

Whales, River Dolphins, and Dolphins in the Campos Basin

Field Guide Series
Campos Basin Marine Fauna

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Campos Basin

Description of the Area

Just as cities are named, so geological sites – in this case, sedimentary basins – are named after geographic accidents or nearby cities. This procedure is followed internationally and rigidly using the “Code of Stratigraphic Nomenclature” adopted by geologists. The Campos Basin, as well as the Pelotas and Santos Basins, Foz do Amazonas, Recôncavo Baiano and others were also named in this manner. Curiously, in the case of Campos, the city gave back the name it received to the geographic accident because the fields formed by accumulated sediment over millions of years.

The sedimentary area known as Campos Basin is nearly 100,000 square kilometers in size and extends from the state of Espírito Santo (near the city of Vitória) to Cabo Frio in the state of Rio de Janeiro on the northern coast. To the south of the Vitória –Trinidad chain, the continental shelf edge is considerably wide. This shelf is characterized by intense terrigenous sediment flux, which favored the development of a mild morphology of transition to the continental slope, with break depths located between 80 and 180 meters, with an average of 140 meters. The Continental slope is interrupted by underwater canyons, like those along the northern part of the state of Rio de Janeiro, or by intense ravinement and erosion zones (Neto & Silva, 2004) (Fig. 1).

The Campos Basin area can be characterized by its rainy season humid climate during the summer and dry climate during the winter. This region is under the regular effect of atmospheric systems in the Tropical Atlantic, which causes good stable temperatures, and Polar Atlantic, related to cold fronts in the south. The predominant winds in the Campos Basin region are from the northeast during a large part of the year. In the winter months, the strength of the cold fronts out of the south causes the wind turn to the S-SW, also increasing its intensity. Campos Basin air temperature can vary from 20 to 30°C, giving the sensation of hotter temperatures on windless summer days, and more intense cold periods of strong gusts from the S-SW in the winter.

The continental shelf region between Campos and Rio de Janeiro has a mixture of water masses. The surface water is tropical water which is warm and salty, and is situated over the South Atlantic Central Water (SACW), cold and less salty beyond coastal waters, characterized

by low salinity and high temperature. During the summer when a seasonal thermocline is established, the coastal resurgence controlled by NE/E winds occur between 21° and 23°S latitudes, when the SACW penetrates the internal shelf, and 16°C temperatures are observed (Patchineelam, 2004) (Fig. 2).

Winds are important mechanisms for generating currents in this shelf. Throughout the year, east winds are predominant in the Abrolhos region to Cabo Frio, the Brazilian current travels south, parallel with the shelf breakline. To the south of the Abrolhos-Campos region northeast winds, predominant especially in the summer, produce a coastal resurgence, common at this time of year, between Cabo Frio and Cabo de São Tome (Patchineelam, 2004). Tessler (1994) calls attention to the fact that Cabo Frio marks the transition between tropical environments to the north and temperate subtropical environments to the south. As a result of these oceanographic changes, all biota (benthos, nekton, and plankton) show very peculiar characteristics with single occurrences of species for the region, including a rich contingent of marine birds.

Sea Mammals and Turtles

This Project is for the purpose of preparing PETROBRAS to meet the challenge of being granted an environmental license for its offshore structures. Currently, the federal environmental agency presents us with questions of distribution patterns and species behavior within an area of influence of each site (each offshore unit).

With marine mammals moving throughout a wide area and have a complex distribution, investments in a study that includes oceanographic fields navigating in transects that cover shallow waters of the continental shelf and slope deep waters. This sample gave us a wider view of how these organisms are distributed spatially and the beginning of a temporal series where we can understand how natural factors like ocean surface temperature, underwater relief, and bathymetry can help us interpret the observed distribution.

During these expeditions, we witnessed these organisms along the structures in full operation in the Campos Basin, with this being a strong indicator of environmental health. In addition to giving researchers on board an opportunity to study the behavior of oceanic animal characteristics and collect genetic material (skin and fat) for population analysis.

This is only a step toward defending the idea of a wide regional licensing when dealing with organisms with a wide distribution along the south Atlantic.

Cordially,

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BACKGROUND

THE WHALE IN COLONIAL BRAZIL

An important phase in Brazilian economy and history could have passed practically unnoticed if it had not been for the extraordinary work and personal commitment of Professor Myriam Ellis. One of the economic activities that may be less known about our past was dissected in detail, supplying valuable information, from a scientific point of view, about the life of whales. Unfortunately, almost all the richness generated with whale exploration was lost with time and a piece of our history was reduced to ruins and some geographic accident names: Ponta do Arpoador, Praia da Armação, da Baleia and dos Ossos, among others.

Once more, the history of whale hunting in Brazil shows a poor relationship between man and his environment. For centuries, whales were simply the most explored resource for producing riches. And they remained that way until some species were practically extinct and causing a change, still unknown, in the biological chain of sea life.

However, all this also serves as an example of an intrinsic relationship that history and economy have with the conservation of natural resources. Brazilwood (pau-brasil) was the first natural resource found by Portuguese sailors in the 16th century. The wood was explored to the limit of extinction. Next came the golden era of coffee and rubber. For the explorer, there has always been a product to generate wealth. This relationship of using natural resources continues until today, but it is undergoing a profound change.

Maybe the whale is one of the best examples of this kind of traditional exploration. A natural resource thought to be infinitely abundant was almost totally gone in only one and a half centuries of exploration. Protection measures in the 70s and 80s were implemented just in time to save the majority of the large whale species. Have we learned our lesson?

To learn about the whales' return to the Brazilian coast, exploratory history of these animals in colonial Brazil and in the world must be understood. Rudimentary methods and hunting instruments used in colonial Brazil only allow capturing whales that came along the coast and float after being harpooned. On the shoreline of southern Brazil, Rio de Janeiro and Santa Catarina, the Right Whale was the species captured most in most cases. On the other hand, the Humpback Whale was also captured along the shore of Sao Paulo and Rio de Janeiro. Along the Bahian coast in the north, the Humpback Whale was probably the only species to be captured; however, some Right Whales which had made it so far north were also hunted. Other whale species captured, like the Sperm Whale, for example, would not have occurred at that time since the species lives in deep waters and rarely come so close to our coast. Simple capturing methods contributed to the reduced number of whales captured along the shoreline. On the other hand, the North American and English whale hunters had already put the right and Humpback Whale numbers below the critical level at the end of the last century, mainly in the northern hemisphere and in frozen waters in the southern hemisphere. But with the use of modern capturing techniques, with the use of harpoon canons on ships with the capability of traveling for months, processing and storing whale products, the great olympic whale hunt started.

In 1910, starting with the use of harpoon canons, modern whale hunting in Brazil started with the startup operation of the Costinha whale station located in the city of Lucena in the state of Paraíba. The company, financed with Japanese and Brazilian capital used the commercial

name, Northern Brazil Fishing Company (COPEBRA) and operated with contracted ships. At least five whaling ships operated in the region in different periods. The most famous, Cabo Branco (Katsu-Maru 18) made in Japan, was nearly 50 meters long and had a crew of 24 men. It was refueled at the Cabedelo quay, spending the night and sailing out in the early morning. Normally, weighing anchor at approximately 4:30 am and return between 7:20 and 9 pm each day. It worked each day including Sundays and holidays. The area hunted was located between 06°S-08°S and not too far from the coast, on the average not going over 25 nautical miles. The hunting season started in the middle of June, with the first group of whales and continuing through December when the whales returned to Antarctic waters. During Costinha's first years of operation, the Humpback Whale was the only species captured for its large quantities of oil it produced. With the decrease in this species population, hunting Sei and Bryde Whales increased (the two species were considered the same until 1967). A decrease in the availability of capturing Sei/Bryde Whales increased hunting of Minke Whales, and on a smaller scale, Sperm Whales. In 1966, five times as many Minke Whales were captured compared to Sei and Bryde Whales in the same period. Minke Whales were the only ones captured starting in 1981 when 749 whales were hunted. Until the closing of the Costinha station, with the prohibition of hunting in December 1987, an average of 1,000 Minke Whales was captured, starting in 1982. The practice of hunting large whales first led to their lower numbers throughout the world.

