



Beaked Whales *of El Hierro*

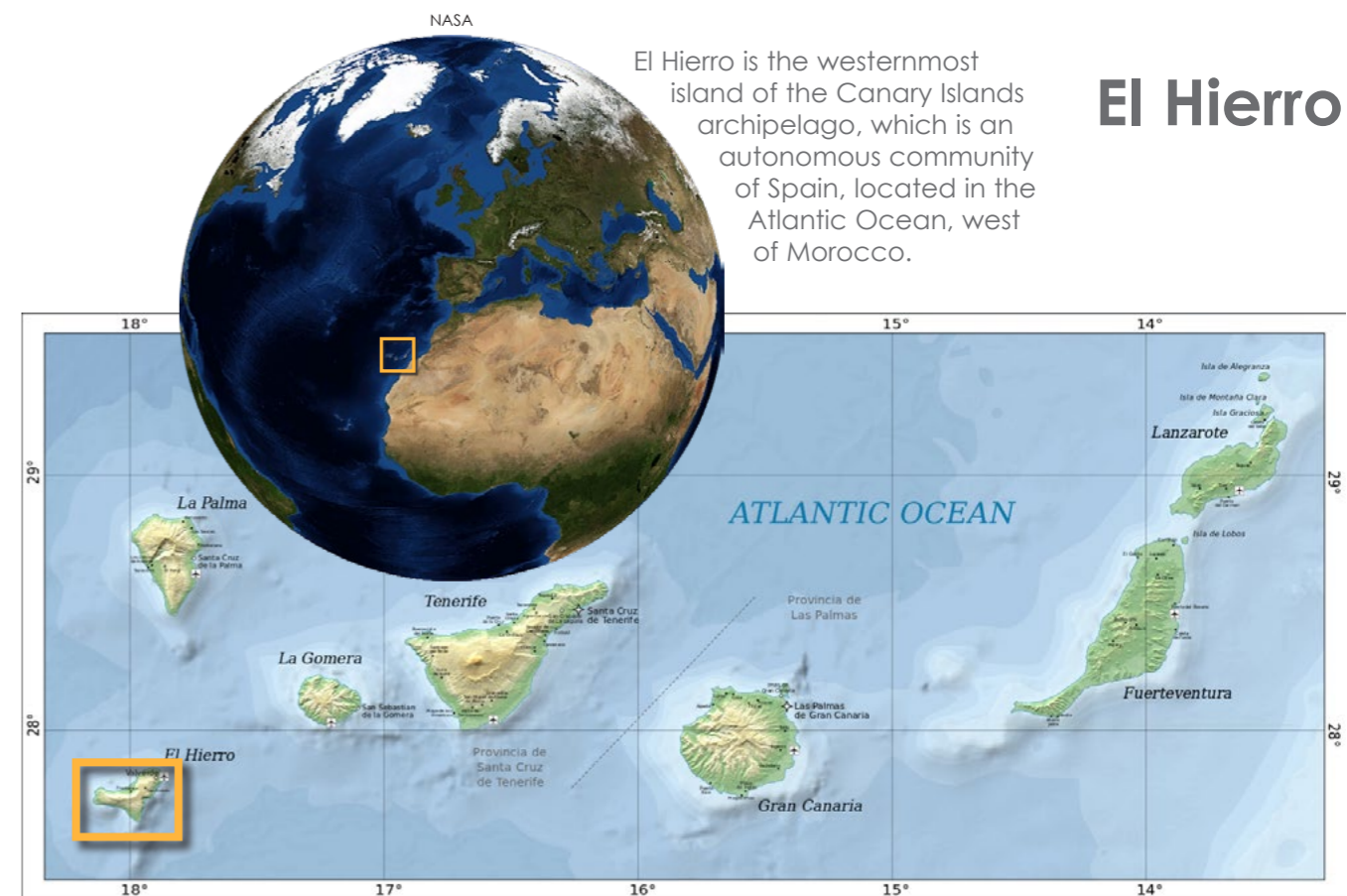
Text and photos by Claudia Weber-Gebert



THIS PAGE. View of beaked whales above and below the waves (previous page)

El Hierro

El Hierro is the westernmost island of the Canary Islands archipelago, which is an autonomous community of Spain, located in the Atlantic Ocean, west of Morocco.



