

Virtual Research Programme

Become a virtual research volunteer, help us with our work, and get half price volunteering and a free scuba try-dive when in Tenerife. If, together, we can get your 'paper' published then we will offer you free volunteering.

Special Note: Due to the COVID-19 pandemic we have developed a new land based project to monitor cetacean behaviour without the whale watching boats so we can then compare the behaviour as the whale watching boats resume activity in the Summer. We will be looking at tracking: Migratory species passing through (and their interaction with resident species); the resident pod of Bottlenose dolphins (and their interactions on their daily circuit of the SW coast of Tenerife; and the resident Pilot Whales, particularly the family groups we follow from the whale watching boats. In due course we will be linking this work with a rib equipped with acoustic equipment. Our intent is to help develop a more efficient management system for the whale watching boats and so help create a more sustainable and ethical industry.

AWdF Research Data

The AWdF have been carrying out research on the cetaceans visited off of the SW coast of Tenerife for the best part of 25 years. In this time, we have recorded data on some 15,000 interactions.

Our research platform has mainly been from the whale watching boats. They allow our volunteers to go on their boats as 'research guides' with the dual responsibility of carrying out research and promoting cetacean education and conservation to the whale watching tourists- a symbiotic relationship! The whale watching boats trips are two to six hours long, the shorter trips are focused on visiting the pilot whale residents between Tenerife and La Gomera from the ports of Los Cristianos and Puerto Colón, or the resident bottlenose dolphins with boats from the port of Los Gigantes and from Las Galletas on the west coast of Tenerife which visit a different bottlenose dolphin group. The longer trips span the length of the SW coast.

Core datasets:

1. Resident Pilot Whales: Essentially a photo Identification database linking a photo of a whale's dorsal fin (which is like a finger print enabling identification and tracking of individual animals) with GPS and time/ date. This data allows us to track individuals through time, group associations, group movements during day/ time etc. This is our core data.

In addition to this, volunteers collect a range of data covering parameters laid down by the Tethys Institute for non-intrusive research into cetaceans. These cover a range of variables such as behaviour, sea state, pod structure, (**see appendix 1 Datasheet and its legend**)

We estimate there are some 1000 resident pilot whales split into family groups of 15-20 animals. The family groups are matriarchal although big males remain within the group for hunting, protection and procreation. It is thought males mate outside of the family group and that the big males tend to move around from family to family over the years ('**Beneath the Waves**' a documentary on the Short-finned Pilot whales residents of Tenerife. <https://www.youtube.com/watch?v=0GfBNayoZo0>)

We are following a number of matriarchs and their families.

2. Resident Bottlenose Dolphin: there are a number of bottlenose dolphin families around the Canaries including a resident family of 30 or so dolphins, 'The Dolphins of Los Gigantes. Their territory comprises of the waters along the SW coast of Tenerife (Teno to Rasca) about 200 sq kms. Bottlenose dolphin families are matriarchal with males evicted from the group around the age of two. They go in pairs, friends for life, 'visiting' other female groups around the Canaries. The dolphins of Los Gigantes follow a routine every day starting in the waters off of Los Gigantes and travelling along the coast to Rasca and back again for early evening. They have a fission- fusion society, breaking into bigger and smaller groups within the pod and 'gossiping'. They interact with other visiting dolphin groups, resident pilot whales, migratory species including other bottlenose dolphins as well as fish farms, fishing boats, whale

watching boats etc. A really interesting aspect of bottlenose dolphin - pilot whale interaction is the often-observed sexual aggression displayed by the dolphins.

There is a second dolphin family visited by boats leaving Las Galletas, along the east coast of Tenerife.

Our data is collected on the same datasheets as above (appendix 1.) .

3. Migratory species: There are 28 species either resident in, or migrating through, Canarian waters. (**appendix 2. species list.**) There are four resident species: Pilot Whales, Bottlenose dolphins, Risso Dolphins and Sperm whales. Risso Dolphins were resident off of San Sebastian, La Gomera but departed the day the Fred Olsen ferry on blades started operating and now reside off the north coast near Puerto de la Cruz. Sperm whales are resident between Tenerife and Gran Canaria and were often seen in SW coast. Sadly their population were also decimated by the above mentioned ferry; Sperm whales are the second deepest diving mammal, second only to the elusive Cuviers beaked whale, their skulls specially constructed to collapse at depth, and come back to the surface vertically- many were decapitated by the ferry and they are rarely seen now by the whale watching boats.

