

**REPORT ON THE OCCURRENCE AND DISTRIBUTION
OF CETACEAN SPECIES IN THE SOUTHERN
BAY OF BISCAY, AUGUST 1999**



Fin whale *Balaenoptera physalus* (C. Weir)

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1) SUMMARY

- A dedicated survey to determine the occurrence and distribution of cetacean species in the southern Bay of Biscay was carried out during August 1999. A total of four days were spent at sea, with 3,110 minutes of survey effort achieved.
- A total of 50 cetacean and five large fish sightings were recorded during the survey. This included sightings of eight cetacean species, comprising two baleen whale species, two beaked whale species and four species of dolphin. A number of sightings were not identified to species, due to adverse weather conditions or distance from the vessel.
- The common dolphin was the most numerous species observed during the survey. The fin whale was the most frequently sighted species, and a large number of the unidentified rorquals were probably of this species. One sighting of a blue whale was notable for the rarity of the species within the region.
- Sightings of some cetacean species showed an association with depth, with bottlenose dolphins found much closer to shore than other species, and striped dolphins having a largely deep water distribution. The northern bottlenose whale and Cuvier's beaked whale sightings were recorded to the south of deep water canyons, in depths of over 1,500 m water.

2) INTRODUCTION

The Bay of Biscay is situated within the latitudes 43° 20' N and 48° N, and the longitudes 1° 20' W and 9° W, and is bordered by France and Spain (Figure 1). The majority of the bay is comprised of abyssal plain of over 4,000 m depth, but the region also contains shallow shelf waters and areas of steep slope. The study area centred on the southern region of the Bay of Biscay, and covered both shelf waters of less than 200 m depth, slope waters between 200 and 4,000 m depth and deep water over 4,000 m depth. Deep water is predominant in the study area, with the 1,000 m isobath approaching to within 17 kilometre of the Santander coastline. The primary feature of the area is the deep Santander Canyon, which extends to depths of over 4,000 m only 75 kilometre off the Santander coast.

The variation in sea-floor relief may provide habitat for a range of cetacean species within a relatively small spatial area. Previous work within the Bay of Biscay has identified the region as containing a diverse cetacean fauna, with surveys from large passenger ferries travelling across the Bay of Biscay between the UK and Spain recording at least 17 species since 1996 (Walker, 1998). Additional species are known to occur in the area from old whaling records, survey data and strandings data. These include several rare species such as the blue whale (*Balaenoptera musculus*) (Fletcher, 1995), northern right whale (*Eubalaena glacialis*) (Casinos & Vericad, 1976; Cendrero, 1993; Fernandez, 1996), True's, beaked whale (*Mesoplodon mirus*) (Cendrero, 1993), pygmy sperm whale (*Kogia breviceps*) (Casinos & Vericad, 1976; Cendrero, 1993; Fernandez, 1996), and dwarf sperm whale (*Kogia sinus*) (Creton *et al.*, 1992).

The southern region of the Bay has been identified as being exceptionally rich in both sightings and number of species, and for this reason the area was chosen for the present survey. In particular, the presence of two deep water submarine canyons in the area has provided sightings of beaked whales (Family: Ziphiidae) relatively close to shore. Most frequently observed are the northern bottlenose whale (*Hyperoodon ampullatus*) and Cuvier's beaked whale (*Ziphius cavirostris*), but several unidentified sightings of *Mesoplodon* species in the region were thought to be Sowerby's beaked whale (*Mesoplodon bidens*) or True's beaked whale (P. Coles, pers. comm.).

The main aims of this survey were:-

- To survey a previously identified area of importance for cetaceans and collect more detailed information on occurrence, distribution and abundance of cetacean species
- To determine the broad factors governing cetacean distribution within the region
- To record and where possible photograph the poorly known beaked whale species that have been sighted within the area

This report presents the results of the preliminary survey of occurrence and distribution of cetacean species in the southern Bay of Biscay during August 1999.

3) METHODS

A dedicated survey for cetaceans was carried out in the southern region of the Bay of Biscay between 2nd and 6th August 1999. Surveys were conducted aboard the 40ft yacht “Fandango”, at an eye height of 1.5m. Six pre-determined transects had been plotted to traverse the study region (Figure 2), giving a transect distance of 389 nautical miles which was estimated to require 65 hours (six days) at an average speed of six knots to complete. Although pre-determined transects had been laid out, their completion was subject to weather conditions and they were also departed from on occasion to approach cetacean species for the purpose of confirming species identification and photography. Under such circumstances, effort was recorded as normal and the transect was re-joined as near to the point of departure as possible.

A total of eight experienced observers participated in the survey. A two hour rota system was employed, with four observers on watch at any one time, two each on the port and starboard sides of the vessel. A 360° continuous scan was therefore maintained throughout daylight hours during the survey. Watches were carried out with the naked eye, and with regular scans using binoculars (Leica and Zeiss, 10x40 magnification).

