

May-1982

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Recommended Citation

Jahoda, John C. (1982). The Whales of Cape Cod. *Bridgewater Review*, 1(1), 1-4.

Available at: http://vc.bridgew.edu/br_rev/vol1/iss1/4

The Whales of Cape Cod Bay

By
John C. Jahoda

In recent years, public concern for marine mammals has resulted in the rediscovery of our native New England whales. However, this time instead of hunting them for their oil, whale bone and flesh, we follow whales to learn more about the ecology and behavior of these, the largest of all mammals. Growing public interest in whales has resulted in several successful whale watching enterprises through which large numbers of people have a unique and unforgettable opportunity to view whales up close. The first Massachusetts whale watch was started by Captain Albert Avellar of Provincetown with his boat, the Dolphin III. Groups from Bridgewater State College were among the first to start whale watching with Captain Avellar. For the past 6 years groups from Bridgewater have gone every spring and fall on several whale watches. Whales have been spotted on all these trips and many excellent opportunities to observe whales have resulted.

Public trips have done more than allow large number of people to see whales. They have contributed to a growing public awareness of, and support for, whale conservation and protection. In addition, these trips have provided a unique opportunity for scientific observation of whales. Dr. Charles "Stormy" Mayo of the Provincetown Center for Coastal Studies started whale watching with Captain Avellar and has been able to gather seven years of valuable data. These observations are beginning to provide answers to some very basic questions about whales and their habits. At Bridgewater, we have been cooperating with Dr. Mayo in his research. Bridgewater graduate student Carol Carlson has been working on the problem of scarification in the Humpback whale, in an attempt to perfect a system of individual identification and to understand the mechanism by which such scars may be acquired and how the patterns of scars change as the animal ages. We will continue to coordinate our research efforts with those of Dr. Mayo

since his data represents definitive baseline data on the population of whales from Cape Cod Bay.

Whales belong to a group of marine mammals called the *Cetacea*. Over 21 species of *cetaceans* have been recorded off our coast. Today seven species are commonly seen: Humpback, *Megaptera novaengliae*; Finback, *Balaeoptera physalus*; Minki, *Balaeoptera acutorostrata*; Pothead whales, *Globicephala melaena*; Harbor porpoise, *Phocoena phocoena*; White-sided dolphins, *Lagenorhynchus acutus*; and the Common dolphin, *Delphinus delphis*. Occasional sightings have been made of the common Sei whale, *Balaenoptera borealis*; Right whales, *Eubalaena glacialis*, and killer whales, *Orcinus orca*. The giant Blue whale, *Balaenoptera musculus*, and the Sperm whale, *Physeter catadon*, are rarely observed.

The earliest *cetaceans* are an archaic group called the *Archaeoceti* which were long and serpent-like in appearance and were first seen in the middle Eocene Period about 50 million years ago. Whales of the modern type were to be found by the Miocene about 35 million years ago. (It was during the Miocene Period that the early apes appeared which are the dim ancestors of both modern apes and man.) Modern whales are divided into two major groups: The *Odontoceti* and the *Mysticeti*. The *Odontocetes* are the

toothed whales. They have many cone-like teeth and feed primarily on fish and squid. They have several physiological adaptations which enable them to dive to great depths and communicate with each other with high-pitched sounds. These whales have a sophisticated and highly-developed sonar, which allows them to navigate and find their food at great depths using sound waves for echolocation. The majority of whales are *Odontocetes* and most of them are small. Only one, the Sperm whale reaches a size large enough to be considered a great whale.

In Cape Cod Bay, we commonly find several species of *Odontocete*. The most commonly observed is the white-sided dolphin. White-sided dolphins are about nine feet long when mature. They are attractive animals with a large white or cream colored blaise on the side which gives them their common name. The white-sided dolphin is commonly found with larger whales and will be observed in pods of up to 200 or so individuals. It feeds primarily on fish, and has been observed spreading out over the Bay in search of schools of bait fish. Once a dolphin locates a school, it communicates with the other dolphins using high-pitched sounds. This efficient method of hunting allows the dolphin to effectively utilize the food resources of the Bay. White sides will often approach a boat while it is

underway and take advantage of the pressure waves created as the boat passes through the water and bow ride. When bow riding, the dolphins are carried along by the bow wave of the boat with little effort on their part.