In 1960, a second whaling station started its activities at Arraial do Cabo, on the east coast of Rio de Janeiro. The station, also managed by Japanese, was responsible for the capture of 1,134 Sei/Bryde Whales, 241 sperm whales, 84 Fin Whales, 10 Humpback Whales, and a Blue Whale from 1960-1963. Due to operating difficulties, the station had a short production period. Whaling ships were obligated to run long distances, at times up to 200 nautical miles from the coast just to capture whales heading north.

Alarmed by the observed decrease in whale numbers throughout the world, starting in 1930, hunting countries started discussing the need to establish quotas for each whaling season. After some preliminary agreements, the London Convention was signed in February 1944 by nine nations. The convention established the Blue Whale Unit (BWU) which designated the quantity of oil supplied by the Blue Whale. It established that the Blue Whale corresponded to two Fin whales, two and a half Humpback Whales, and six Sei Whales. These artificial units were established as a reference for setting quotas of capturing without taking into account the situation of the population and the bio-ecological characteristics of the different species which would take the whales to the brink of extinction.

In December 1946, delegates from 19 nations met in Washington, U.S., created the International Whaling Commission (IWC), and promulgated a new convention deciding new rules for hunting whales. The convention established hunting season opening and ending dates, prohibited capturing females accompanied by their calves, set minimum whale size to be captured among the several species, and finally it stipulated annual whale quotas expressed in B.W.U. to be hunted.

Although the IWC had formed a scientific committee to study whale stock, it was unable to discipline whale activity and ended up becoming just an instrument in the industry, resulting in the almost decimation of large whales.

With the exception of the Minke Whale, all large whale species are on the brink of extinction with the whale industry.

Strong pressure from conservationist groups and public opinion in the 70's led to go governments of whaling countries to review their positions. In Brazil, protection of large whales became a reality with Law No. 7.643 of December 1987 which established its first article: "it is prohibited to fish or any other intentional offense to any cetacean species in the jurisdiction of Brazilian waters."

Now protected by law, whales need to be looked at in another way. We need to review our relationship with the other inhabitants of this planet.

Throughout time, whales have been related to man in myths, literature, art, music, and trade. Centuries of killing put whales in the spotlight, making them the symbol for the conservationist fight throughout the world. The fascination these animals cause in people lead to the organization of campaigns in favor of ending whale hunting. The first non-governmental organizations that fought for a specific cause appeared and in a short time mobilized thousands of people against hunting.

Data collected by Brazilian researchers in recent years started to define areas inhabited by right and Humpback Whales on the Brazilian coast. Research on cetaceans in Brazil grew, despite the general lack of resources researchers had to deal with. Coastal species have received greater attention because it is easier to access concentrated or problem areas where there is interaction from fishing. The best examples are river dolphins inhabiting bay areas and estuaries, Humpback Whales and Right Whales. Some research groups started up at the start of the 1980's along with NGO's like the Brazilian Foundation for Natural Conservation. Other studies were made by graduate-level courses. Few research jobs last very long or they limit their expansion to new areas or aspects.

Two studies stand out because of their results and the "re-discovery" of these whales' return to the Brazilian coast: the Humpback Whale Project and the Right Whale Project.

The Humpback Whale, *Megaptera novaeangliae*, is found in all oceans throughout the world, but is less common in the arctic regions. They were hunted heavily by commercial whaling companies until the middle of the last century. The species received legal protection for the first time in the North Atlantic in 1955 when the IWC prohibited non-sustaining hunting by member countries. Protection was expanded to North Pacific and southern hemisphere after the 1965 whaling season. The Humpback Whale is classified as an endangered species by the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA), by the International Union for Conservation of Nature (IUCN), and by the U.S. Endangered Species Act. The Humpback Whale is the third most reduced (numerically) cetacean species in the world. The Northern Right Whale, *Eubalaena glacialis*, leads the list, followed by the Blue Whale, *Balaenoptera musculus*.

Before the commercial hunting season, it was believed the world population was about 125,000 Humpback Whales. North American whaling ships killed between 14,164 and 18,212 Humpback Whales between 1805 and 1909 alone. In the Brazilian northeast, the Costinha station killed 1,542 Humpback Whales between 1911 and 1963. Currently, there is less than 10,000-12,000 Humpback Whales in the world, not more than 10% of the initial number.

Practically decimated by hunting, Humpback Whales seem to demonstrate an extraordinary ability of population recovery. The increase in the number of sighting and beaching cases on the Brazilian coast starting in 1980 is significant, and old areas of concentration seem to be gradually re-occupied.

Humpback Whales migrate annually to the Brazilian coast for warm shallow waters for reproduction purposes and raising their young. The Arolhos Bank on the Bahian southern coast has all the necessary ecological conditions for Humpback Whales in low latitudes: the water temperature is always warm and the maximum depth is 50 meters; additionally, the coral reefs protect against strong winter winds. This is the perfect environment for raising whale calves and guaranteeing their survival during the first months of life when they are more vulnerable. The Humpback Whale calves are approximately 4 meters in length at birth and by the end of spring, they are almost twice the size and are ready to accompany their mothers on the return to the Antarctic.

With the information of whales in the Arolhos region, researchers were attracted to it. The first surveys of the whales in the region came out in 1988. Initial data confirm Humpback Whales are still using that area for reproduction and raising their young in the winter and spring months and have done so for the last two centuries. Old sailing records have mentioned their presence since the 17th and 18th centuries.

The study of Humpback Whales started in 1988 for the purpose of biological and behavioral studies in the Arolhos region and they counted on the support from the Brazilian Foundation for the Conservation of the Natural Environment, the Boticario Nature Protection Foundation, the International Foundation for Nature – WWF Brasil, Cetacean Society International, and the Allied Whale/College of the Atlantic (Maine, USA). In 1994, the Humpback Whale Project was adopted by IBAMA.

Fieldwork is done throughout the season, from June to December. Using photo identification records of the ventral fluke, it is possible to recognize them within the population. This modern study technique of cetaceans, which does not interfere with the animals, is called photo-identification. Like a fingerprint, the marks are different from one whale to the next, i.e., no two whales are identical. This technique also allows other types of important information on whale life to be gathered. For example, time spent in the Arolhos region can be estimated. Each time a whale is re-photographed, new data on its life is collected by researchers. The technique also gives proof of Humpback Whales returning to Arolhos during consecutive years. Thus, it is possible to estimate population size based on long term and statistical methods.

These are just the first steps on researching Humpback Whales. The study of large cetaceans usually take a number of years before they start to show any results. The whales can live between 50-70 years, and it takes time to understand fundamental aspects of their societal structure, reproductive aspects, and behavior.

The fact Humpback Whales frequently jump out of the water, mainly the calves, and their observed behavior in the reproduction areas makes them the most popular group of large cetaceans in the entire world. Along with this, is the fact that the species looks for coastal waters or oceanic islands, like Hawaii, to reproduce.

Thus, the Humpback Whale is perhaps the most studied cetacean and which have received a lot of effort from researchers and conservationists to improve their chances of survival.

Commercial hunting of Humpback Whales is over, but the problems caused by man are not. One of the most current frequent problems is whale interaction with fishing operations. Whales are not capable of long-distance detecting of ocean nets and frequently become entangled in them, which can cause their death. Since 1983, several cases have been recorded where Humpback Whales get caught in waiting nets along the Brazilian coastline. Three of

these resulted in the death of these whales, and on a few occasions, the whales were still alive and were released by fishermen. The accidental capture of whales in fishing nets can represent a risk to the recovery of the species. For fishermen who suffer damages to their nets, whales start to be seen as a problem.