The other 24 species are migratory, moving from breeding to feeding grounds in the main, and back again. The big rorquals- Blue, Humpback, Fin, Sei, Minke and Brydes whales are particularly interesting but other migratory species are interesting to observe such as the Atlantic Spotted dolphins, Common dolphins, Beaked whales, Orcas, etc. Our data only shows records of their presence, indicating the GPS coordinates, date and time of the sighting.

The Atlantic Ocean Cetacean Network is a project to link cetacean projects across the Atlantic Oceans. By linking with projects to piece together a particular species movement we can create support networks, a key goal of the AOCN.

Comments about the data:

1. Our data is collected by volunteers. After induction and training our volunteers are accompanied by experienced researchers and it is only when the latter are satisfied that the data is being collected in a rigorous manner that the data is added to our master database.
2. As our volunteers are on multiple boats the same interaction will be recorded multiple times. The GPS, time and date will tell you where this duplication exists, if relevant to your research proposal.
3. Rorqual. The large whales are often seen from a distance and identification is difficult. This being the case we 'lump' our large whale sightings together as 'Rorquals', Spanish for large whale. We know Brydes whales can be seen throughout the year as they reside to the south of the Canaries and we know such as Fin and Sei whales migrate at certain times of the year so this helps break down the total figures.

Use of Research-data:

AWdF data is open access. Many thousands of students have used it for project work- A levels through to PhDs and papers presented at conference.

Protocol to use data (Appendix 3 Research data usage protocol) basically, you define what data you need for your proposed project and on receipt of your literature review we will release the relevant data to you.

As an example; an interesting research project would be to look at a particular species and tie in observations of that species across the Atlantic Oceans so as to identify the migratory routes which are by and large unknown.

Research ideas:

We have a list of suggested research proposals (appendix 4) and are more than open to receiving other ideas. Please feel free to discuss them.

For further information, please contact Mimi
at mimi@fairearthfoundation.org or Eve at eve@fairearthfoundation.org

To ask about incorporating our virtual research programme into your curriculum please contact
Ed@whalenation.org

Appendix

Appendix 1: Datasheet and its legend.

Date: _____ Observer: _____ Photographer: _____
 Boat: _____ Speed of Boat on Approach: Appropriate (1) /Fast (2)

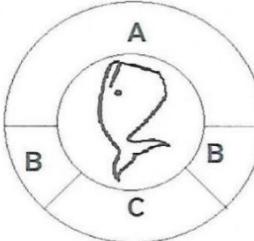


Start time of Excursion: _____ Start time of Interaction: _____
 Finish time of Excursion: _____ Finish time of Interaction: _____

Species Observed During Interaction Pilot Whale YES/NO Bottlenose Dolphin YES/NO Other _____ Give photos of migratory whales to the person that collects them (with boat name/date)	GPS Coordinates Start of Interaction N: _____ W: _____ End of Interaction N: _____ W: _____
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Oceanic Cloud Cover (Circle Number as Appropriate) 0% (0) Up to 25% (1) Up to 50% (2) Up to 75% (3) Complete Cover (4)	Beaufort Scale of Sea State (Circle Number as Appropriate) 0 Flat: Flat means flat, comparable to a swimming pool. 1 Ripples: 0.1m 2 Small Wavelets: 0.2m 3 Large Wavelets: 0.6m 4 Small Waves: 1m 5 Moderate Longer Waves: 1.2m Some foam and spray. 6 Large Waves: 3m Foam crests and spray.
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Cetaceans Present Total Number of Individuals: _____ Number of Adults: _____ Number of Juveniles: _____ Number of Calves: _____ Number of Indistinguishable: _____	General Group Behaviour Travelling (1) Bow Riding (2) Logging (3) Milling (4) Surfing (5) Wake Riding (6) Start behaviour: _____ End behaviour: _____	Group Formation: (1) Tight (2) Loose (3) Groups Tight (4) Groups Loose
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Boat Approach (Circle as Appropriate) 	Individuals Behaviours' (Number of times each activity is observed.) Porpoising (Swimming, whole body out of water) _____ Spy-Hopping (Head & eyes vertical, out of the water) _____ Feeding (Chasing & eating prey) _____ Breaching (Most of body out of the water) _____ Fluke Slapping (Hitting surface with tail) _____ Flipper Out (Pectoral fins held above water) _____ Fluke Out (Tail held above water) _____
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Other Boats Present _____	Cetaceans present upon departure: Yes / No Other (Specify): _____															
Calf Behaviour (Circle as appropriate.) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Calf Behaviour</th> <th style="text-align: center;">Interaction of Calf with Boat</th> <th style="text-align: right;">Position of Calf (if travelling)</th> </tr> </thead> <tbody> <tr> <td>Calf 1: Clinging to adult (1) Free in pod (2)</td> <td style="text-align: center;">Yes (1) No (2)</td> <td style="text-align: right;">Front (1) Side (2) Middle (3) of pod</td> </tr> <tr> <td>Calf 2: Clinging to adult (1) Free in pod (2)</td> <td style="text-align: center;">Yes (1) No (2)</td> <td style="text-align: right;">Front (1) Side (2) Middle (3) of pod.</td> </tr> <tr> <td>Calf 3: Clinging to adult (1) Free in pod (2)</td> <td style="text-align: center;">Yes (1) No (2)</td> <td style="text-align: right;">Front (1) Side (2) Middle (3) of pod.</td> </tr> <tr> <td>Calf 4: Clinging to adult (1) Free in pod (2)</td> <td style="text-align: center;">Yes (1) No (2)</td> <td style="text-align: right;">Front (1) Side (2) Middle (3) of pod.</td> </tr> </tbody> </table>		Calf Behaviour	Interaction of Calf with Boat	Position of Calf (if travelling)	Calf 1: Clinging to adult (1) Free in pod (2)	Yes (1) No (2)	Front (1) Side (2) Middle (3) of pod	Calf 2: Clinging to adult (1) Free in pod (2)	Yes (1) No (2)	Front (1) Side (2) Middle (3) of pod.	Calf 3: Clinging to adult (1) Free in pod (2)	Yes (1) No (2)	Front (1) Side (2) Middle (3) of pod.	Calf 4: Clinging to adult (1) Free in pod (2)	Yes (1) No (2)	Front (1) Side (2) Middle (3) of pod.
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Legend of datasheet