Another dolphin which is less frequently encountered is the Common dolphin. Common dolphins reach a length of about eight-and-a-half feet. They are black above and white on the belly with a distinctive figure-eight pattern of grey or ochre along the sides. Common dolphins are among the most abundant small whales in the world, but are seldom seen in coastal waters, due



Humpback Breaching

Photo by Carol Carlson

to their preference for off-shore deep water. They are also much more common in warmer water regions. I have seen large schools of them in the warm waters off Baja, California, but have only seen them occasionally off New England.

Other *Odontocetes* which are occasionally observed in our waters, are the Pothead whales, Risso's dolphin, and the Harbor porpoise. The harbor porpoise, is actually fairly common, but this, the smallest of the whales, is quite secretive in its behavior. It does not approach boats and does not jump out of the water and so is usually overlooked.

The most impressive whales found in our waters belong to the order, *Mystecieti*, the Baleen whales. These whales have lost their teeth and have evolved a unique straining device formed from large plates of epidermis. These baleen plates hang down from the roof of the mouth and form a massive sieve through which the whale can strain sea water for food. When the whale is swimming toward you with its mouth open these plates resemble a moustache. The word *Mysticete* comes from a Greek word *mystax* meaning moustache. Baleen whales are often thought of as feeding on plankton, which are very small microscopic plants and animals. Actually, not all of them feed on plankton. Many feed on small fish or small invertebrates. The coarseness of the baleen, number of plates, size of the mouth and other variations are directly related to the type of food upon which the whale commonly feeds. The daily food demands of the Baleen whale is 2-4 percent of its body weight. A 45-foot adult Finback weighing fifty tons will eat about one or two tons of fish a day. The least frequently seen of our Baleen whales is the Right whale. Today, Right whales are regarded as a highly-endangered species. Almost one-third of the body length is head, with massive plates of very fine baleen. Right whales feed on minute orange calanoid copopods called brit, the smallest food of all whales. They also probably feed on other small zooplankton such as lobster-krill and pteropods. Because of their slowness, bouyant carcasses (they float when killed), and high yield of oil and baleen, Right whales were ruthlessly exploited in the past and are now very rare.

It is the Right whale and the other Baleen whale along with the Sperm whale that are considered to be the great whales. The Blue whale, the largest of all whales, reaches nearly 150 tons and a length of 100 feet. The Blue whale was found off our coast in the past but today

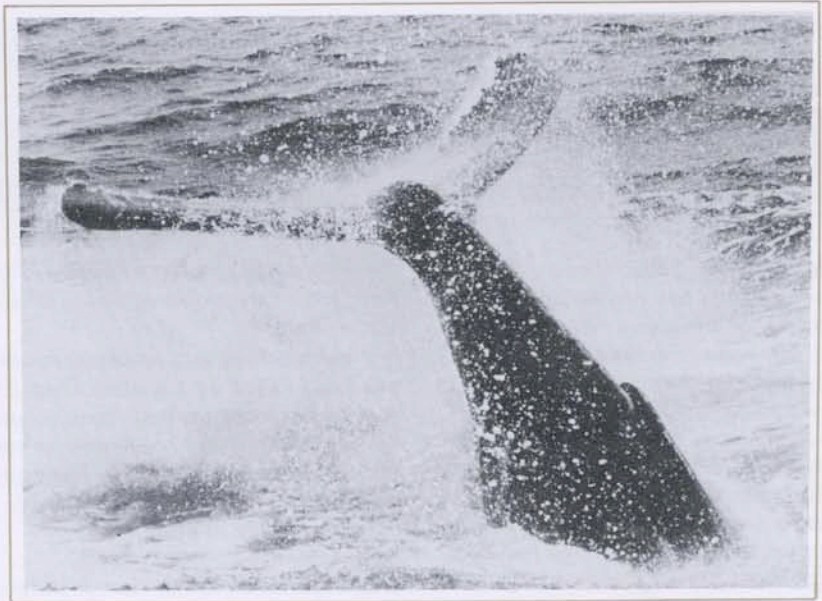


Photo by Carol Carrison

Humpback Loptailing

it has been so decimated by whaling that it is seldom seen. The second largest whale, the Finback whale, occurs commonly in our waters and is the most abundant of our native whales. The Finback can be observed moving in large groups of 30 or more individuals feeding on small fish. The baleen of the Finback is coarser than the Right whale and its diet of larger crustaceans and small fish reflects this. These whales are among the fastest swimming of all whales. Speeds of up to 20 knots have been recorded. Finback whales can dive to depths of 650 feet. The Finback can measure up to 80 feet, but we seldom see animals much larger than about 60 feet in length. It weighs up to about 60 tons. This commonly-sighted whale is grey on the back and white on the underside. A curious characteristic of the Finback is that the lower right lip, sometimes the upper right lip and about a third of the baleen on the right side is usually white in color. The Finback is the most hunted whale in the world with the annual catch by whalers being about 25,000 whales. It is completely protected in United States waters but elsewhere in the world the slaughter continues. As Finback populations are decimated, whale killers are now turning to the smaller Mink to take up the slack.

