# STUDYING SPERM WHALES ON THE GALAPAGOS GROUNDS

*by*

*Hal Whitehead*
*Newfoundland Institute for Cold Ocean Science, St John's, Newfoundland, Canada A1B 3X7*

The presence of sperm whales *(Physeter macrocephalus)* around the Galapagos Islands was one of the most important factors in the exploitation and degradation of the islands. During the nineteenth century large numbers of whalers from the U.S., Britain, France and other countries hunted the sperms of the Galapagos. During their visits on shore the whalers plundered tortoises and seals. There has been much research and writing about the destructive effects of the whaling industry but the whales themselves have been largely ignored in recent years.

Between mid-February and late April 1985 we made a study of the sperm whales off the Galapagos from the 10 metre sloop, *Elendil.* With a crew of five (Tom Arnbom, Amelia Brooks, Vassili Papastavrou, Linda Weilgart and Hal Whitehead) we located and followed groups of sperm whales using a directional hydrophone to listen for their distinctive clicks. The principal objective of the study was to investigate the effectiveness of the waters around the Galapagos for studying the social behaviour of sperm whales. We were particularly interested in the interactions between the apparently stable groupings of 20-40 female sperm whales, with their young and the large mature males who spend much of the year in polar waters, migrating to the tropics for a few months to mate. We were hoping to gain information on questions such as: for how long does a mature male associate with a group of mature females; and do mature males act in consort or competition with one another? These issues are particularly crucial to current attempts to model sperm whale populations (Anon. 1983).

The research that we were undertaking was a consequence of the 1981-1984 World Wildlife Fund Indian Ocean Sperm Whale Study, which three of us (V. Papastavrou, L. Weilgart, and H. Whitehead), as well as our sloop *Elendil,* had taken part in. During the Indian Ocean Project we had developed methods of finding, tracking and studying sperm whales (summarized by Whitehead and Gordon, in press). When it ended we wondered if there might be a better research area where we could continue our investigations of sperm whale behaviour. Sri Lanka, our major study area in the Indian Ocean, had many advantages, but it was very far from my home in Canada, extremely hot, swept by monsoons which made research almost impossible for half the year, and has recently become embroiled in political turmoil. However, its most significant disadvantage was a lack of the large male sperm whales because during our months in the Indian Ocean we had seen only three large males, and these briefly. At that rate it would take many years to obtain any understanding of the crucial interactions between the large males and the groups of females.

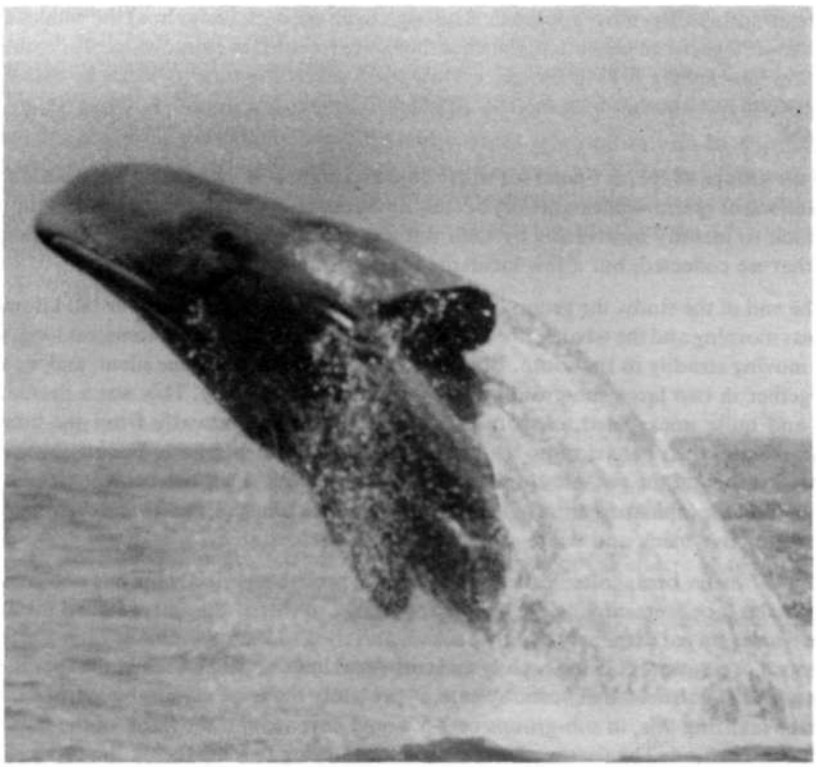
We examined maps of where the 19th century Yankee whalers made their kills (e.g. Townsend 1935), and also charts of ocean weather conditions. The ocean area that the whalers called "The Galapagos Grounds" immediately stood out in terms of the abundance of sperm whales, and the prevalent calm, relatively cool weather. The British had discovered the Galapagos Grounds during their late 18th century round-the-world explorations. Captain James Colnett aboard the ship *Rattler* made *"A Voyage to the South Atlantic and around Cape Horn into the Pacific Ocean, for the purpose of extending the Spermaceti Whale Fisheries, and Other Objects of Commerce".* He visited the Galapagos in 1793 and 1794, writing: *"Everyone was charmed with the place"* (Colnett 1798). They *"saw spermaceti whales in great numbers",* and Captain Colnett recommended the Galapagos Grounds to British whalers. His advice was followed, particularly by the stubby American whaleships sailing from New Bedford, Nantucket, and other New England ports. During the first part of the 19th century, the Galapagos formed one of the Yankees' favourite grounds. At that time the whalers provided much of the western world's oil, and the whales were remorcelessly exploited. After 1850, presumably because the sperm whale populations had been depleted, the whalers found the Galapagos *"dry cruising"* (Shuster 1983) and went there no more.

