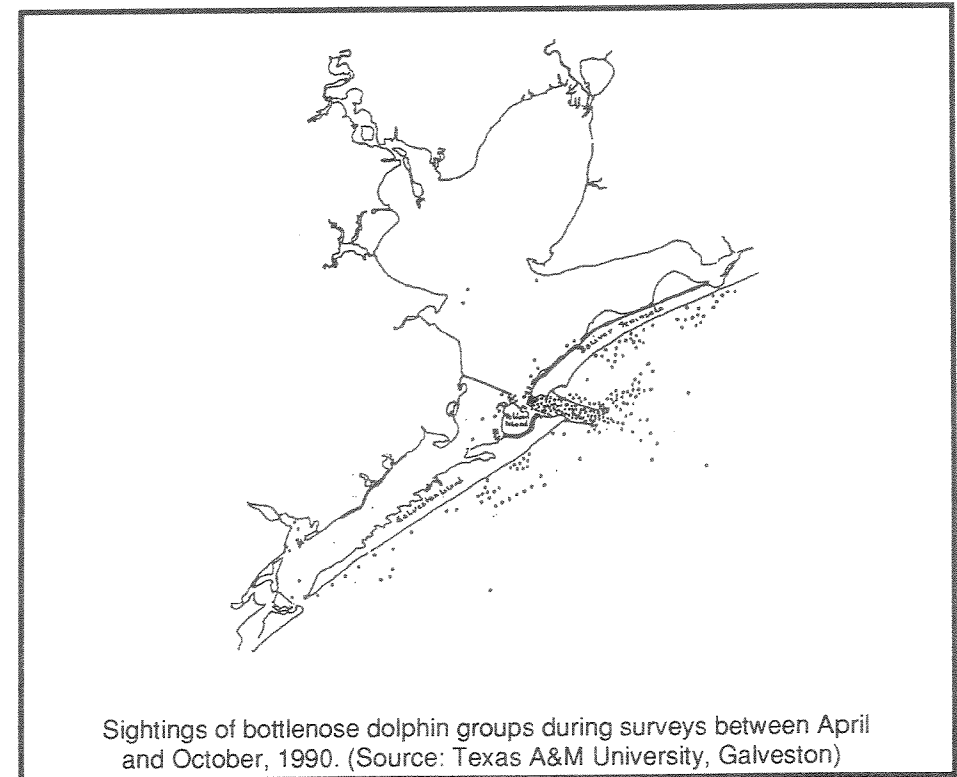
Bottlenose dolphins have relatively large

brains, up to 1700 grams in weight, compared to 1,450 grams for man. This has fostered speculation that they are highly intelligent. There are many reports of cooperative behavior occurring among dolphins, lending further consideration to this theory.

Dolphin behavior is classified into the main categories of traveling, feeding, playing, socializing, resting and milling. Dolphin society is very fluid, with loose associations between individuals. Bottlenose dolphins live in groups called *Pods*, ranging in size from 2 to 15 individuals. They may spend time alone, with a group, or move from group to group at will. Occasionally several pods will join temporarily to form larger groups called *herds*.

Bottlenose Dolphin Feeding Habits

Bottlenose dolphins feed on a wide variety of fish, *cephalopods* (mollusks) and *crustaceans* (shrimp and crabs). They are very flexible in their feeding tastes and take whichever species is most abundant. In the bays of Texas, a large part of their food



intake appears to be composed of croaker, sand seatrout, silver perch, silver seatrout and mullet.

Bottlenose dolphins are opportunistic feeders and display a diverse array of feeding patterns as they capture fish and invertebrates. Dolphins feed alone, feed cooperatively in groups, use natural and man-made barriers to corral fish, "kick" fish with their flukes to stun them, and feed in association with human activity such as dredging and shrimping.

In the Galveston Bay area, bottlenose dolphins appear to have learned to take advantage of the concentrated food source made possible by shrimping operations. Shrimping activities result in the incidental capture and loss of unwanted fish and other organisms. This *bycatch* (up to 8 pounds for every pound of harvested shrimp) is discarded back into the water, and dolphins generally display a strong attraction to shrimp

boats so that this easy source of food can be utilized. Dolphins can be observed feeding individually or in small groups behind shrimp boats during all stages of operation: trawling, raising nets, culling bycatch, and dropping nets. An additional attraction to shrimp boats seems to be social interaction with other dolphins.

While dolphins feed behind shrimp boats all around Galveston Bay, they are particularly active in the Galveston Ship Channel.

Dolphins often feed on organisms stirred up by the shrimp trawl dragging on the Bay bottom, as well as fish escaping the nets. They may also pick out fish entangled in the nets or passing through the nets. They can be seen feeding on "trash" fish at the surface as shrimpers cull their catch.

Mother-calf pairs are frequently seen following shrimp boats, probably because the concentrated source of easy prey provided by shrimping may help females meet the increased energetic demands of lactation and calf-rearing. (Captive dolphins that are nursing calves can more than double their intake of food.) Knowledge of shrimp boats as a food source is apparently passed from generation to generation.