Very similar to the Finback in general appearance is the small Mink whale, which only gets to be about 30 feet and 11 tons. It has been noted that the Blue, Finback, Sei, and Mink represent various sized versions of the same general type of whale. Fast swimming, these whales were relatively safe from whaling during the days of historic New England whaling. However, they have no defense against

modern whalers with high-speed catcher boats and explosive harpoon guns. The Finback and Mink are usually observed swimming at relatively high speed or massing into feeding groups when food fish are abundant.

By far the most interesting of our local whales is the Humpback whale. The Humpback is a Baleen whale but is a very different type of whale from the general fin-type whale. The Humpback's scientific name means *large-winged New Englander* and refers to its most striking characteristic - its tremendous flippers. These flippers are usually white in color, although occasional individuals do occur with dark flippers, and measure one third of the body length. The whale uses them for acrobatic maneuvering under water. They are also used by the whale for some very spectacular surface display behavior. Humpbacks on the surface have been observed to repeatedly slap the water with their huge flippers. Sometimes the whale may lie on its back and hit the water simultaneously with both flippers. The purpose of this display is unclear. It may be a territorial defense; a means of communication with other whales; a way of announcing presence; a means of frightening predator fish, such as blue fish away from the food fish; or simply a means of having fun. All of these explanations have been advanced, and we are still attempting to determine the actual role of this behavior in the life of the whale.

Humpback whales are relatively slow-moving animals. Their normal cruising speed is 4 knots. Top speed for a Humpback is approximately 10 knots. The Humpback whale averages about 50 feet and reaches a weight of 30 tons. It is

the most acrobatic and fearless of the Baleen whales and, because of its playfulness, curiosity, and acrobatic maneuvers, it is the favorite of whale watchers. Since the whale watchers seek them out, people may get the impression that they are fairly common. Actually they are very rare and are on the endangered species list. The entire North American population of Humpbacks is estimated at only around 4,000 animals. On one of our trips last fall we observed one of the largest concentrations of Humpbacks ever recorded off our coast. Over 50 individuals were recorded. To see this many Humpback whales on one trip is truly the experience of a lifetime. At present it is suspected, but not proven, that such groupings are actually family units or small isolated stocks.

spectacular, especially when viewed close up. Most common is surface feeding where the whale simply swims through the massed food fish with its mouth open. Fish and water enter the front and the water is forced out through the baleen. Another frequently observed feeding maneuver is lunge feeding. The whale will come up under the school of fish and lunge out of the water with its mouth open. The mouth fills with food and water and the throat expands into a massive fluid-filled sack. Special grooves on the throat allow for this expansion. These grooves are found in many Baleen whales and the term "rorqual" is used to describe whales with a large number of expansion folds or pleats. The whale then settles into the water straining the water through its baleen.

Humpbacks. In the shallow dive the whale moves just under the surface. The back is arched only slightly for a shallow drive and the tail flukes are seldom shown. In the deep dive the arch of the back is much more pronounced and the flukes are often shown. By contrast, a diving Finback seldom shows its flukes. The deep diving whale can remain underwater for about 10-20 minutes. The usual span is about 8 minutes before the whale returns to the surface.

The deep dive has provided scientists with a means of identifying individual whales. A number of years ago Steve Katona at the College of the Atlantic started a catalog of whale tails (Katona et al, 1981). This catalog has been expanded by contributions from other researchers and now includes a sizable sample of the



Humpback on side, showing fluke & flipper

Photo by John Jahoda

Humpbacks will approach boats on occasion and seem to be interested in the attention that is paid to them. Last fall two Humpbacks spent over two hours along side our boat. The whales repeatedly dived under the boat and surfaced close to the boat on the other side. Such close encounters with whales are truly memorable. When close to the boat, the Humpback may raise its head out of the water, a behavior called "spy hopping." This behavior is believed to afford the whale a better view.