The Galapagos seems to have mercifully escaped the attention of the ultra-efficient mechanized whalers of the 20th century, and there is little recent information on the Galapagos Grounds. Some competent authorities warned us that we would be wasting our time off the islands, as there were a few whales and those far offshore. Others were more optimistic. The only way to find out was to sail there and see.

We obtained the support of the Green Island Foundation, the Connecticut Cetacean Society and a few private individuals. World Wildlife Fund Netherlands allowed us to continue to use some of the

equipment from the Indian Ocean Study, and so we sailed *Elendil* across the Atlantic Ocean and through the Panama Canal to reach the Galapagos in February 1985. There, with excellent co-operation from the Charles Darwin Research Station, INOCAR, and the Galapagos National Park Service, we found conditions almost ideal for our research. The weather was very calm and often pleasantly cool. The female sperm whales were in large groups that were easy to track acoustically. Most importantly, the large males were often in attendance. Captain Colnett (1798) had advised:

"The situation I recommend to all cruizers, is between the South end of Narborough Island (Fernandina) and the Rock Redondo (Redonda)." This region, where the sub-surface Cromwell Current, running eastwards directly beneath the Equator, is forced upwards by the islands of Isabela and Fernandina, became the core area for our research. The groups of sperms would sometimes stray a hundred kilometres or so to the south or west, but it was between Fernandina and Redonda that they were most numerous. (See map on inside back cover).



Sperm Whale breaching off the Galapagos. 22 March 1985.
*Photo by:* Vassili Papastavrou

During all the weeks that we have spent with sperm whales, the subjects of our research have shown themselves to be gentle animals. They are often shy, but occasionally curious towards humans and their boats. However, with each other they display a very highly developed sociality. Although adjacent sperms are probably separated by a few hundred metres when feeding at depth, off the Galapagos they often appeared to be co-ordinating by forming a rank several kilometres long, with the whales swimming abreast of one another. These ranks swept through the deep ocean at a steady 2.5-3 knots (4.5-5.3 kilometres per hour), for 24 hours or more. Individuals would come to the surface every forty minutes or so to breathe, but the whole phalanx bore on.

When foraging 400 metres beneath the surface, each individual made the characteristic regular (about once per second) click of the sperm whale, which is presumably a form of echolocation used for locating the large squid that they mainly eat. The jumble of clicks of a group of hunting sperms, which together sound rather like radio static, must foretell approaching death for many squid. But for us on board *Elendil* the clicks were an important key. We listened for them through a directional hydrophone. With this instrument we could detect the bearing of a clicking sperm whale at about 8 kilometres and, by listening regularly and adjusting our course and speed depending on where and how loud we heard the clicks, were able to track groups of sperm whales for periods of days.

Off the Galapagos, between 40 minute feeding bouts, the sperm whales remained at the surface breathing for about 8 minutes. During these periods the whales seemed irresistably drawn to one another; if there was another whale nearby, they would almost surely sidle up together for companionship during their few minutes at the surface. The small calves, who did not dive deeply, were particularly active in joining adults.

But once every day or two the whales ceased their feeding to congregate at the surface in sub-groups of five to forty animals for an hour or more. It was during these "social times" that the significance of their communal relationships was most apparent. Although from the deck of our boat the whales appeared like a raft of inanimate logs, when beneath the surface they were revealed as extraordinarily flexible, tactile and tender animals. Snorkelling behind *Elendil,* we saw them gracefully turn to watch us with deep blinking eyes, gently stroke one another with their small flippers, or nuzzle a smooth bulbous brow against a vast wrinkled flank.

