



Dolphins of the Kelp



Condor Survey Data collection protocol 2017

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Background

In order to gather information about Commerson's (*Cephalorhynchus commersonii*) and Peale's (*Lagenorhynchus australis*) dolphins presence and distribution in the waters off the west coast of West Falkland, a nine-days exploratory survey was carried out in February 2017, on board of the vessel "Condor".

Study area

The study area includes the waters from Carcass Island to New Island and the west coast of West Falkland Island (**Figure 1**). The Islands off the west coast are heavily indented giving rise to numerous sheltered bays and narrow passages between islands that are strongly influenced by the pressure gradients across these land masses and the daily change in tides (Glorioso, 2000). Currents over the west coast of the Falklands are not only stronger than those over the east coast, but considerably less saline and slightly warmer due to differing oceanographic forcing. Waters off the west coast are influenced by Magellan Strait, while the east coast waters have a Sub-Antarctic nature (Palma *et al.*, 2008).

The remoteness and limited access to most of the coast make the western coast of the Falklands islands difficult to survey from land and/or using small boat.

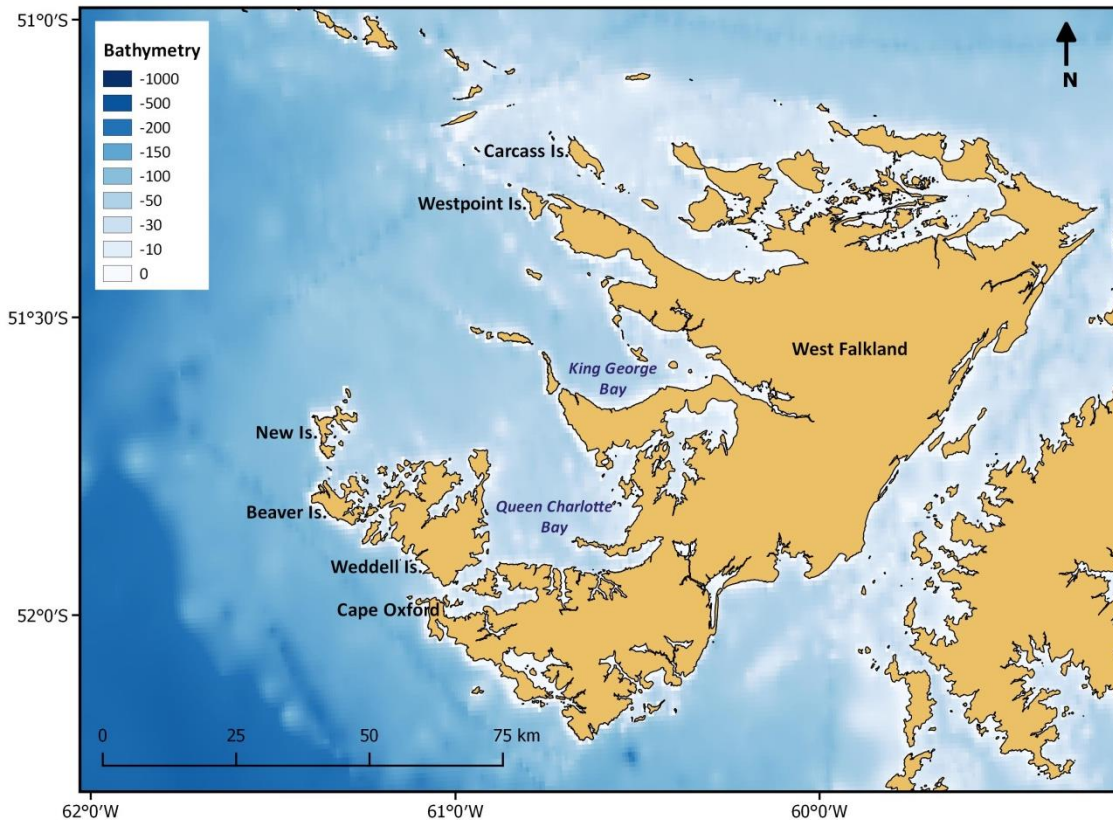


Figure 1 – Map of the study area including the waters from Carcass Is. to New Is. and the west coast of West Falkland.

Research vessel

The “Condor” (**Figure 2**) is a metal hull vessel, 15 m long, 5 m large, has a 1.5 m draft, and is equipped with a single Roll Royce 220HP diesel truck engine. The fuel tank has a capacity of 4,000 litres while the two freshwater tanks have a capacity of 150 litres each. The Condor average cruising speed is 7 knots (about 15 km/hour). The vessel was built in Germany in 1968 and served as fishing boat in the North Sea until it was bought by Michael Clarke who converted it for tourism purposes and transported to the Falkland Islands.