A good part of whale sightings in the Abrolhos region is made in the Abrolhos National Marine Park. The park was created in April 1983 and includes an area of 910 km² which corresponds to only 30% of the total area of the Abrolhos Bank. Tourists go to the park mostly to go diving, and the distance from the coast increases the trip to a minimum time of 2 days, and on average, 3-4 days. It is during the time when crossing the continent to the Abrolhos arquipelago, where ships pass at night to observe Humpback Whale groups. The easiness of observing the whales at Abrolhos became a new attraction to visit the area.

Tourism built on whale watching is very common today in countries like Canada, United States, Mexico, Norway, Australia, and New Zealand, just to name a few. Whale watching became a true million-dollar industry per season even though it occurs at certain times of the year.

Without a doubt, the Abrolhos National Marine Park is the best region in Brazil to do whale watching, but some measures are necessary to avoid accidents with tourists, with ships, and with the whales. Some rules are: avoid excessively approaching whales, maintaining a minimum distance of 150 meters from the group being observed; do not try to steer the whales to a determined area and do not separate the female from her calf. Part of the work by Abrolhos researchers includes inspecting these rules and the education of tourist and fishing fleet personnel.

During the long migration from the South Georgia and South Sandwich Islands to Brazil, Humpback Whales can encounter other problems. In addition to fishing nets, there is water pollution which is a real threat difficult to assess.

Humpback Whales depend on their vision and not echo-location (an acoustic system in which the cetacean is oriented based on reflected sound waves) to navigate and avoid obstacles; however, the cloudy water can represent a serious problem for them. Deforesting and erosion can aggravate the problem even more.

All of the Abrolhos Bank should be formally designated as critical habitat for Humpback Whales on the Brazilian coast. A critical habitat represents any area that appears to be essential for the survival and/or population growth of a species. In the Abrolhos region, this is a chance to save the Brazilian population of Humpback Whales.

Right Whale studies started at the beginning of the 1980's with the original purpose of increasing knowledge on the presence of Right Whales, or true whales, *Eubalaena australis*, on the Brazilian coast, to confirm whether reported occurrences were sporadic or whether they represented a migratory pattern and to collect data that would allow them to study protection measures.

With the exception of the Northern Right Whale, *Eubalaena glacialis*, the Right Whale, *E. australis*, is the rarest of the large whale in the world, being hunted by the whaling industry at the beginning of the century before last. Acknowledgement of this fact in 1927 resulted in international measures four years later, i.e., 1931; and only in 1935 did they go into effect. Initial Right Whale population before being hunted was estimated at 100,000. In 1976, the Food and Agriculture Organization (FAO) estimated the numbers of the Right Whale population in the southern hemisphere to be between 3,000 and 4,000.

During their migratory seasons, Right Whales look for coastal areas like bays and inlets to stay in during the winter and spring (June to November). On the Brazilian coast, the Right Whale chose the coast of the states, Santa Catarina and Rio Grande do Sul as a preferential area for reproduction and raising their young. Researchers have already observed copulating behavior of these whales near the Santa Catarina beaches several times and have confirmed a high frequency of mother whales with their offspring.

Right Whales have callosities on their heads which allow individual identification. Photo-identification includes photographing the whale's head from above using a small plane and then comparing the pictures. As with the Humpback Whale tail fluke, Right Whale callosities are individual as fingerprints of humans. This method allowed an estimate of populations and the rate of annual recovery. The Valdes Peninsula in Argentina is famous for sheltering a Right Whale population estimated to be between 450-600 individuals (data from photo-identification studies since 1971) in the winter and spring. Some whale identified with this method in Brazil had already been identified in Valdes Peninsula which suggests to researchers that there is only one population which extends throughout the whole area.

It is estimated the Right Whale population is increasing at a rate of 7% per year in South Africa, 5% on the west side of Australia, 2% in New Zealand, and 7.6% in Argentina.

Some threats to population recovery includes mortality in fishing devices, calf mortality in reproduction areas, interference from tourist boats, the development of offshore oil exploration, and interactions with ships.

It is our challenge to try to reduce these threats and guarantee population growth of Right Whales that migrate to Brazil.

Research is fundamental for guaranteeing the survival of whales on the Brazilian coast; it is the only means to assess, for example, the recovery of a species and learn about their areas of concentration and occurrence. For this, official encouragement to researchers for whale study is needed.

A large collaborative effort with whale research in Brazil was made by Professor Myriam Ellis. A part of the national information was saved in her book and will always be used to support cetacean study in Brazil.

The old areas where whales have been seen were confirmed by the existence along the shoreline. Today, researchers are confirming the repopulation of whales where they had been previously harpooned.

It will not be surprising if one day a whale appears on Armação Beach (Praia da Armação). They are coming back in grand style, repopulating our coastal waters. Look for a good place to watch them because the spectacle is fascinating. Happy whale watching!

Salvatore Siciliano

To learn more:

ELLIS, M., 1969. A Baleia no Brasil Colonial (The Whale in Colonial Brazil). Melhoramentos/Editora da Universidade de São Paulo. 235p.

INTRODUCTION

Those who have already seen a dolphin or a whale, surely marveled at their beauty, characteristics, acrobats, and even their games. Whether at sea, on a television program, in a picture in a book, the presence of cetaceans – whales, river dolphins, and dolphins – always awoke human curiosity and have been a part of popular imagination for centuries. They are synonymous with beauty, mystery, intelligence, elegance, likable personalities, strength, and many other qualities attributed to our own kind. But what do we know about the lives of these very interesting animals? Who are they? Where can we find them? How can we identify the different species? How do they feed and reproduce?

It is with the idea to present a basic knowledge about these animals that the PETROBRAS Research and Development Center (CENPES/PETROBRAS) and the Marine Mammal Studies Group in the Lagos Region (GEMM-Lagos*) present the Guide for Whales, River Dolphins, and Dolphins in the Campos Basin.

We hope the next time you see a cetacean, you, reader, have the opportunity to use this guide and increase your interest for these magnificent animals. We only protect what we love and we only love what we truly understand.

EVOLUTION AND ADAPTING TO THE ENVIRONMENT

First, it is important to emphasize cetaceans are aquatic mammals; they are not fish, they have lungs exactly like humans do and need to come to the surface to breath.

The first cetaceans evolved about 50 million years ago, starting with the ancestral land mammals that invaded the aquatic environment during the Eocene Epoch. These old forms, the Archaeocetes, disappeared at least 25 million years ago.

Currently, cetaceans (whales, river dolphins, and dolphins) are represented by nearly 80 species in the entire world, distributed in two groups or suborders, as researchers usually call them: Mysticeti are those that make up the true whales or whales with buccal cirri; and the Odontoceti which make up the cetaceans with teeth.

In Brazil, more than 40 cetacean species can be found and at least 31 of them inhabit the Campos Basin (Table 1).

*The Marine Mammal Studies Group of the Lagos Region - GEMM-Lagos – was formed in July 2002 with the growth of the Arraial do Cabo Whales and Dolphins Project.

We have been active at Arraial do Cabo since 1999, with studies of Humpback Whale migration and monitoring of marine mammal beachings. This was soon expanded to include research activities, expanding by neighboring municipalities (cities) spontaneously. In practice this meant the GEMM-Lagos group acting in all municipalities in the Lagos region from Saquarema to Quissama. Currently, GEMM-Lagos has a basecamp at Praia Rasa in Buzios, operated in conjunction with the Bem Te Vi Foundation activities.