We tracked the groups of sperm whales for thirty days and nights. Much of what has been learnt about the social interactions of sperm whales will only be fully apparent after a complete analysis of the photographs (which we took to identify individuals by their natural markings), recordings of the whales' clicks and other data that we collected; but a few incidents revealed immediate insights.

Very near the end of the study, the group that we were following had strayed over 180 kilometres west of Isabela. It was morning and the whales, lined up in an east-west rank several kilometres long, were clicking noisily and moving steadily to the south. But at 09.45 they suddenly became silent, and we spotted them clumped together in two large sub-groups a few thousand metres away. This was a dramatic change in behaviour, and quite unexpected as sperm whales usually shift gradually from the hunting/spread-out/clicking phase of their behaviour to the social/congregated/silent phase. For an hour or two less and less clicks are heard, and the sub-groups that the whales form at the surface become steadily larger. This sudden silence and the rapid formation of sub-groups was most unusual, but its reason was apparent when we saw the distinctive black and white shapes of orcas (*Orcinus orca*).

The powerful 6-7 metre orcas, often called killer whales, probably the only serious non-human predator that sperm whales face, were circling the huddled sperms. For three hours we watched the attack. The 25 or so sperm whales stayed extremely closely packed, and tried to keep themselves facing directly towards the nearest orcas. They were clicking rapidly and with great intensity. The head of the sperm whale with its powerful jaw and sophisticated acoustic system, is probably the least vulnerable part of the whale. The orcas, perhaps realizing this, in sub-groups or 2-5 would dart around the flank of the massed sperms to attack them from behind. The sperm whales would turn, trying to keep facing the orcas. There was one tiny sperm whale calf. It was kept right in the centre of the concentration, presumably the safest place. In contrast the only large male sperm whale in the group usually hung behind. Was he protecting their vulnerable rear, or just tagging along? The two large male orcas also hung back, taking little part in the action. Most of the close-quarters interactions between the two species took place under water, hidden from us. We did see some fresh open wounds on several sperm whales, but none were particularly deep. It seems unlikely that any of the sperms were badly injured. The whole attack seemed to constitute a skirmish in which the orcas tested the sperms to see if there were any particularly vulnerable animal, which might then be assaulted in force.

The end of the incident was most interesting. The sperms began to turn in tight circles, the whole mass of whales revolving every 2-3 minutes. Perhaps the orcas now realized the futility of their attack for they began to move off to the west. With the orcas 500 metres away the sperm whales made their move. They fell totally silent and started travelling fast eastwards, remaining in their compact sub-group. For six hours they maintained 5.5 knots (9.5 kilometres per hour), and we motored after them. With the exception of the

large male, who fell behind for a while and lost synchrony, the whales remained co-ordinated and tight-packed throughout the entire flight, which was unparalleled in our experience with sperm whales. They were also uncharacteristically silent, again with the exception of the big male, who briefly broke the silence with his very slow distinctive click. When night came, the whales were continuing eastwards, but with no clicks our directional hydrophone was useless, and they were lost to us.

The incident was very instructive in showing how the top natural predator in the ocean attacks what is probably its most formidable prey, but it also contained some important hints about the relationship between the large male sperm whale and the group to which it was attached. The male made considerable effort to stay with the group, although he did not seem to be a fully-integrated member of it, or, in any sense, to be leading it. He also broke the silence of the other sperms, thereby perhaps revealing their presence to the orcas.

On returning from the Galapagos it was particularly interesting to read the accounts and log-books of the whalers who had preceded us. So many of their comments, about the calms, currents, headlands, sperm whale behaviour or other marine life, could have come from our own journals. The most significant variations concerned observations about the density of sperm whales. After a very preliminary examination of the sources, our observations seemed to lie intermediate between those of Captain Colnett and his contemporaries around the year 1800, who found "great plenty of whales", and the frustrated skippers of the second half of the 19th century scanning the horizon without any sign of the sperm whale.

We look forward to analysing the data that we have collected for more indications of the social system of the sperm whale and, above all, to returning to the sperm whales on the Galapagos Grounds in a year or two. But in the meantime we must also worry lest any of the sperms that we grew to know stray northwest to the "Coast of Japan Grounds". There, the Japanese whalers, abetted by the US Government, are defying the International Whaling Commission's ban on sperm whaling.

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