Beaked whales are shy animals, which are only found far out to sea, but in El Hierro, where the landscape slopes steeply underwater, the whales can be seen closer to shore

Beaked whales—now honestly, who has ever heard of Cuvier beaked whales (*Ziphius cavirostris*) or Blainville beaked whales (*Mesoplodon densirostris*), or even knows what they look like? Anybody? No? It's no wonder—they are shy animals, they can be seen at the water surface only for a very short time, and they are usually not very noticeable. Unlike their relatives, the dolphins, beaked whales are found only far out to sea, far from the coast and therefore, they just simply are less well-known.

The whales also do not ride on the bow waves of boats, but rather avoid noise and are extremely quiet representatives of their kind—a species that lives quite

inconspicuously in our world's seas and hunts at great depths. As a result, little has been known about these whale species until 2004, when a large number of strandings, worldwide, were recorded, in the context of acoustic disturbances. Underwater photos of these marine mammals are rare because of their seclusion.

The research project

The marine biologists of the University of La Laguna in Tenerife (ULL) have been commissioned by the US Navy to investigate the beaked whales at the small Canary Island of El Hierro. Funding for the project has been secured to the end of 2018.

The background of this project involves the stranding of 60 animals in 2003 in the Canary Islands after the Navy carried out military sonar tests in the waters of the islands. The stranded beaked whales were covered with hematomas, air bubbles were found in their livers, their sensory organs for echo location were destroyed, and they experienced agonizing deaths. Not even the animals that

had not died yet could be helped.

The US Navy was accused of having caused the strandings and the cruel death of these whales. Of course, everything was denied, and to prove the contrary, the University of La Laguna received money for the research project from the US Navy.

The project, which is still on-going until the end of 2018, comprises the following. First, all military sonar tests have been suspended in the Canary Islands, so-to-speak, creating a protected zone. Then, two to three times per year, teams of marine biologists and ULL students come to El Hierro for at least three weeks to do intensive research work. During this time, focus is given to various aspects of the study, such as cataloging, sound recordings with the hydrophone, biopsies (collection of skin samples), behavioral research, photos and videos, etc. The results are subsequently evaluated, and the research results published. There is also a lively exchange with other researchers worldwide. So, the beaked whales are now quite well researched;

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Views of the island of El Hierro in the Canary Islands (left and lower left)

research on the beaked whales is made possible. In addition, an agreement was signed between the University of La Laguna and the Woods Hole Oceanographic Institute, which allows joint projects to be presented and shared.

At the end of September 2016, I had the opportunity to spend some

with a nice "Zifio" team and with wonderful and fascinating whale excursions. The permits for underwater photography were also available to me, but the research work always had absolute priority, and so, only a few underwater photographs with the GoPro were possible.

Why El Hierro?

The question is quite simple to answer: It is the geographical location of the small Canary Island. Cuvier and Blainville beaked whales hunt at a depth of about 800-1,600m. These depths are usually far off the coasts and make research work expensive, extravagant or nearly impossible. Not so on El Hierro.

Already at 100-200m from El Hierro's coastline, with its steeply sloping underwater landscape, the seabed reaches the appropriate depth. Both beaked whale species are found here all year

and the military. While the military only wants to assess possible collateral damage, the scientists naturally want to learn more about the size and the health status of the populations. The funds are therefore used very sensibly and

time together with the researchers at La Restinga on El Hierro, to observe the work and to take part in it, to take photos of surfacing beaked whales and to get information directly on the spot. It was a wonderful experience,



many details of their living habits are available on worldwide database networks.

Beaked whales belong to the order of the whales (Cetacea), subordinate tooth whales (Odontoceti), and the family of the beaked whales—Ziphiidae, which are called "Zifios" by the Spanish researchers.

The research in the Canary Islands is intended to determine

the size of the populations, the age of the animals and the rate of reproduction. For the US Navy as well as for the scientists, it is important to know if, for example, when 10 animals die in the case of strandings, it is 10 out of 100 or about 10 out of 1,000 animals. This is the determining factor in maintaining the population.

The importance of the results is, however, very different for science



Rugged coastline of El Hierro has a steep slope underwater, so beaked whales are often seen near shore



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Taletale dorsal fin of a beaked whale (above) Researchers survey the water for beaked whales from a boat (right), while others search from land (top right)

round, because their prey in the open Atlantic is in the immediate vicinity of the island.