Suborder	Family	Scientific Name	Common Name	C	O	OCR/SA
Mysticeti	Balaenidae					
		<i>Eubalaena australis</i>	Southern Right Whale	X		OC/S
	Balaenopteridae					
		<i>Balaenoptera musculus</i>	Blue Whale		X	OC/S
		<i>Balaenoptera physalus</i>	Fin Whale		X	OC/S
		<i>Balaenoptera borealis</i>	Sei Whale		X	OC/S
		<i>Balaenoptera edeni</i>	Bryde Whale	X		OC/N
		<i>Balaenoptera bonaerensis</i>	Southern Minke Whale		X	OC/S
		<i>Balaenopter acutorostrata</i>	Dwarf Minke Whale	X		OC/DI
		<i>Megaptera novaeangliae</i>	Humpback Whale	X	X	OC/S
Odontoceti	Physeteridae					
		<i>Physeter macrocephalus</i>	Sperm Whale		X	OC/DI
	Kogiidae					
		<i>Kogia breviceps</i>	Pygmy Sperm Whale		X	OC/DI
		<i>Kogia sima</i>	Dwarf Sperm Whale		X	OP/DI
	Ziphiidae					
		<i>Berardius arnuxii</i>	Arnoux's Beaked Whale		X	OP/DI
		<i>Mesoplodon europaeus</i>	Gervais' Beaked Whale		X	OP/DI
		<i>Mesoplodon mirus</i>	True's Beaked Whale		X	OP/DI
	Delphinidae					
		<i>Orcinus orca</i>	Killer Whale	X	X	OC/DI
		<i>Globicephala macrorhynchus</i>	Short-finned Pilot Whale		X	OC/DI
		<i>Pseudorca crassidens</i>	False Killer Whale		X	OC/DI
		<i>Feresa attenuata</i>	Pygmy Killer Whale		X	OC/DI
		<i>Peponocephala electra</i>	Melon-headed Whale		X	OC/DI
		<i>Sotalia guianensis</i>	Estuarine Dolphin, Costero Dolphin, Guiana Dolphin	X		OC/N
		<i>Steno bredanensis</i>	Rough-toothed Dolphin	X		OC/N
		<i>Grampus griseus</i>	Risso's Dolphin		X	OC/DI
		<i>Tursiops truncatus</i>	Bottlenose Dolphin	X	X	OC/N
		<i>Stenella attenuata</i>	Pantropical Spotted Dolphin		X	OC/N
		<i>Stenella frontalis</i>	Atlantic Spotted Dolphin	X		OC/N
		<i>Stenella longirostris</i>	Spinner Dolphin		X	OC/N
		<i>Stenella clymene</i>	Clymene Dolphin		X	OC/N
		<i>Stenella coerulecalba</i>	Striped Dolphin		X	OC/N
		<i>Delphinus sp</i>	Common Dolphin	X		OC/N
		<i>Lagenodelphis hosei</i>	Fraser's Dolphin		X	OC/N
	Pontoporiidae					
		<i>Pontoporia blainvillei</i>	La Plata Dolphin	X		OC/N

(C): coastal community; (O): oceanic community; (OCR/AS): occurrence/seasonality; (OC): confirmed occurrence; (OP): possible occurrence; (S): seasonal occurrence; (N): out-of-season occurrence; (DI) insufficient data.

All cetaceans show adaptations to aquatic living exclusively and pass their entire life in this environment. Their bodies are fusiform, i.e., spindle-shaped, with smooth skin. They have no body hair, they have nostril openings on the upper part of their head, and their forelimbs are flippers. They have a well-developed layer of blubber, internal reproductive organs and mammary glands, integumentary structures formed out of boneless fiber (tail and dorsal fins, with the latter absent in some species). They have no pelvic waist, posterior body parts or ears.

As an important adaptation to aquatic life, during their evolutionary process, cetaceans developed a complex auditory system, having a life in large part dependent on sound. They use sound to detect food, find mates during reproduction, establish social interactions, and in their environment. This is because sound waves spread easily in water, allowing for an efficient way of interaction in the environment.

TAXONOMY

Suborder: Mysticeti or True Whales

True whales have two respiratory openings (erroneously called blowholes) and have structures called buccal cirri, instead of teeth. The cirri are made of keratin, like nails, hair, and horns on other mammals; and are used for eating when water is taken in through the mouth along with the food and then is pushed out with tongue with the food being filtered and swallowed.

Mysticeti can vary in size, from the small Dwarf Minke Whale (*Balaenoptera acutorostrata*) (8m) to the colossal Blue Whale (*Balaenoptera musculus*) (30m), the largest animal on the planet.

Generally, true whales eat invertebrate crustacean zooplankton (small shrimp, krill) and small fish.

In Brazil, there are species from two of the four true whale families (Table 1). Among the most well known are the Humpback Whale (*Megaptera novaeangliae*) and the Southern Right Whale (*Eubalaena australis*), that frequent the Brazilian coast in the winter and spring, during the reproduction season and to raise their young, coming from their Antarctic and sub-Antarctic feeding regions where they spend their summer.

Suborder – Odontoceti (cetaceans with teeth)

The odontoceti have only one respiratory opening and are characterized by the presence of teeth. They also have a melon, an organ on their head which makes an intricate system of interaction with the environment (echolocation system).

The morphological variation among the odontoceti is quite diverse, from very small species, like the La Plata Dolphin (*Pontoporia blainvillei*) (1.75m) to the Sperm Whale (*Physeter macrocephalus*) (18m), the large inspiration for the novel, *Moby Dick*.

In relation to eating habits, some odontoceti species have a varied menu; others have a specialized, restricted diet. The Orca (*Orcinus orca*) and the False Killer Whale (*Pseudorca crassidens*), for example, can eat fish, rays, shark, sea birds, and even other whales. On the

other hand, oceanic species, like the Sperm Whale and beaked whales, basically eat mollusks, more specifically, squid.

Of the nine odontoceti families known currently, seven are found in Brazil (Table 1).

Probably the odontoceti species recognized by the public is the bottlenose dolphin (*Tursiops truncatus*) (the same as the famous TV series, *Flipper*) and the Killer Whale (*Orcinus orca*), Delphinidae with predominant coastal habits, and which are usually exhibited in aquariums. In these locations, they are restricted from a natural lifestyle and are trained to do a series of tasks according to a command from their trainers. This behavior, in general does not imitate their natural behavior.

However, other odontoceti species are among the least known by man, like the Beaked Whales (Ziphiidae Family), the Dwarf Sperm Whale (*Kogia sima*), and the Pygmy Sperm Whale (*Kogia breviceps*). They live in deep waters, far from the coast, their lifestyle is difficult to observe, and their surface behavior is discrete. Additionally, they travel in small groups which makes it even harder to observe. The little information on this species comes from them becoming beached and rare sightings at sea; thus making analysis of beached cetacean carcasses important.

ECOLOGY, DISTRIBUTION AND BEHAVIOR

The different cetacean species do not occur by chance in the oceans and seas, but according to distribution patterns determined by their habits, behavior and ecological needs.

Environmental characteristics also influence these factors. There are species that live in rivers and river mouths to species that exclusively live in deep oceanic regions far from the coast.

To understand them better, it is necessary to understand the principal elements of the underwater terrain: the continental shelf, the continental shelf break, continental slope, and the deep ocean floor.

The continental shelf is a submersed plain along the coast, after which, the ocean bed may or may not suddenly slope off to great depths. The continental slope assimilates an abyss where the depth suddenly increases from 200 to 2000 or 3000 meters down.

For purposes here, it is easier to separate cetacean species according to their environment: coastal species and oceanic species.

Coastal species prefer shallow area, on the continental shelf. They can inhabit the coastal shoreline to the continental shelf break, located 200 meters in depth.

The oceanic species are typically restricted to the continental shelf break, to the slope and the adjacent areas of the deep ocean floors more than 200 meters down.

Despite this clear separation, some species are more versatile in relation to distribution and can live along the coast as well as in the oceans. An example is the bottle-nosed dolphin (*T. truncatus*), seen from along the coast to far away locations such as the Arquipelago of São Pedro and São Paulo. Another example is the Humpback Whale (*M. novaeangliae*) that despite

preferentially migrating to the continental shelf of the Campos Basin, has been seen in oceanic waters with depths up to 3000 meters.

It is possible to find certain species outside their preferred regions. For example, Sperm Whale groups (*P. macrocephalus*) and the False Killer Whale (*P. crassidens*), known oceanic species have been seen close to the continent at Arraial Bay in Rio de Janeiro. It is known oceanic species can come close to the coast in areas where underwater terrain have certain characteristics like underwater mountains, mountain chains, and canyons or where the continental shelf break is close to the shoreline; the latter is the case at Arraial do Cabo where the depth is less than 100m less than 10km from the coast.