Date: day of observation

Observer/Photographer: the volunteers in charge of photography/annotation of the data.

Boat: the whale watching boat the data was collected on.

Boat Speed: Appropriate (1) and Fast (2). describes the speed at which the boat approaches the individuals.

Time of excursion: the time the whale watching boats leave the port and arrive. Time of interaction: note down the time start to end of interaction, to keep track of the time spent with the groups.

Species Observed: the species are identified and noted down for each interaction.

GPS coordinates: we note down the coordinates at begining and end of interaction, north and west.

Cloud Cover: Cloud cover describes the percent of the sky that is covered with clouds. Record the cloud cover on a scale from 0-4.

Sea Height (Beaufort Scale): The Beaufort scale describes the height of the chop, or the surface of the water and is numbered from 0-6. Record the sea height in the trip info. Cetaceans present (number of individuals): we identify all the individuals that are seen and group them into Adult, Juvinile, Calf and indistinguishable.

General behaviour: for this section, the observer circles the most seen behaviour, and notes down the begining and end behaviour of the interaction.

- Travelling (1): Moving in a specific direction, often in a linear fashion.
- Bow riding (2): When the dolphins swim in the pressure waves created by the boat's bow (front).
- Logging (3) :When a whale or dolphin is stationary just below the surface of the water. Another term for sleeping. Whales and dolphins can only shut off $\frac{1}{2}$ their brain at a time so they can remember to breathe.
- Milling (4): Swimming while staying in the same general area.
- Surfing (5):
- Wake riding (6): When the dolphins play in the wake created by the boat.

Group Formation:

- Tight (1): when all the individuals that are seen are grouped close together.
- Loose(2): when all the individuals that are seen are spread apart from each other.
- Tight groups(3): when the individuals are in separate groups and they are close together within each group.
- Loose groups (4): when the individuals are in separate groups and they are spread apart within each group.

Boat Approach: the position of the whale relative to the boat upon approach (A,B,C) Individual behaviours: recorded in a tally system for every observed behaviour

- Porpoising: A form of travelling in which the dolphin jumps in and out of the water; thought to conserve energy; reduces friction from the water.
- Spy-hopping: when a whale rises vertically towards the surface with its head raised out of the water. Some believe this allows the whale to look at activity going on above the surface.
- Feeding: When a whale or dolphin is seen eating
- Breaching: A jump that results in more than 40% of the whale's body being out of the water; thought to be a form of communication.
- Fluke Slap: when a cetacean throws their peduncle/fluke and slaps the surface of the water; thought to be a form of communication
- Flipper out: When a cetacean raises their pectoral fin out of the water for an extended period of time; thought to be a form of thermoregulation
- Fluke out: When a whale raises their entire fluke out of the water before a deep dive.

Cetaceans Present upon departure: the individuals seen or not when the interaction ends.

Boats Present: we note down all boats that can be seen during the interaction.