A small motorboat is all that is required to study the whales along this coastal strip. For the studies, seasons are chosen in which the sea is particularly calm and the shy beaked whales, which only appear briefly on the surface, are easier to spot. In case of high waves, sighting is almost impossible, since only the whale's short gray back with a small fin can be seen for a brief time at the surface. The beaked whale's blow is hardly more than half a meter high and cannot be seen at the distance. In the windy shadows of the island of El Hierro, on the Mar de las Calmas—"the calm sea"—the conditions are ideal, and the animals can be explored at close range.

A typical research day

The leaders of the research team are Crístel Reyes Suárez from the University of St. Andrews in Scotland and Agus Schiavi from

the Universidad de La Laguna in Tenerife. Both are responsible for the research and findings on El Hierro.

The research day begins at 7:30 a.m. There are two teams: a "terra" team and a boat team. Both teams alternate daily, so that it does not become too one-sided. The work on the boat is simply more interesting, but without the terra team, nearly impossible. The terra team drives by car to their post. The boat team goes by boat out into the bay. The "external work" ends around 4:00 or 5:00 p.m. After that, the data is saved, and the first analyses are made. Only after 8:00 p.m. in the evening is there time for lunch—a long and exhausting day.

The terra team is located on a hill above the bay, equipped with two to three binoculars with integrated compass and up to 50x magnification. They have the task of systematically screening the water's surface along the coast. If the animals show up, the species is determined and the number



of animals counted, if possible. Through the scale in the binoculars, the position of the animals can be defined quite precisely by means of a computer program. The position is then transmitted immediately by radio to the boat.

Observation & designation

Each group of animals that is spotted is given a letter, supplemented by a number, depending on how often the group shows up on the particular day: "A-1" at the first sighting; or "A-2" if the animals

surface again. The next group is named "B," the third is given the letter "C," and so on. This data is stored on a map in the computer so that a complete overview of the sightings is available at the end of a day, with notes on time





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Rugged coastline of El Hierro (above); Researchers survey the water for beaked whales from a boat (right), while others search from land (far right)

duration on how long the whales' dives were, or how long their surface pauses were. The students' positions on the binoculars and the computer alternate every 20 minutes, so that the eyes do not tire too much by observing the surface of the water.

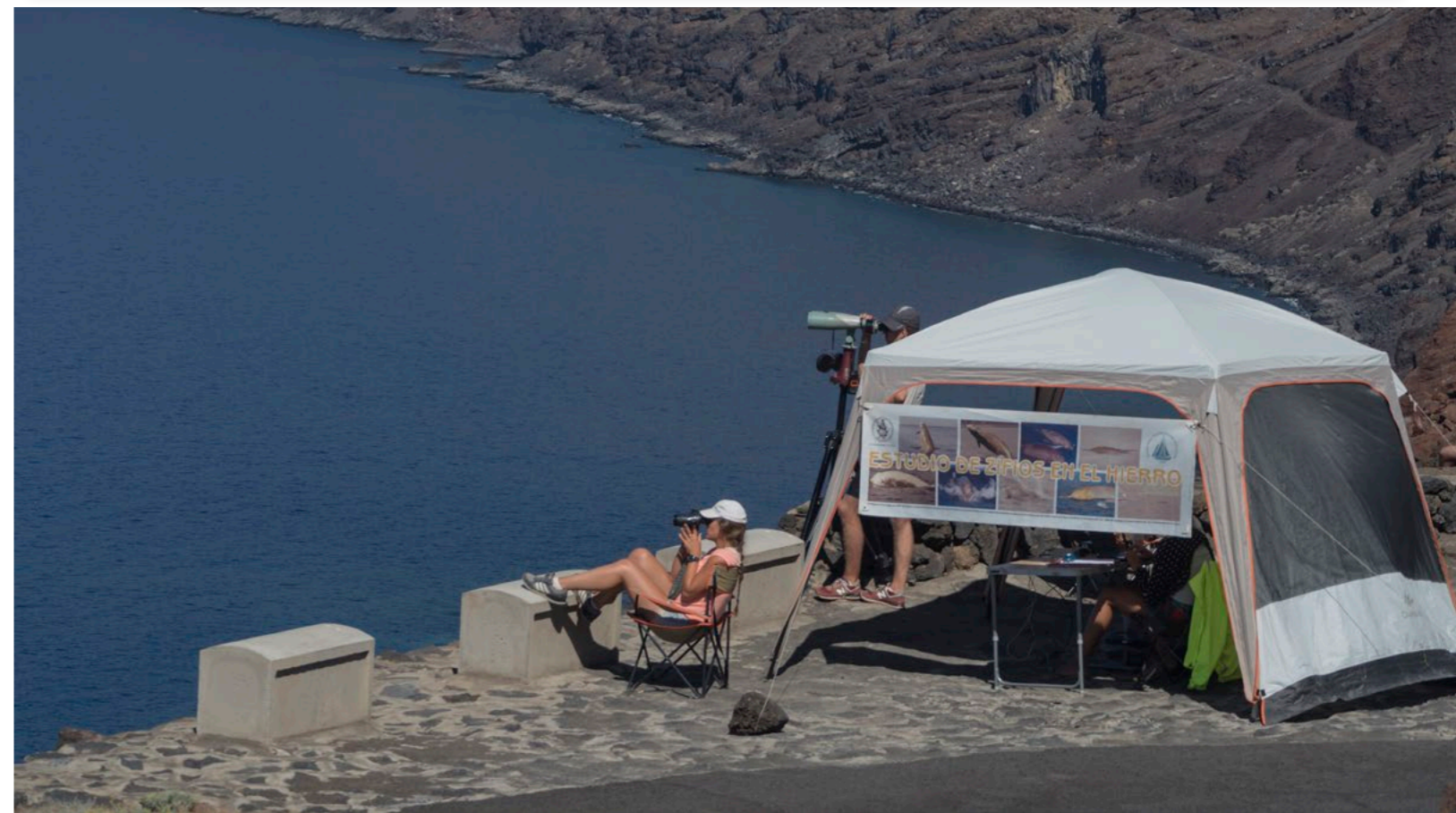
On the boat, each of the four or five team members is given a direction for which the water surface is systematically to be scanned. On board, this is very tiring for the eyes. The glittering water surface becomes a major challenge, especially in the early afternoon hours. For both teams, the sun and the heat are a factor, which cannot be underestimated over the three weeks of daily surveying without interruption. Sun protection and head cover are absolutely necessary. In between