In addition to be influenced by the depth and underwater terrain, distribution of some species can also be related to other environmental conditions like surface temperature, salinity, and water clarity, among others. This group of ecological characteristics as well as evolutionary processes of each cetacean species, directly influence their behavioral characteristics. Some cetaceans have developed and transmitted behavior only within their societies or groups. This is cultural transmission. Some known examples are Killer Whales (*O. orca*), in Patagonia, Argentina, and the Crozet Islands (Indian Ocean), and the Bottlenose Dolphin (*T. truncatus*), in Laguna, Santa Catarina, and Torres and Tramandai, in the state of Rio Grande do Sul. Certain Killer Whale groups are capable of hunting sea lions (*Otaria flavescens*) and sea elephants (*Mirounga leonina*) at the edge of the beach, practically out of the water stranding it on the beach intentionally. This hunting technique is transmitted among group members, from adults to the young and calves. However, other local Killer Whales are not capable of expressing the same type of behavior, with this action remaining part of that particular social group. Similarly, Laguna, Torres and Tramandai dolphins relate to the fishermen in those areas, circling fish at the banks of the rivers near the fishermen, where they give a signal to the fishermen indicating the right time to cast their nets. This interaction helps both sides: the fishermen guarantee their work and the dolphins guarantee their food. Other groups of the same species frequenting nearby areas have not developed this kind of behavior.

CONSERVATION AND THREATS

Like other aquatic animals, cetaceans face several kinds of danger from humans on rivers, seas and oceans. Pollution, ship traffic, and fishing constitute the main threats to the survival and the continuation of these species. Pollution from chemical and industrial waste can lead several different populations to the brink of extinction. Once these compound chemicals make it into the environment, they find their way in to the food chain. This is called bio-accumulation and it occurs when the dolphin eats fish that have eaten other fish which are contaminated and the dolphin ends up with the full effects of the pollutants. The pollutants cause endocrine problems in which some hormones do not function properly. This could lead to serious reproductive and development problems. A well-known case is that of the Beluga Whale (*Delphinapterus leuca*) that inhabit the Saint Lawrence River in Canada. This region receives residuals from factories located on the North American Great Lakes, like those in Chicago and Detroit which freely throw several kinds of pollutants into the river, including heavy metals and organo-chlorides. Due to their accumulation, these compounds started to cause irreversible problems. Nowadays, this population is threatened with a large number of cancer cases in the whales and deformations in the calves.

Another problem is the pollution, i.e., that from people in cities, along rivers, on the beaches, or on the sea, throwing trash into the water. Many dolphin species die after swallowing pieces of plastic, lines, and other object which are confused for food. This is a very serious problem

and is increased because of people using plastic cups, straws, and other types of disposable material.

Ship traffic can also be a serious problem for those populations found near ports and busy locations. The Southern Right Whale is an example of this and is more than rarely found dead from being hit and deeply cut by ship propellers.

Like pollution, hunting is another impact which is hard to see the effects in the short term, and many times is only perceived when it is too late. The drastic decrease of stock, in addition to being a threat to the marine-life ecosystem as a whole, also leads to a short basic food supply for whales and dolphins. In many cases, the animals are forced to change their preferred food source or move to another location in search of food.

All these conservation problems can and must be minimized. However, understanding them depends on research on their impact on cetaceans, as well as understanding specie biology and ecology, the implementation of measures to reduce impacts, and the execution of environmental education campaigns for coastal communities, ship employees, and tourists.

Cetacean carcasses found on beaches, due to the large source of information they represent, are of great importance in evaluating the marine environment. If you ever find a beached cetacean or marine mammal, contact researchers and the local fire department.

BALAENIDAE FAMILY

Southern Right Whale (*Eubalaena australis*) – Geographical Distribution

The Southern Right Whale lives in oceanic waters and coastal regions in the southern hemisphere generally between 20°S and 63°S. During the summer and fall, they find food in the Antarctic and sub-Antarctic regions but migrate extensively to the tropic and sub-tropic regions for reproduction and raising their young, where they stay during the winter and spring seasons. The main known locations for raising their young are the coastal areas of south Australia, the Tasmanian Sea, New Zealand (south Pacific), Argentina, Uruguay, Brazil, and South Africa (south Atlantic). The Valdes Peninsula in Argentina is the principal reproductive region for the species in the South Western Atlantic Ocean. In Brazil, there historical records of them in Guanabara Bay (Rio de Janeiro) and Todos os Santos Bay (Bahia), but currently, they can be found from the coast of Rio Grande do Sul to the southern coast of Bahia, (18°S), between July and October.

The largest concentration of the species are seen in coastal areas of the state of Rio Grande do Sul (Rio Grande, Cidreira, Tramandai, and Torres) and the state of Santa Catarina (Garopaba, Imbituba, Laguna, and Cabo de Santa Marta). They are also commonly seen along beaches in the southeast region of Brazil, on the coast of the states of São Paulo and Rio de Janeiro.

In the Campos Basin, Southern Right Whales were seen far offshore, accompanying Humpback Whales (*Megaptera novaeangliae*) during migration. In the Lakes region, and in the area of influence of the Campos Basin, there are records of sightings near the coast of Arraial do Cabo, where the peak of occurrence is in August, and beached at Saquarema, Arraial do Cabo, Grussai, and São Francisco de Itabapoana.

BALAENOPTERIDAE FAMILY

Blue Whale (*Balaenoptera musculus*) – Geographic Distribution

Currently, there are three recognized subspecies of Blue Whales: the True Blue Whale (*B. musculus intermedia*), which lives in high latitudes in the southern hemisphere; the Common Blue Whale (*B. musculus musculus*), which is found in the northern hemisphere in the Atlantic and Pacific Oceans; and the Pygmy Blue Whale (*B. musculus breviceuda*), found at medium latitudes in the Indian Ocean, and at the edge of the North Antarctic convergence. They are found in oceanic waters far from the coast in both hemispheres, in the Atlantic, Indian, and Pacific Oceans from the equatorial regions to the plate boundaries of the polar ice. Still, some populations are most known for frequenting coastal waters, like those of Baja, California (North Pacific) and Nova Scotia/Newland (North Atlantic). There are also recorded sightings at the Gulf of Aden, Arabian Sea, Bay of Bengal, Malaga Strait (Indian Ocean), and the Chilean coast (South Pacific).

Populations in the South Atlantic primarily frequent polar and sub-polar waters in the summer, between latitudes of 60-70°S; but there is no information on their movement during the austral winter.

In Brazil, the Blue Whale is the rarest balenopterideo, with only seven recorded sightings: two during hunting operations for Minke Whales along the Paraíba coast (1980 to 1985), one recently beached in Rio Grande do Sul (1992), and three specimens captured during the hunting season, two of which were on the Paraíba coast. The only recorded Blue Whale sighting for the Campos Basin and southeastern region of Brazil is one specimen captured near Cabo Frio and unloaded at the Arraial do Cabo processing station in 1962.

Fin Whale (*Balaenoptera physalus*) – Geographic Distribution

Fin Whales live in oceanic waters in both hemispheres and have a wide distribution between the latitudes of 20-75°S and 20-75°N. Some Fin Whale populations are relatively better known, like those in Nova Scotia and Labrador (North Atlantic), those in the Mediterranean Sea (France and Italy) and those seen from central California and British Columbia (North Pacific). Many of these populations' migratory movements in areas far from the coast and their winter regions in low and medium latitudes are still little known. However, new discoveries indicate the existence of resident populations throughout the whole year. An example being the group that lives in waters in the Gulf of California. In South America, there are recent records of sightings on the Chilean coast (South Pacific), Venezuela (North Atlantic), the Drake Passage, South Shetland Islands, and Elephant Island (South Atlantic).