Calf behaviour: we record the behaviour of each calf we see during the interaction (1-4).

- Calf behaviour: clinging to adult (1), and free in pod (2).
- Interaction of calf with boat: yes (1) and no (2).
- Position of calf: front of pod (1), middle of pod (2), side of pod (3).

APENDIX 2:

List of all migratory species. More information can be found here:
<https://www.whalesanddolphinsoftenerife.org/28-species.html>

- ◆ Northern Right Whales (*Eubalaena glacialis*)
- ◆ Minke Whales (*Balaenoptera acutorostrata*)
- ◆ Curvier's Beaked Whales (*Ziphius cavirostris*)
- ◆ Fin Whales (*Balaenoptera physalus*)
- ◆ Blue Whales (*Balaenoptera musculus*)
- ◆ Killer Whales (*Orcinus orca*)
- ◆ Northern Bottlenose Whales (*Hyperoodon ampullatus*)
- ◆ Blainville's Beaked whales (*Mesoplodon densirostris*)
- ◆ False Killer Whales (*Pseudorca crassidens*)
- ◆ Brydes Whales (*Balaenoptera brydeei*)
- ◆ True's Beaked Whales (*Mesoplodon mirus*)
- ◆ Gerval's Beaked Whales (*Mesoplodon europaeus*)
- ◆ Sei Whales (*Balaenoptera borealis*)
- ◆ Pygmy Sperm Whales (*Kogia breviceps*)
- ◆ Dwarf Sperm Whales (*Kogia sima*)
- ◆ Long-finned pilot whale (*Globicephala melas*)
- ◆ Atlantic Spotted Dolphins (*Stenella frontalis*)
- ◆ Striped Dolphins (*Stenella coeruleoalba*)
- ◆ Pantropical Spotted Dolphin (*Stenella attenuata*)
- ◆ Common Dolphins (*Delphinus delphis*)
- ◆ Fraser's Dolphin (*Lagenodelphis hosei*)
- ◆ Rough-Toothed Dolphins (*Steno bredanensis*)

Below you can find a factsheet on the pilot whale, our main Research Species

Fair Earth's Fact Sheet

Short Finned Pilot Whale



Globicephala macrorhynchus



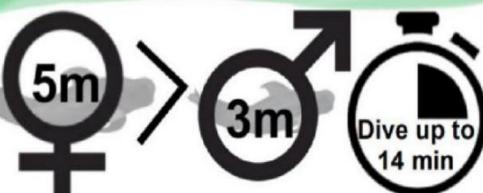
Average Weight



Carnivorous Diet



Worldwide Population ≈ 700,000



Dive up to 14 min



Global Distribution:

Tropical and warm-temperate waters, 41°S and 45°N. Extend into cold-temperate waters in the North Pacific.



Biology:

Reproduction: maturity at age 10. Females have calves every 5-8 years. Gestation period of 15 months.

Behaviour: Pilot whales occur in groups of 25 to 50 animals. Males have more than one mate—typically a group has one mature male for every eight mature females. Males generally leave their birth school, while females may stay in theirs for their entire lives.

Kingdom	→	Phylum	→	Class	→	Order	→	Family	→	Genus	→	Species
Animalia		Chordata		Mammalia		Cetacea		Delphinidae		Globicephala		Macrorhynchus

Threats and issues:

- Fishing bycatch** in drift, gillnets and deep-set longline fishery.
- Ocean pollution**, microplastics to toxic levels of Mercury, PCBs and pesticides found in blubber.
- Entanglement** in drifted and abandoned nets causes drowning.
- Harvest / Whaling**. 500+ individuals are hunted annually out of tradition/food. Japan, Caribbean islands, Philippines, Nordic Europe.
- Vessel strikes** increased boat population traffic.
- Loud anthropogenic sounds from the military and seismic surveys lead to **mass strandings**.
- Marine debris** leading to plastic ingestion.

Projects around the world:

AWdF conservation and research based in north Atlantic Ocean.
<https://www.whalenation.org/>

NOAA fisheries, setting laws and information, based in the USA.
<https://www.fisheries.noaa.gov/>



WDC, collaborating with charities, based in the UK.
<https://uk.whales.org/>

How can you help:

- Volunteer or support a cetacean organisation.
- Stop using single use plastics.
- Eat less fish or sustainably sourced fish.



Appendix 3.

RESEARCH: APPLICATION FOR DATA USE

AWdF data is open access. We want it available to researchers to expand our understanding and make full use of the data our volunteers have collected over the last quarter of a century. We want to do this in a properly managed way and would ask that people wanting to use our data confirm that they have read our Research Data Use Protocols and agree to comply with the spirit of it.