surveys, a jump into the water to cool off is necessary, especially in case there is no wind. Then the heat on the boat becomes intolerable.

If a group of beaked whales is sighted, the teams communicate by radio and the boat immediately heads towards the position. Depending on the distance, the boat is simply not fast enough.

But as the terra team has a better overview, the boat will be directed to where the contact with the zifios will be most successful. Usually, two to three whale groups are observed at different positions along the 1,000m course at the same time, and the probability of which direction is most appropriate for the boat is assessed.



Research activities

The tasks on board are clearly distributed: One team leader drives the boat, one or two students take photos of the animals, another person holds the GoPro on a pole into the water, and the second team leader gets the air gun ready for a possible biopsy. When the boat arrives near to the beaked whales, everything must

go very quickly, as the animals surface for an average of only three to five minutes before they descend again.

So, what must be done? Intensive observations of the animals, counting individual whales, determining how many are adults and how many are young animals, taking as many photos as possible with a telezoom lens on

the swaying boat, putting the GoPro on the correct side in the water against the water pressure from the moving boat, maneuvering the boat to the animals, sidestepping the person with the biopsy rifle, and then at the same time, still ensuring that not all team members are on the same side of the boat at the same time.

In other words: maximum con-





centration on the tasks at hand, for the short time the beaked whales are at the surface!

To do this, the entire team must be well-coordinated and understand each other without using too many words. All the activities must be done hand-in-hand. If biopsies are made, all the other team members have to go to the opposite side of the boat for safety reasons. The air pressure gun is extremely sensitive and can occa-

sionally free itself upon impact in high waves!

Diving behavior

The zifios, which are usually in groups of three to five animals, hunt at a maximum depth of 800m. After three to four short dives with an average duration of 20 minutes each and approximate depths of 800 to 1,000m, a deep dive with an average duration of one hour is often made, down to

Cuvier beaked whales will sometimes split off from groups to join others; Before a deep dive, beaked whales will do a little jump at the surface (left)

a depth of 1,600m or even more. Maximum dive times of over two hours were recorded. Then a few deep breaths followed at the water's surface and the whales disappeared again. The deep dive could be identified very well, since the whales first made a small "jump" and inhaled particularly intensively.

For the researchers on the boat, this meant waiting one hour or more for the animals to show up again. Usually, they surfaced again along the same course and from the same depth to which they previously descended. In the meantime, researchers looked for other groups of whales, collected plastic waste from the sea, or looked at photos and communicated with the terra team, saving data of what had been observed onto the computer. During this time, individual animals were cata-



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Mother beaked whale with newborn calf (above)

logged, groups could be identified, and animals were found to be changing groups, or dividing and recombining groups.