Figure 2 – The vessel “Condor”.

Data Collection

Data were collected only during on effort periods (positive conditions) which required the vessel speed ranging from 9 km/h to 15 km/h (5 to 8 knots), visibility of at least 4 km (*i.e.* no fog and low to no precipitation), and at least two observers to be searching for cetaceans. Navigation was carried out *Ad libitum*, *i.e.* without following pre-established routes. Survey was carried out from one hour after sunrise to one-two hours before sunset allowing time to anchoring for the night. Survey effort was suspended with the sea states above 5 Beaufort (**Table 1**).

Navigation data, including time, position (latitude and longitude in decimal degrees), and vessel speed and bearing, were recorded automatically every 10 seconds on a computer running the software Logger (Logger 2010, International Fund for Animal Welfare) interfaced with a global positioning system (GPS) Garmin 72H. A customized MS Access database was used by Logger to store the data (**Table 1** and **Table 2**).

Four researchers took turns every 30 minutes alternating from right and left observer (**Figure 3**), data recorder (**Figure 4**), and off duty. The observation platform was located on top of the roof of the pilot cabin where a fence was set up to safely accommodate the two observers (**Figure 3**). Observers searched with naked eyes from 10 degrees on one side of the track line to 90 degrees on the opposite side therefore creating an overlap of 20 degrees. Waterproof 7x50 binoculars were used to confirm species identification

particularly for whales. Observers had angle boards (protractors) in front of them to record horizontal angle from the trackline to the animal observed or the centre of the group in case of dolphins (**Figure 5**). A personalized distance-stick (with bins fixed at: 30, 40, 50, 75, 100, 150, 200, 300, 500, and 800 meters) aided the observers to estimate the distance to the animals at the initial sighting location (the formula to customize the stick is available upon request to SAERI). The distance was estimated by placing the upper side of the stick in correspondence of the horizon and by reading the value on the stick correlated to the sighting position (**Appendix 2**). Observers communicated with the data recorder using walky-talkies.



Figure 3 – Observers on the observation platform, on top of the captain cabin; a fence was set up to safely accommodate the observers. Note the presence of the protractors (red arrows) to estimate the dolphin angle at sighting.



Figure 4 – Data recorder inserting data received by the observers into Logger.



Figure 5 – Detail of the protractor. Note the protractor needle (red arrow) used to locate the bearing at which animals were sighted (bottom left enhancement box - pointed by the white arrow).

At the beginning of the survey, every 30 minutes and every time a change occurred, the following data were recorded (see **Table 1** for a detailed explanation): effort, event, environmental variables (including Beaufort scale, wind direction, cloud cover, swell, glare,

	East
	Southeast
	South
	Southwest
	West
	Northwest
Cloud cover	Coverage in %
Swell	No swell
	Low <1m short/average
	Low <1m long
	Moderate 1-2m short/average
	Moderate 1-2m, long
	Big 2-4m, short/average
	Big 2-4m, long
Confused	
Swell direction	Angle read using the protractor (0-360 degrees relative to the vessel's heading)
Glare angle: from/to	Start and end angle of glare in the observer's view, read using the protractor (0-360 degrees relative to the vessel's heading) - e.g. 270 to 300 degrees means the left side of observer view is covered in glare
Glare intensity	no glare
	Mild - Glare affects sightings within that sector very little
	Moderate - Glare affects may ability to detect sightings within that sector
	Severe - Glare severely affect ability to detect sightings within that sector
Precipitation	None
	Mild
	Moderate
	Severe
Fog	None
	Mild
	Moderate
	Severe
Visibility	Good >4km
	Moderate 2-4km
	Poor <2km
Sightability	Excellent
	Good
	Moderate
	Poor

Table 2 - List of sighting data collected during the Condor survey, using the software Logger.