In Brazil, the large part of the sightings come from hunting station reports, especially from the Taiyo industry which operated at Arraial do Cabo between 1960 and 1963. From 1980 to 1986, nine individual sightings of the *B. physalus* during the Minke Whale hunting season on the coast of Paraíba. There are only two recorded beachings, one in Peruipe (São Paulo) in 1941, and the other in Guarajuba (Bahia), in 1991. Recently, in 2002 two sightings were recorded in deep waters in the Santos Basin, in block BS-400. Given this rare occurrence in Brazilian waters, it is speculated that the winter regions of the South West Atlantic Ocean population was located in areas far from the coast at medium latitudes (>23°S).

Sei Whales (*Balaenoptera borealis*) – Geographic Distribution

Sei whales spend the summer in feeding areas situated at high latitudes, particularly in Antarctic waters and a part of the eastern North Atlantic and North Pacific Oceans. They are found in deep areas far from the coast and in both hemispheres, generally associated with the continental slope. Like other balenopterideo species, the Sei Whale has a large migratory path to winter areas situated in low and medium latitudes, practically unknown.

In South America, there are recent recorded sightings on the coast of Chile (South Pacific – fall, winter, and spring), Ushuaia (Argentina), the Drake Passage (Argentina/Chile) and the Bransfield Strait (Antarctic Peninsula).

On the Brazilian coast, the Sei Whale was abundant as confirmed whaling hunts recorded in the 20th century in the northeastern region and at Cabo Frio. Along the coast of Paraíba, 74 individual whales were sighted between 1980 and 1985, during Minke Whale hunting operations. Currently, recorded sightings in this old hunting area (2000) and in deep areas in the Santos Basin (2001 and 2002) and along Espírito Santo (2005).

The species occurring in the ocean in Brazil are confirmed by rare beaching records: one in Ilha Velha (1980), a 12-meter male in Bertioga (1988) two skeleton heads collected at Florianopolis (1989) and in Rio Grande do Sul (1994), respectively.

Bryde Whale (*Balaenoptera edeni*) – Geographic Distribution

Bryde Whales are found in coastal and oceanic waters and in both the hemispheres, between latitudes of 40°S and 40°N. Some populations are residents, like those that inhabit the California Gulf and the coast of South Africa. In South America, there are historic records and recent ones for the coast of Chile (South Pacific), Venezuela (Equatorial Atlantic), Argentina, and Brazil (South Atlantic). The Bryde Whale has recorded beachings on the Brazilian coast from the state of Maranhao to Rio Grande do Sul. A large number of the sightings are concentrated in the southeast region of Brazil, where the species is frequently seen in areas near the coast or associated with the coastal islands, like the Arquipelago de Alcatrazes (Sao Paulo), Ubatuba (São Paulo), Parati (Rio de Janeiro), Ilha da Marambaia (Rio de Janeiro), Barra de Guaratiba (Rio de Janeiro), Barra da Tijuca (Rio de Janeiro), and Praia Seca (Rio de Janeiro). In the Campos Basin and its area of influence, the Bryde Whale is commonly seen from along the coast of Arraial do Cabo (spring, summer, winter) and Buzios (spring, summer, and fall), as well as in the areas farther away from the coast of Arquipelago de Santana / Macae (summer) and on the Cabo Frio continental Shelf, to the line depth of 200 meters. According to their local patterns of distribution, the species is considered a coastal community component of the Campos Basin cetaceans.

Antarctic Minke Whale (*Balaenoptera bonaerensis*) – Geographic Distribution

The Antarctic Minke Whale restricted to the southern hemisphere, highly migratory, is found on the Antarctic Continent during the austral summer, between 60°S and 70°S from the coastal limits of the ice pack to the oceanic areas. During the winter and spring they are found in tropical and subtropical oceanic areas of the southern hemisphere throughout all the oceans. In Brazil, the species is found in deep areas on or beyond the continental slope from Rio Grande do Sul to the northeastern region of the country. There is an important reproduction area along Paraiba where there were sightings of peak density in September and October. In the same area, specie distribution is essentially oceanic, between depths of 2000 and 3000 meters. In the Campos Basin, Antarctic Minke Whales can be seen during their migration, between July and September, especially on the continental slope, between 300 and 3000 meters in depth. In August 2004, one that became beached and lived at the Praia dos Ossos, in Buzios, Rio de Janeiro was returned to the ocean successfully. The Dwarf Minke Whale, which is thought to have its area for raising young in the South West Atlantic Ocean found at medium latitudes has been seen in small numbers of pairs of mother and her calf in the northeastern region of the country.

Dwarf Minke Whale (*Balaenoptera acutorostrata*) – Geographic Distribution

The Dwarf Minke Whale which is restricted to the southern hemisphere and is apparently migratory, is found in Antarctic and sub-Antarctic waters during the summer, and in tropical and subtropical waters during the winter and spring. A large part of the known records come from Australia, New Zealand, and New Caledonia (South Pacific), Argentina, Uruguay, and Brazil (South Atlantic) and the Atlantic and Indian coasts of South Africa. On the Brazilian coast

the Balenopterideo has the largest recorded number of beachings from the Rio Grande do Sul coast to the Paraíba coast (7°S).

There are still many doubts about the distribution patterns and occurrence of Dwarf Minke Whale on the east coast of South America. Normally, low latitudes of the northeast coast of Brazil would be a reproductive region for the species, as seen at the Great Coral Reef in Australia, where there are several during the winter and spring. In fact, sexually mature whales were hunted in deep waters along the coast of Paraíba. On the other hand, large numbers of Dwarf Minke whales have ever been seen in the northeastern region of Brazil. Additionally, a large percentage of those becoming beached have been in the south and southeast regions. These facts support the hypothesis that these whales are more common in medium latitudes of the South Western Atlantic Ocean. Another curious fact is that newborns, very young, and females with their calves are only seen or caught in latitudes above 12°N. This suggests that medium latitudes of the South Western Atlantic Ocean, situated between the north of Argentina and the southeast of Brazil, can serve as a permanent area for immature whales and calves, while reproductively active whales can use the low latitudes exclusively as an area for coupling.

Approximately 80% of the total number of Minke Whales that become beached on the Brazilian coast correspond to Dwarf Minke Whales, suggesting that their distribution is predominantly coastal and tied to the continental shelf. Additionally, the few confirmed sightings of *B. acutorostrata* in Brazil basically come from areas situated between the coast and the continental shelf break to the depth of 200 meters.

Their migratory patterns are still not very clear. On the Brazilian coast, the species is seen 11 months of the year, with the exception of March, and with peak occurrences between June and September. Along the highly productive coastal zone of Arraial do Cabo, an area of influence of the Campos Basin, Dwarf Minke Whales were seen showing feeding behavior in the summer. This could mean part of the *B. acutorostrata* population do not go to sub-Antarctic feeding locations, but stay in productive waters on the Brazilian coast throughout the year. In the Santos Basin, some groups have already been seen near Rig PXIV, showing a certain degree of interaction with oil rigs. Recently sightings were made on the continental shelf break, the slope, and adjacent deep waters of the Santos Basin (BMS 8, 9, 10, and 11, and BS-400) and Campos (BC-20).

Humpback Whale (*Megaptera novaeangliae*) – Geographical Distribution

A cosmopolitan species found in all the oceans and in both hemispheres, the Humpback Whale migrates over a large region between polar or sub-polar feeding areas, where it spends the summer and fall, and tropical areas for reproduction and raising the young during the winter and spring. They are found preferentially in coastal waters on the continental shelf from the polar ice pack to equatorial areas. Paradoxically, it can migrate to deep areas and it shows a certain predilection for oceanic islands far from the coast. Some populations are relatively well known, like the ones that move between Alaska and Hawaii (North Pacific). In the southern hemisphere there are recognized stocks on the Atlantic and Indian coasts of Africa, in south America, Australia, New Zealand, and Tonga.