What we are offering: data, helping in developing a project proposal, support in analysis, review the finished report, poster design, distribution.

What we need from you:

Contact Details:

- Full Name:	-	- Email:
DOB:		- Phone (inc. int code):

Details of Knowledge and Experience:

- Education:
- Research:

Academic Supervisor (if relevant):

- Name:
- Email:

Research idea of interest (see our list but feel free to suggest alternatives):
-

Motivation for research topic chosen or suggested:
-

Time frame available to complete the work:
-

I Agree To:

1. Develop and agree a sensible research proposal.
2. Carry out a comprehensive literature review.
3. To credit fully the AWdF and its volunteers for the data used.
4. To complete analysis and write full report on the findings for AWdF to appraise.
5. To only publish once we agree on the finished report.

AWdF Agrees to:

1. Support development of research proposal.
2. Evaluate literature review.
3. Provide data required (need to define research variables being looked at and time frame of interest).
4. Evaluate analysis and report.
5. Promote selected work for publication.

Appendix 4.

Possible research projects titles

Interspecies interaction of cetaceans in Tenerife. Eg:

- Does Pilot Whale behaviour change when another species of whale or dolphin are present during an interaction?
- Are sperm whales more likely to be spotted when other species are present?
- Map out the sightings (using GIS) of pilot whales and bottlenose dolphins over the last 10 years. Do the geographical ranges overlap. Have they changed?

Family relations within pilot whale pods.

- Does pilot whale pod behaviour change when a calf is present?
- Are matriarchs within a pod of pilot whales involved with the courtship of younger members of the family?
- Show the geographical distribution of a named individual over the last ten years. ie map out all the sightings of Indio over the last ten years. Has the geographical distribution of this individual/family changed over the last ten years. (using GIS)

Cetacean offspring relationship with both parents.

- Does calf behaviour change during an interaction with a whale watching vessel?
- When there is a calf present does the group formation or behaviour change?
- Map out the geographical range of pod sightings when calves are present. Is this different to sightings when calves are not present. (Using GIS)

Atlantic spotted dolphins are they really migratory?

- Has the frequency of Atlantic Spotted Dolphin sightings increased over the last ten years?
- Show the geographical distribution of Atlantic Spotted Dolphin sightings over the last ten years (using GIS)
- There are two populations of Atlantic spotted dolphins that migrate through the waters on the west coast of Tenerife. Investigate the movements of these populations across the Atlantic from the Caribbean and the Bay of Biscay by getting in touch with other organisations.

Population numbers of pilot whales and bottlenose dolphins.

- Have sightings of pilot whales decreased or increased over the last 30 years?
- Have sightings of bottlenose dolphins decreased or increased over the last 30 years?
- Are the number of sightings from whale watching boats accurate enough to project the population size of resident species off the west coast of tenerife?

Boat traffic and their relation with the number of interactions.

- Does pod behaviour change depending on the direction of approach by the whale watching boats.
- Does the number of boats present affect the behaviour of the whales and dolphins during an interaction?
- Are certain species of whale and dolphin more greatly affected by the number of boats present during an interaction?
- How frequently are individuals encountered with visible boat collision injuries. Has this number increased or decreased over time?

Climate change

- Has temperature and climate change affected cetaceans?

- Will climate change affect the availability of prey living in the waters of Tenerife?

COVID-19 effect:

- Has the behaviour of pilot whales changed since the COVID-19 lockdown?
- Has the species distribution of whales and dolphins off the coast of Tenerife changed since the COVID-19 lockdown was imposed?
- Use GIS to map out the distribution of pilot whales before and after the COVID-19 outbreak. Has it changed in anyway?

□

Sperm Whales

- Sperm whale sightings have decreased since data started being recorded. Investigate this trend.
- Are sperm whales being spotted in other parts of the Canaries. Has their spatial distribution changed?

The effect of tourism

- Investigate the trend between the number of whale watching boats departing daily from Puerto colon and the number of whale and dolphin sightings.
- Investigate the trend between the number of whale watching boats departing daily from Puerto colon and the distribution of whale and dolphin species of the coast of tenerife
- Has the variety of whales and dolphins spotted changed overtime?
- Has the time of interactions changed? Are individuals getting 'used' to the whale watching boats?

Atlantic ocean cetacean network (AOCN): *brings together individuals and organisations from across the region working toward the conservation and protection of our whales and dolphins.*

Investigate the movements of species across the Atlantic by comparing ID work from our data to other projects in different regions. Create a spatial and temporal map of their movements.