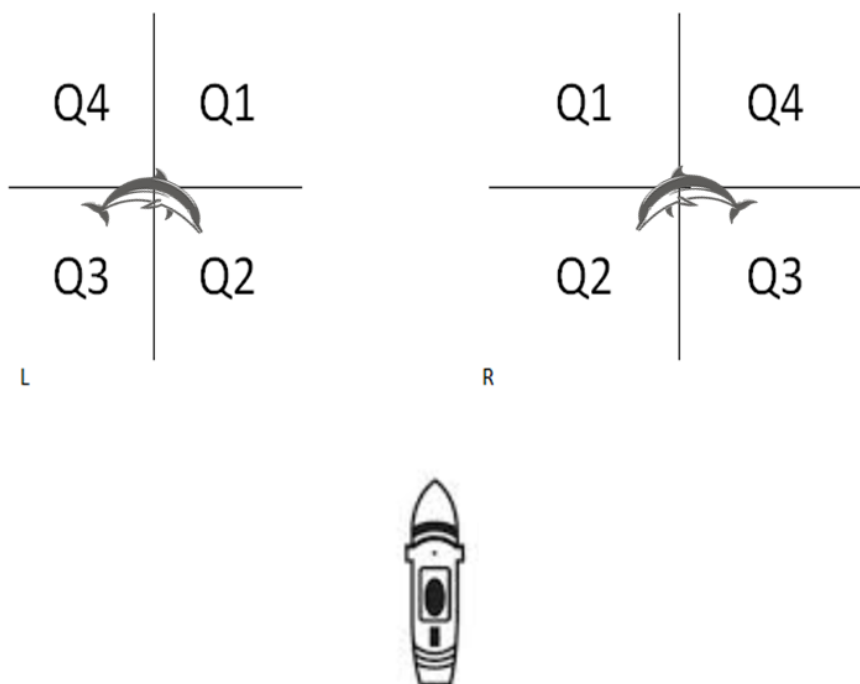
Distance	Distance in meters
Horizontal angle	This is the angle (to the nearest degree – do not round to the nearest 5°) to the animal (or centre of a school) where the sighting was seen. Read from the protractor.
Quadrant	Q1
	Q2
	Q3
	Q4
Observer	Enter the code for the spotter
Cue	Body
	Blow
	Splash/Breach
	Jump

	Slick
	Flash
	Associated with birds
	Associated with other wildlife
	Not applicable
Method of observation	Naked eye
	Binocular
	Other
Species	Commerson's dolphin - <i>Cephalorhynchus commersonii</i>
	Peale's dolphin - <i>Lagenorhynchus australis</i>
	Sei whale - <i>Balaenoptera borealis</i>
	Minke whale - <i>Balaenoptera acutorostrata</i>
	Orca - <i>Orcinus orca</i>
	Hourglass dolphin - <i>Lagenorhynchus cruciger</i>
	Southern right whale - <i>Eubalaena australis</i>
	Dusky dolphin - <i>Lagenorhynchus obscurus</i>
	Fin whale - <i>Balaenoptera physalus</i>
	Long-finned pilot whale - <i>Globicephala melas</i>
	Blue whale - <i>Balaenoptera musculus</i>
	Sperm whale - <i>Physeter macrocephalus</i>
	Humpback whale - <i>Megaptera novaeangliae</i>
	Southern bottlenose whale - <i>Hyperoodon planifrons</i>
	Unidentified whale
	Unidentified baleen whale
	Unidentified dolphin
	Unidentified marine mammal
	Unidentified <i>Otariidae</i>
	Unidentified <i>Phocidae</i>
Unidentified piniped	
Falkland Fur seal - <i>Arctocephalus australis</i>	
Southern sea lion - <i>Otaria flavescens</i>	
Leopard seal - <i>Hydrurga leptonyx</i>	
Southern elephant seal - <i>Mirounga leonina</i>	
Confidence of ID	High / Definite
	Med / Probable
	Low / Uncertain
Group size	Group size (minimum, best and maximum) including calves. If you are unsure of the exact number enter your best low and high estimate and put the range in the comments field. A group is defined as containing individuals not more than 5 animal lengths from each other, and exhibiting the same swimming pattern and/or general behaviour
	When populations are distributed in loose aggregations it is better to identify smaller, homogeneous groups within the aggregation. Note in a comment that the groups belong to the same aggregation
Presence of calves	Yes/No
Number of calves	Number of the calves (identified as an individual less than $\frac{3}{4}$ of the body length of the adult with which is associated)
Presence of Newborn	Yes/No
Number of Newborn	Number of the Newborn (identified as an individual less than $\frac{1}{2}$ of the body length of the adult with which is strictly associated, by the presence of foetal folds and usually different colour)

Quality gr. size	Good (± 1 individual)
	Moderate (between ± 2 and ± 5 individuals)
	Poor (more than ± 5 individuals)
Initial behaviour	Attracted to ship
	Normal swimming
	Milling
	Travelling
	Surface active
	Bowriding
	Feeding
	Resting
	Avoiding ship
	Undetermined
Boat Reaction	Attracted to ship
	Avoiding ship
	Bowriding
	None
	Undetermined
Swim Direction	Only for whale, swimming direction (using a compass)
Picture	Yes/No
Genetic	Yes/No