In South America there are at least two distinct populations that have been studied recently: the group that migrates between the west face of the Antarctic Peninsula and the Pacific Ocean coast (Ecuador/Columbia) and the group that migrates between the South Georgia/South Sandwich Islands and the northeastern coast of Brazil in the Atlantic Ocean. On

the Brazilian coast, there are records of beachings from the coast of Rio Grande do Sul up to the state of Ceara, but normal areas of occurrences extend to the southeastern region to the northeastern continental shelf, reaching distant areas like the Arquipelago of Fernando de Noronha. The Abrolhos Banks represent the main reproductive region of the species throughout the South Western Atlantic Ocean, where density peaks are seen in September and October.

During the migration toward the northeast, the largest group of Humpback Whales to frequent Brazilian waters come near the coast starting on the Rio de Janeiro coast. Sightings in coastal waters were recorded at Arraial do Cabo and Buzios, especially between mid-July and the end of August. In the Campos Basin, where it has been shown the existence of a migratory corridor for the species, groups can be seen moving toward the northeast region from June to September, including near oil rigs. Their migratory movements toward the south are little known, but some sightings have been made in the Lagos region between the start of November and the last half of December. Recent telemetric studies via satellite show more oceanic movement heading south (starting at 24°S), when the last groups leave the Brazilian coast at the end of December, during their return trip to the Antarctic.

Despite preferentially migrating to areas up to 200 meters in depth, on the continental shelf, Humpback Whales show a wider distribution in the southeastern region, occupying deep areas far from the coast. Recently, groups were seen on the continental slope of the Santos and Campos Basins, confirming occurrences of the species in areas up to 3000 meters deep.

Sperm Whale (*Physeter macrocephalus*) – Geographical Distribution

Sperm Whale distribution goes from the tropics to the polar regions; but only the males go beyond latitudes of 40° in the two hemispheres. Sightings are common in the South Atlantic. The GEMM-Lagos has recorded beachings of Sperm Whales at Praia Grande, Arraial do Cabo in 1999, and a sighting in the same municipality from land, starting at the Pontal do Atalaia. However, recently, a 3.26 meter newborn became beached at Rio das Ostras.

Pygmy Sperm Whale (*Kogia breviceps*) – Geographical Distribution

The Pygmy Sperm Whale is found in all tropical and subtropical oceans and temperatures. In Brazil, they have become beached in the states of Rio Grande do Sul, Sao Paulo, Rio de Janeiro, Pernambuco, and Paraiba. These cetaceans prefer oceanic oceans, avoiding the continental shelf.

Dwarf Sperm Whale (*Kogia sima*) – Geographical Distribution

Apparently, Dwarf Sperm Whale distribution is throughout all tropical oceans and temperatures. Since sightings are pretty rare, most of the information is from beachings. In Brazil, there are records of beachings in Rio Grande do Sul, Parana, Sao Paulo, Bahia, Sergipe, Paraiba, and Ceara. There was a report of a Dwarf Sperm Whale becoming beached on Farol de Sao Thome Beach, in the Campos Basin, in 2001.

BEAKED WHALES

Arnoux's Beaked Whale (*Berardius arnuxii*) – Geographical Distribution

These whales are only found in the southern hemisphere in warm and cold. They are commonly seen in Antarctic waters where they can form groups of 6 to 10 whales. There are two known records of these whales on the Brazilian coast: one floating in the Sao Sebastiao Channel on the northern coast of the state of Sao Paulo in August 1993; the other more recent sighting was in January 2004 on the northern coast of Rio Grande do Sul.

Gervais' Beaked Whale (*Mesoplodon europaeus*) – Geographical Distribution

This is a species that inhabits tropical waters and is relatively common in the Gulf of Mexico and the Caribbean. There are also some records of it being seen in Africa and Ascension Island, located in the middle of the Atlantic Ocean. There were no known records in Brazil until recently when one in perfect condition became beached on the Sao Paulo coast. There was another report of one on the coast of the state of Ceara.

True's Beaked Whale (*Mesoplodon mirus*) – Geographical Distribution

True's Beaked Whale is found in the North Atlantic and Pacific Oceans and in the southern part of Africa and Australia, suggesting a distribution in warm environments as well as tropical. Until recently there were no records of this species in Brazil. A male became beached in Sao Sebastiao on the northern coast of Sao Paulo and this was the first to be reported in South America, indicating a possible continuous distribution between the northern and southern populations. Before this, they were thought to be separate.

Killer Whale (*Orca*) (*Orcinus orca*) – Geographical Distribution

Of all the whales, the Killer Whale has the widest distribution throughout all the oceans. They can be found from the North Pole to the South Pole, in oceanic and coastal waters. Although they are cosmopolitan, they prefer warm and cold waters and are more abundant there. On the Valdes Peninsula, in Argentina, they hunt southern sea lion calves just learning to swim. The adult whales do this by purposely running sea lions ashore and capturing the calves that are on the edge of the beach. This behavior can be seen in few places throughout the world (e.g., Crozet Islands) and is passed on from generation to generation. In the Campos Basin, these whales have been seen somewhat frequently, including near the coast. On the Brazilian coast they are commonly seen along Rio Grande do Sul up to Rio de Janeiro, where reports become less frequent in northeastern oceanic waters. The GEMM-Lagos has 27 reported sightings of Killer Whales from along the coast of Buzios and Arraial do Cabo and from ships in the same area. Two reports of beachings are confirmed in the Campos Basin with one being found and was autopsied by the group at Praia Grand, Arraial do Cabo in July 2001.

Short-finned Pilot Whale (*Globicephala macrorhynchus*) – Geographical Distribution

The Short-finned Pilot Whale is found in deep tropical and temperate waters throughout all the oceans. This species prefers tropical waters while the Long-finned Pilot Whale limits itself to temperate and cold waters. In Brazil, the species does not seem to be found in the southern part of Sao Paulo, where known records are of Long-finned Pilot Whale (*Globicephala melas*). There are confirmed beachings in Piaui, rio Grande do Norte, Paraiba, Pernambuco, Bahia, and Sao Paulo. For the Campos Basin and surrounding areas, there are three recorded beachings, one in Espirito Santo (Guarapari) and the other two in the municipality of Arraial do Cabo in Rio de Janeiro. The most recent one was a 4.15 meter male autopsied by the GEMM-Lagos group in June 2004.

False Killer Whale (*Pseudorca crassidens*) – Geographical Distribution

The False Killer Whale can be found in all oceans, in temperate and tropical waters. It is believed they do not frequent colder regions. In the South Atlantic, the species can be found from Terra do Fogo, Argentina up to the equator. There are records of sightings in Argentina, Uruguay, Brazil, and Africa. In Brazil, there are confirmed sightings in Paraiba, Espirito Santo and the south coast. GEMM-Lagos has one sighting from land in the South Atlantic at Arraial do Cabo in 2003. There are also reports of beachings from the northeastern region to the south of Brazil. In the Campos Basin, there was a recorded beaching in Buzios and a newborn was accidentally captured in a fishing net near Atafona on the northern coast of Rio de Janeiro.

Pygmy Killer Whale (*Feresa attenuata*) – Geographical Distribution

The Pygmy Killer Whale is found in tropical and subtropical oceanic waters throughout all oceans, preferring warmer tropical waters. Beachings are rare on the coast of Brazil, and little is known about their distribution.

Melon-headed Whale (*Peponocephala electra*) – Geographical Distribution

The Melon-headed Whale seems to have the same distribution as the Pygmy Killer Whale, occupying tropical and subtropical oceanic regions. There are few records of them in the South Atlantic. In Brazil, there are reports of beachings in the states of Bahia, Ceara, and Alagoas. In April 1987, there was a mass beaching of at least 240 of the whales on the beaches of Itacare in Bahia.

Estuarine Dolphin, Costero Dolphin, Guiana Dolphin (*Sotalia guianensis*) – Geographical Distribution

This dolphin's distribution goes from Honduras in Central America to Santa Catarina in southern Brazil. These are coastal dolphins generally associated with outlets and estuaries and therefore, are present in cloudier water.

On the northern coast of Rio de Janeiro, they are seen from Barra de Sao Joao, associated with the Sao Joao River outlet, to the northern boundary of the Campos Basin region, with

emphasis in the areas like Macae, Carapebus, and Quissama (location of the Jurubatiba Sandbank National Park) and Atafona (Paraíba do Sul River outlet).