Occasionally we have been lucky enough to encounter feeding whales. Humpback feeding behavior is

Less commonly observed is the use of bubbles by the whale to concentrate the fish prior to the lunge. Bubbles are blown under water which serve to corral the bait. A special variation of this behavior is the bubble net feeding maneuver. This seldom seen behavior involves swimming to a downward spiral of decreasing diameter. The rising bubbles thus close in on the bait fish driving them into a more and more concentrated mass. When the whale reaches the bottom it turns and lunges upwards in the middle of the net, with its open mouth engulfing the concentrated food.

There are two kinds of drives shown by

New England population. Humpback tails are distinctive in shape and color, scar patterns, and other characteristics. The record of these patterns in the catalog enables researchers to plot the movements of whales and to record the occurrences of whales over the span of several years. Such information will help clarify the movement patterns of whales between their summer waters in New England and their winter grounds in the Caribbean. This past winter Carol Carlson was able to make five matches in the Caribbean with whales from our waters. Such observations will help add to our understanding of whale behavior and ecology.

The Humpback whale is the singing whale. Roger Payne of the New York Zoological Society has made several records of Humpback whale songs (Payne, 1970, 1977). Such singing activity principally occurs in the southern breeding and calving waters and we now believe it is only the males that sing. The singing of the whale may serve the same function for whales as for birds. It may serve to stake out the whale's territory; to announce its presence to other males and attract females. The whale's song seems to change from year to year and all the whales adopt the new song each year. Humpback whales have rarely been recorded singing in their summer waters off New England.

There are several other displays performed by the Humpbacks off our shores. The most impressive is breaching behavior. Several variations exist. In the tail breach, the whale throws its tail and hind end out of the water and comes down with a loud slap. In the head breach the animal comes out of the water head first and rolls to the side and falls back with the accompanying splash. The full breach is by far the most impressive. Here the animal comes completely out of the water and falls to the side with the accompanying splash made by 30 tons of animal hitting the water. It has been calculated that a full breach requires a short burst of about 30 knots in order to clear the water. The function of breaching is still not fully understood, but the most plausible hypothesis is that it, like flipper slapping, is a display involved in territorial determination. It has also been suggested that breaching may communicate emotional states, help to rid the body of ectoparasites or drive away bluefish and other food competitors. It is possible that breaching may serve several different functions and as we learn more about whale behavior it may be possible to develop a better understanding of these displays and their meaning.

The Humpback whale follows a seasonal migratory pattern, leaving our waters and heading south in late October and early November. Preliminary results from research being carried out now indicate that some of our summer residents spend their winters on Silver and Navidad banks off of Hispaniola and Puerto Rico. In late March and April the Humpbacks begin to appear in New England, with the majority of whales having returned by the middle of June and again from middle October to early November. During these periods we find not only the resident whales which

will spend their summer feeding in our waters, but also transient whales which will move further north as the summer progresses and move back into our waters in the fall on their way to southern waters. These migrations have to do with temperature and nourishment. The small fish, especially the sand lance, upon which the whales feed, are plentiful in our waters during the summer.

Tropical seas offer ideal conditions during the winter for giving birth. The young newborn whale lacks the thick layer of insulation blubber of the adult and would suffer from exposure if born in cold waters. By the time it swims north with its mother in the spring it has begun to develop this needed insulation.

Whales continue to be hunted primarily by Japan and the USSR, who account for more than 75% of the world kill of whales. Today whales are killed primarily for their oil and meat. Whale oil is used in margarine, lard, cosmetics, and ink, among other things. Whale meat is used for human consumption in Japan and is also used as dog and mink food and in canned pet food.

In recent years there has been a growing world-wide movement to stop killing whales. The United States has placed a complete ban on whaling activities in U.S. waters and a ban on the importation of whale products. The European Economic Community Council of Environmental Ministers agreed to implement a ban on the import of primary whale products and leather treated with sperm oil which took effect in January, 1982. This was an important move since the EEC has been responsible for 65% of the world's whale trade. A strong effort in Congress is being launched in an attempt to bring economic sanctions against Japan to force her to abandon whaling. If these efforts are successful, then future generations may have the opportunity that we have had to observe and research the whale. The growing public awareness of the need for whale conservation which research and whale watching trips help to develop will, hopefully, provide the support needed to make the demise of commercial whaling a reality. Once one has had the opportunity to observe the most spectacular of all the earth's creatures at close range, it is hard to think of them as dog food or lubricating oil.

It is hoped that whale research and a growing public awareness of and appreciation for the whales will help to bring about the day when the reason men

follow whales will be for research or to enjoy their presence. The whale and its environment represent the crowning achievement of millions of years of mammalian evolution. It is a part of our New England heritage and will, we may hope, remain for the enjoyment of many future generations.



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