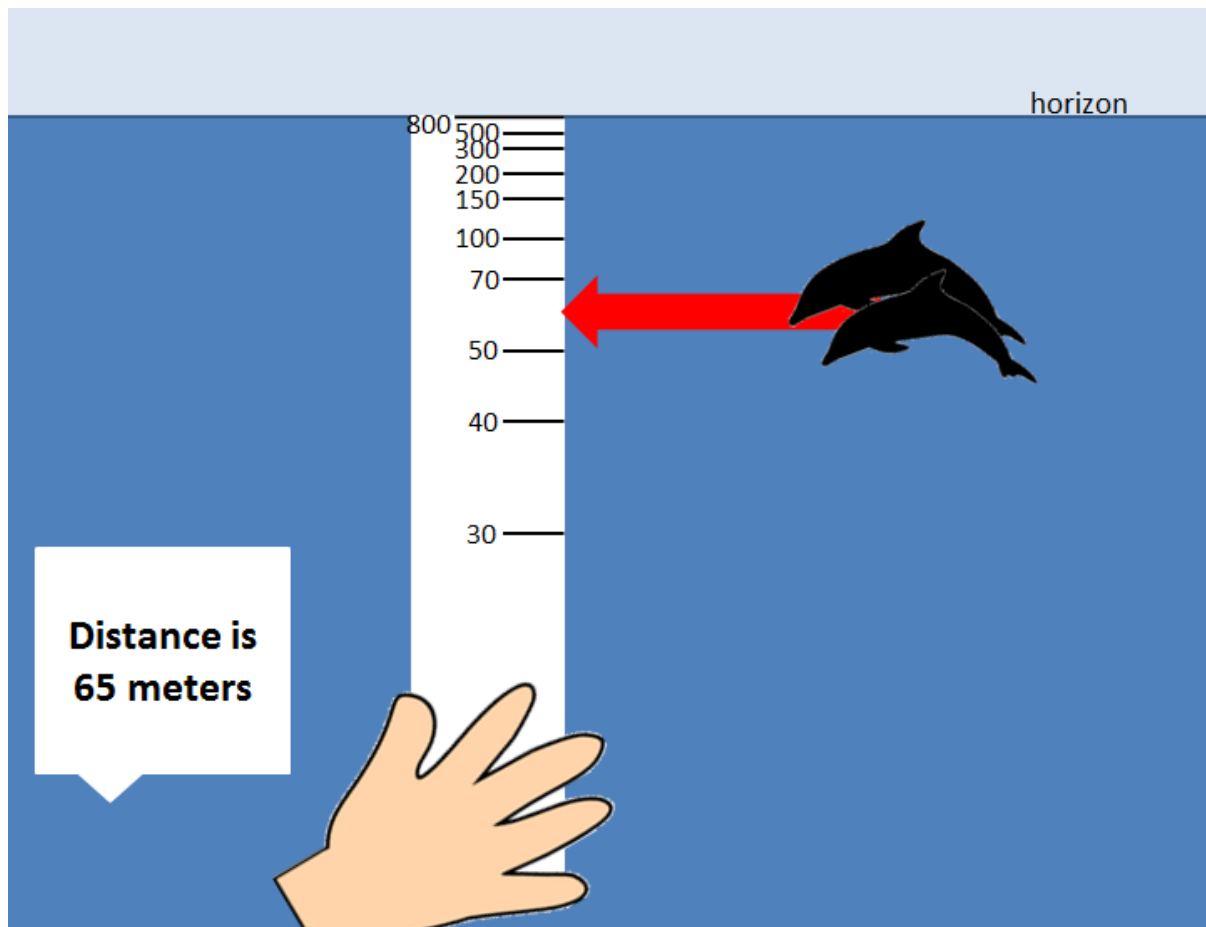
Appendix 1

The detail about the use of the quadrant are explained in Palka & Hammond, 2001.



Appendix 2

Distance-stick (with bins fixed at: 30, 40, 50, 75, 100, 150, 200, 300, 500, and 800 meters) used by observers to estimate the distance to the animals at the initial sighting location.



Bibliography

- Glorioso P.D. (2000) "Patagonian shelf 3D tide and surge model". *Journal of Marine Systems*, 24(1), 141-151.
- Palka D. L., Hammond P. S. (2001) "Accounting for responsive movement in line transect estimates of abundance." *Canadian journal of fisheries and aquatic sciences* 58.4: 777-787.
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