Dolphins of the Kelp

South Georgia Cetacean Survey
Data collection protocol
Summer 2017

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Background

Making the most out of an opportunity provided by the British Royal Navy and an invitation from Commanding Officer Philip Harper, two SAERI's cetacean ecologist joined the HS88 Enterprise on a ten-day expedition from the Falkland Islands to South Georgia. The objective was to conduct cetacean observations in a region there is scarce and patchy information on cetacean presence and abundance (Rossi-Santos et al. 2007) after the 19th century over-exploitation of marine species (particularly seals and baleen whales), where managing illegal fisheries and policing catch limits threatened the sustainability of the local fish and krill stocks and thus recovery of baleen whales (Constable, et al. 2000).

Study area

The HMS88 Enterprise return trip from the Falkland Islands situated at 51°S and 59°W heading east towards South Georgia Island located at 54°S and 36°W. The HMS88 Enterprise navigated through South Atlantic and Sub-Antarctic waters ranging between 2°C to 12°C, and strong frontal oceanographic boundaries such as the Antarctic Convergence Zone. South Georgia is a glaciated island located in the southwest Atlantic, 1390 Km ESE of the Falklands Islands and 1800 Km off east of the South American continental shelf. This 170 Km long sub-Antarctic island, once located next to Tierra del Fuego, was formed by continental drift when the Atlantic Ocean opened and it is now position south of the Antarctic Convergence.

The convergence zone is a highly productive region driven by local mixing and upwelling caused when cold, northward-flowing, Antarctic waters meet and sink under the relatively warmer waters of the Sub-Antarctic.

The area surveyed along track included highly productive environments waters enhanced by terrestrial nutrient input, ocean mixing and upwelling, delimited by areas of lower primary productivity. Such nutrient input and recycling of nutrients promoted by fronts and currents north of South Georgia give rise to the most intense productivity blooms south of the Polar Front. Waters around South Georgia support the highest densities of Antarctic krill (*Euphasia superba*), which constitutes the key stone species in Antarctic food-webs, and thereof are highly important feeding ground for recovering baleen whales populations in polar waters (Atkinson et al. 2008).

Research vessel

The "HMS88 Enterprise" is an Echo-class multi-role Royal British Navy survey vessel (hydrographic/oceanographic) launched in 2002. The ship is 90.6m long, 16.8m beam, 5.5 m draft, weighs 3740 tonnes. The vessel was equipped with three diesel generators, two 1.7 MW (2,279 hp) azimuth electric thrusters and one bow 0.4 MW (536 hp) electric thruster and has a range of about 17,200km (9,300 nm) at a speed of 22 km/h (12 knots). The HMS88 Enterprise average cruising speed is 15 knots (about 28 km/hour), and has a capacity to remain at sea for 35 days (Figure 1).

Figure 1 – The vessel "HMS88 Enterprise".

Data Collection

Two observers collected cetacean sighting data during daylight hours when visibility was at least 0.5 km ahead of the vessel and the vessel was navigating. Visual effort commenced 30 to 45 minutes after sunrise until dusk. Observations were conducted outside on the forward bridge deck of the HMS88 Enterprise (Figure 2) which stands 11 meters above sea level, when the weather conditions were suitable (i.e. during tail winds or head winds less than 20knots) and safe; otherwise observations were conducted inside the bridge (Figure 3).

Observers took breaks after ~3 hours of shifts and/or during bad weather (i.e. sea states above 7 Beaufort, heavy rain or snow, dense fog), and for meal-times.