Rough-toothed Dolphin (*Steno bredanensis*) – Geographical Distribution

The Rough-toothed Dolphin can be found in tropical oceans and moderately warm climates, generally above 25°C. They are found on the Brazilian coast, and the most austral geographical limit known in the South Atlantic is the coast of Rio Grande do Sul. The GEMM-Lagos group has recorded several sightings and collected carcasses on beaches between Arraial do Cabo and Quissama.

Risso's Dolphin (*Grampus griseus*) – Geographical Distribution

This dolphin is found in deep tropical temperate waters throughout all the oceans. In Brazil, the species probably can be found along the entire coast in deep waters. In the Campos Basin, they have been seen feeding near an oil production rig.

Bottlenose Dolphin (*Tursiops truncatus*) – Geographical Distribution

These are found in all tropical temperate waters, being one of the small cetaceans with a large distributions in these locations. It is a typically coastal dolphin and is able to live in lakes and estuaries and are become seen more often seen in groups in deep waters, including living around oceanic islands. In the South Atlantic they are found from the state of Amapá in Brazil to the Chubut province in Argentina. Sightings in the Campos Basin are common. The GEMM-Lagos group has recorded several sightings of *Tursiops truncatus* from the coast of I sightings of *Tursiops truncatus* on the coasts of Buzios and Arraial do Cabo. Large groups of approximately 150 members have also been seen in deep waters from cruise ships in the Campos Basin. One group has 10 recorded beachings in the same region.

Pantropical Spotted Dolphin (*Stenella attenuata*) – Geographical Distribution

the Pantropical Spotted Dolphin is found in all oceans, mainly in tropical waters. In Brazil, they are recorded from the northeast to Rio de Janeiro, which appears to be the southern limit of distribution of this species in the South Western Atlantic Ocean. It lives in deep waters between the continental slope and 4500 meters and appears not to be found on the continental shelf. In the Campos Basin region, this species is found close to oil rigs on the continental shelf, at depths of 500 to 1000 meters.

Atlantic Spotted Dolphin (*Stenella frontalis*) – Geographical Distribution

The Atlantic Spotted Dolphin, as the name suggests, is found only in the Atlantic Ocean. Although they can be found in the North Atlantic as well as the South Atlantic, in the Caribbean and in the Gulf of Mexico, its distribution is associated to tropical temperate regions. In Brazil, the Atlantic Spotted Dolphin can be found almost exclusively on the continental shelf and hardly ever deep waters beyond the continental slope, generally between 30 and 1000 meters deep. However, a large part of the records are at depths of 200 meters. In Brazil, this is the most commonly seen species on the continental shelf in the south and southeast region. On

the Brazilian coast, this species can be divided into two populations, when it is not seen between the north of Espírito Santo and the south of Paraíba, returning and being seen again from Paraíba to Ceará. The region north of the Campos Basin seems to be the northern limit of distribution of the southern population. In this area sightings, beachings, and accidental captures are relatively common. There are no known records of the Atlantic Spotted Dolphin in the states of Bahia, Sergipe, Alagoas, Pernambuco, Piauí, Maranhão, Pará, and Amapá; in these last four states, there are nearly no cetacean research groups in coastal and oceanic waters.

Spinner Dolphin (*Stenella longirostris*) – Geographical Distribution

The Spinner Dolphin is found in all oceans. They are mainly found in tropical and temperate waters, being found on outside the continental shelf as well as deep waters. In Brazil, there are records from almost all parts of the coast, being seen at depths between 170 and 2700 meters. At Fernando de Noronha, there is a resident population which uses the Bay of Dolphins daily to rest and reproduce, after spending the night feeding in deep waters. In the Campos Basin region, this species is seen close to oil rigs on the shelf slope, in waters of 300 to 1000 meters deep.

Clymene Dolphin (*Stenella clymene*) – Geographical Distribution

The Clymene Dolphin as well as the Atlantic Spotted Dolphin are found exclusively in the Atlantic Ocean, in the Caribbean and in the Gulf of Mexico. In Brazil, although it can be seen in Rio Grande do Sul, it is mainly seen in tropical waters on the northeastern coast of Brazil in deep waters from 1000 to 4500 meters deep. In the Campos Basin region, there have not been any beachings or confirmed sightings of this species, but it is believed to be found in deep waters.

Striped Dolphin (*Stenella coerulecalba*) – Geographical Distribution

The Striped Dolphin is found in every ocean. Different from other *Stenella* dolphin species, this one is also found in temperate or even cold waters, in the South Atlantic as well as the North Atlantic where they have been seen at 50° latitude. On the Brazilian coast more than half of the beachings occur in Rio Grande do Sul, where the Falkland Current is very strong. Even though the preferred depth for this species is unknown, records of accidental captures in shallow waters of the continental shelf are known, suggesting it can be found on the continental shelf as well as deeper waters, as seen in other parts of the world. In the Campos Basin, although there are no known records of the species, there are records for the coast of Rio de Janeiro.

Common Dolphin (*Delphinus* sp.) – Geographical Distribution

The Common Dolphin is widely distributed in practically all the oceans, including the Black Sea and the Mediterranean Sea, where a large abundance of them could have been in the past, thus giving the species its name. The Common Dolphin are found in coastal waters as well as oceanic waters. In Brazil, they can be found in the limited regions of the southeast. In the Campos Basin region, Common dolphins are seen frequently, mainly near Arraial do Cabo, very close to the coast, in productive waters strongly influenced by the phenomenon of resurgence.

This region seems to be one of the only places on the Brazilian coast where the Common Dolphin is seen daily.

Fraser's Dolphin (*Lagenodelphis hosei*) – Geographical Distribution

Fraser's Dolphin is distributed throughout all the oceans, in temperate tropical waters between 30°N and 30°S. The species was recorded for the first time on the coast of Brazil in 1997 where a series of live beachings occurred in Rio Grande do Sul and in Rio de Janeiro almost simultaneously (probably due to a mortality event which started in Uruguay). Afterwards, sporadic beachings occurred in Santa Catarina, Sao Paulo, Rio de Janeiro and Ceara. Although it is considered a tropical species, on the Atlantic coast, in South America, records are concentrated in temperate waters, mainly in Argentina, Uruguay, and southern Brazil. Up till now, no groups of these animals have been seen in their natural environment on the coast of Brazil, suggesting that the species can be relatively rare here. In the Campos Basin, sightings have been restricted to a few individual dolphins found beached in 1997 and others in following years. Curiously, some of them show evidence of coming into contact with the morbillivirus, suggesting that the 1997 mortalities, which involved more than 100 animals in Argentina, Uruguay, and Brazil can mean more complex phenomenon than simply lost animals or those outside their habitual distribution zones, as usually cited.

La Plata Dolphin (*Pontoporia blainvillei*) – Geographical Distribution

The distribution of this species is restricted to the coastal waters of the South Western Atlantic Ocean, where they are found in separate areas, not a continuous extension, between Itaunas (18°25'S; 30°42'W), Espirito Santo, and the New Gulf (42°35'S; 64°48'W), the Valdes Peninsula, Argentina. Although they are considered by many to be members of the river dolphin (superfamily Platanistoidea), the La Plata Dolphin is mainly found in coastal ocean waters. Nevertheless, their occurrence on the Uruguayan side of the La Plata River seems to be relatively common. Although there are records of them being found in areas with a depth of 60 meters, their preferred regions are in waters of no more than 30 meters deep.

Evidence indicates that distribution is not continuous along the South Western Atlantic Ocean, where there are two areas in which the species is very rarely or even non-existent. One of those areas is situated between Macae (Rio de Janeiro) and Ubatuba (northern Sao Paulo); the other is north of Atafona (northern part of Rio de Janeiro) to Rio Doce (Espirito Santo). The reason for this is still not clear, but it is believed predators, water clarity, and depth are among the factors.