High points

And waiting was always worthwhile. What was routine for the research teams was exciting and absolutely thrilling for me as an observer. Somehow, I was lucky enough to find ideal conditions on the days I could be on board the boat. The sea was as calm as ever, and there were more animals at the surface than at any time during the researchers' three-week-study on El Hierro.

There were also previously unprecedented observations: A member of a group of four adult Cuvier beaked whales, which had been observed unusually close to the coast the day before, had given birth to offspring. Between the four adult animals, a small gray head was looking out of the water—a sighting that made

every researcher's heart beat faster. Mother and newborn calf could be observed in the shallow waters when the remaining three adult animals had gone to hunt prey. We noticed that the mother had not eaten food lately; her ribs were clearly visible on her back.

For me, it was a special moment when the whales performed their so-called "breaching" behavior, when they would spring out of the water. Three of the four animals in a group of Blainvilles amazed us for four minutes, jumping out of the water within the immediate vicinity of our boat. This behavior is not common. It was an absolutely rare moment of happiness I was allowed to experience!

Findings of the study

Talking to Dr Natacha Aguilar de Soto, head of the University of

La Laguna, it turns out that the military sonar tests had clearly been the cause for the strandings in 2002 in the Canary Islands of these extremely sensitive beaked whales.

"In the search for deep sea food, whales often hunt in family associations," said Aguilar de Soto. "After the feeding phases in the depths, they surface for air and to digest. Afterwards, they dive again to hunt for more food. It is important that both the descent and the ascent phase

are slow. Thus, the entire body can adapt to the changing water pressure. If, however, whales are hit by the extremely loud sonar of military ships, their sensitive organs are destroyed. The animals have a lot of pain and panic. Full of agony, they swim as fast as possible to the water surface. This rapid pressure change

is the reason for blistering in the blood and organs. Air foams properly in their body. It doesn't only interfere in the oxygen supply of the cells, but the fat particles entering the blood from the surrounding cells block the veins and lead to a pulmonary embolism. It is therefore not surprising that in the study of dead animals, a liver full of air bubbles can be found."

Read about this finding on the Internet at the Portal de Canarias. Researchers say the effect is known as diver disease.



Beaked whales were observed jumping out of the water, also known as "breaching" (above and top center); Before a deep dive, beaked whales do a little jump, which can be seen at the surface (center inset)



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Acoustic disturbances

Acoustic disturbances not only influence the beaked whales but all whales that hunt with echo location. Loud noises overshoot the echo signal, so the whales can no longer locate their prey. This is why in the Canary Islands, areas with noise from ferries is carefully surveyed.

Fortunately, the following has been noted: Since the sonar tests were banned in the Canary Islands, the population of beaked whales is healthy and there have been no more strandings!

There are only five sites worldwide where stationary beaked whale populations can be observed and studied right off the coast. This includes El Hierro, just like Hawaii, Italy (Liguria), Greece

and a different population in Nova Scotia in Canada.

Critically, in Greece, military sonar tests are being conducted by the US Navy. A memorandum is in the process of being drafted so that no further military tests can be carried out in Greece.

The results of the study include the cataloging of the whales' dorsal fins and scars on their backs by means of photography, communications between whales, and behavioral patterns—all of which can be exchanged with other research stations to facilitate studies worldwide. By tagging whales, the scientists can get diving profiles, which document the whales' hunting behavior underwater; sound files; speed and depth of dives; and much

The dorsal fin of the beaked whale (left) can be seen when the whale does a little jump before a deep dive;

It is a challenge to see the whale's blow (center), which does not reach very high above the water's surface.

more. Here is a link where you can listen to "whale communication": <http://soundtags.st-andrews.ac.uk/projects-and-species/tags-on-species/>

Micro-plastics ingested

One finding of the biopsies was frightening. Besides "normal" examinations, skin samples were also examined for micro-plastic. Since beaked whales eat only at a depth of around 1,000m, the findings proved that the water column is loaded with micro-plastic up to that depth! It is one more reason to



finally do something about the pollution of the sea and all our plastic waste.

El Hierro will soon be declared

a national marine park, due in part to the findings of the studies by the marine biologists of ULL Tenerife. Negotiations are already underway; it will not take very long. What a success! ■

Claudia Weber-Gebert is an advanced diver, underwater photographer and dive writer based in Germany.

SOURCES:

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View of the seas around El Hierro in the Canary Islands of Spain