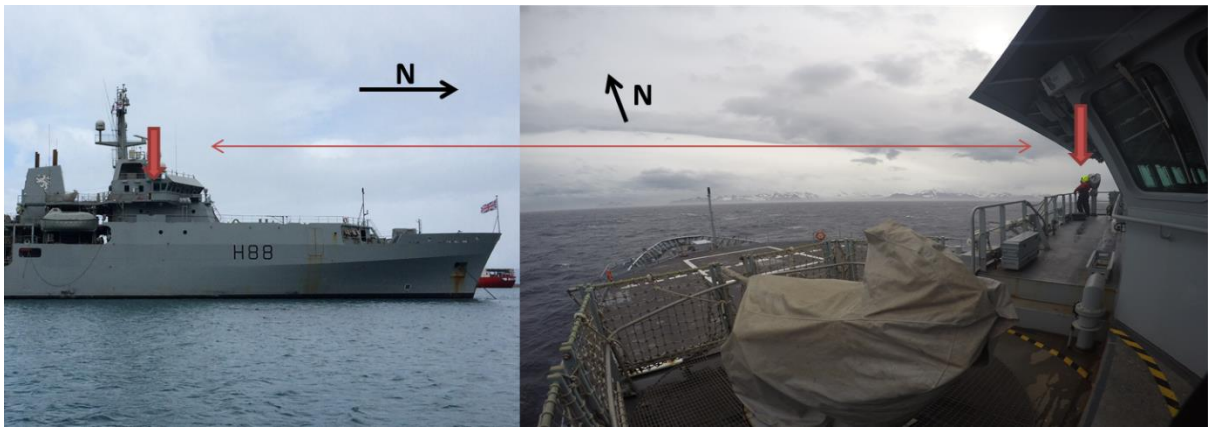

Figure 2 – Observer (red arrow) searching for cetaceans in the other deck of the HMS88 Enterprise's bridge.

Figure 3 – Observer (red arrow) searching for cetaceans inside the HMS88 Enterprise's bridge.

Each observer was station on either side of the vessel. One observers conducted observations off to starboard, while the other search for cetaceans over port side, so that 180 degrees ahead were covered along the track-line. Observers searched with naked eyes directly ahead of the track-line (360 degrees) to 90 degrees abeam on their respective side, and used waterproof 7x50 binoculars with compass to confirm species identification and estimate the true bearing for each sighting.

Photographs were taken when possible using a CANON EOS 7D Mark II, equipped with a lens EF 70-200mm f/2.8 L IS II USM, and a Nikon D7200, equipped with a lens AF-S VR-NIKKOR 70-200mm 1:2.8G. The pictures were used to verify species identification.

Navigation data, including time, position (latitude and longitude in decimal degrees), and vessel speed and bearing, were recorded automatically every minute with a global positioning system (GPS) Garmin 72H.

Environmental and effort data were tape recorded at the beginning and at the end of each observer effort block and every time there was a change in weather conditions. The following data was recorded:

- Time (i.e. format hh:mm:ss).
- Effort – Positive: when two observers are searching for cetaceans, visibility is more than 0.5 km, there is no heavy rain and speed ranges from 14 km/h to 24 km/h (8 to 13 knots); Negative: when one of the previous conditions do not occur; Cetacean: as soon as a sighting occur.
- Observer location (inside or outside the bridge).
- Sea state in both Beaufort and Douglas scales.
- Wind direction (using cardinal points).
- Swell high (in meters) and direction.
- Cloud cover (in %).
- Glare, precipitation and fog (none, mild, moderate and severe).

When cetaceans were sighted, the following data were tape recorded:

- Species.
- True bearing when sighted.
- Distance to the sighting.
- Cue.
- Observer's name who sighted it.
- Group size (best, minimum and maximum).
- Animal behaviour (travelling, feeding, resting, undetermined).
- Pictures taken (yes or no)

In the evening data were downloaded in an excel sheet and position were populated with the observation tape-recorded.

Bibliography

Atkinson, A., Siegel, V., Pakhomov, E.A., Rothery, P., Loeb, V., Ross, R.M., Quetin, L.B., Schmidt, K., Fretwell, P., Murphy, E.J. and Tarling, G.A (2008). Oceanic circumpolar habitats of Antarctic krill. Marine Ecology Progress Series, 362, 1-23.

Constable, A. J., de la Mare, W. K., Agnew, D. J., Everson, I., & Miller, D. (2000). Managing fisheries to conserve the Antarctic marine ecosystem: practical implementation of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). ICES Journal of marine Science, 57(3), 778-791.

Rossi-Santos, M. R., Baracho, C., Cipolotti, S., & Marcovaldi, E. (2007) "Cetacean sightings near south Georgia islands, south Atlantic Ocean." Polar Biology 31(1):63.