Data were recorded using standard vessel-based effort and sighting forms produced by the Sea Watch Foundation (Heimlich-Boran, 1995). Examples of completed forms are shown in Appendix 1. The vessel’s position, course and speed were recorded at 15 minute intervals using a hand-held Global Positioning System (GPS) on deck, and supplemented by the vessel’s own GPS where necessary. Environmental data including wind force and direction, sea state, swell height, visibility and precipitation were also noted at 15 minute intervals. All cetaceans observed during the survey were recorded, along with other conspicuous marine animals such as large fish species. For each sighting the position and associated environmental conditions were noted, the angle to sighting was recorded using a compass bearing and the distance of animals from the vessel was estimated. Information on species, number of animals (including age where possible), direction of movement and behaviour were recorded initially and subsequently revised where appropriate.

Depths of sightings were looked up from Admiralty Chart number 1104 ‘Bay of Biscay’. Results from the survey are presented simply as location of sightings and vessel cruise track; no attempt has been made to calculate species abundance.

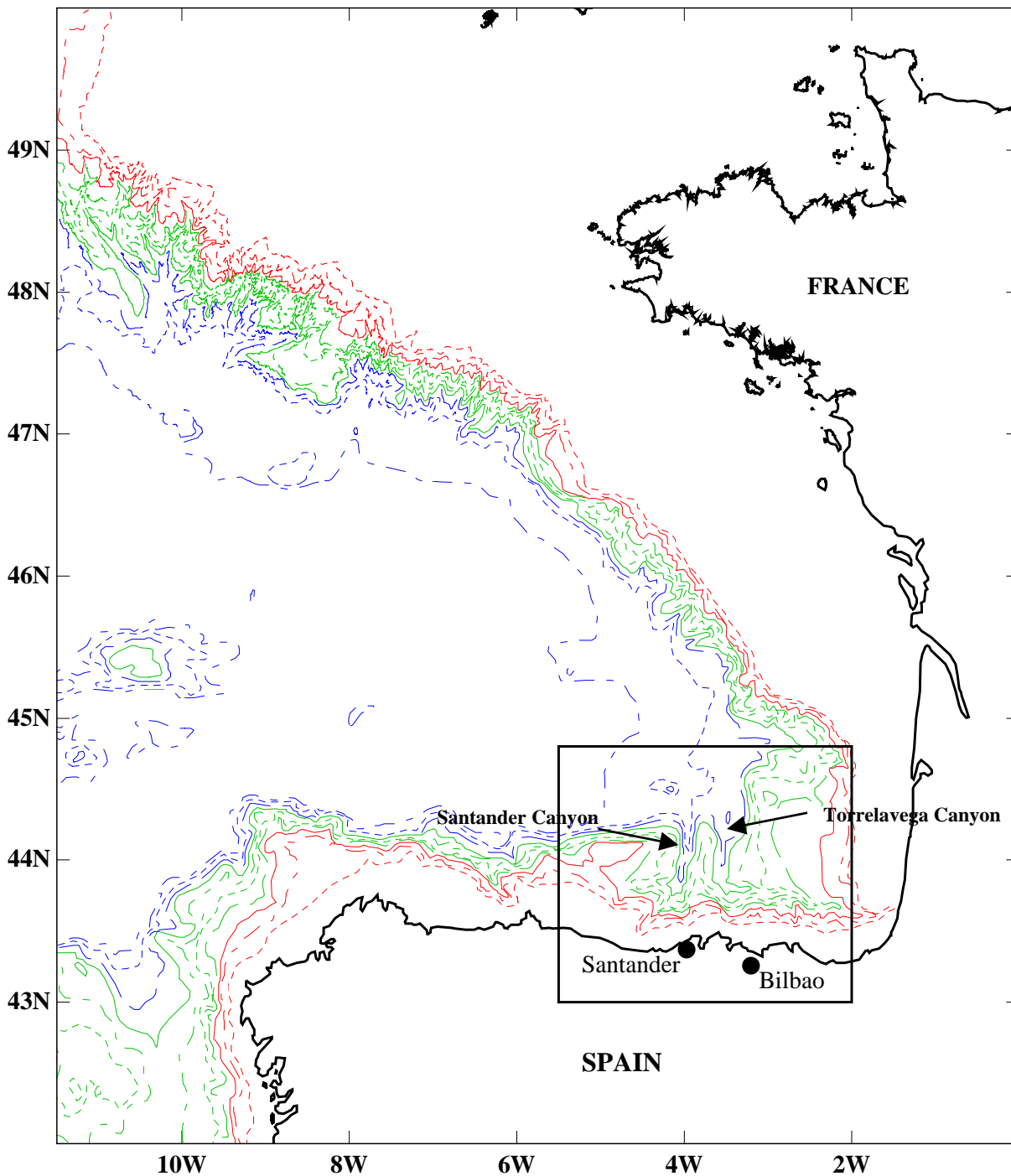


Figure 1. The Bay of Biscay, showing the location of the study area
Bathymetry (shallow to deep): dot, 200 m; dotdash, 500 m; solid, 1,000 m; dash, 1,500 m; dot, 2,000 m; dotdash, 2,500 m; solid, 3,000 m; dash, 3,500 m; dot, 4,000 m; dotdash, 4,500 m

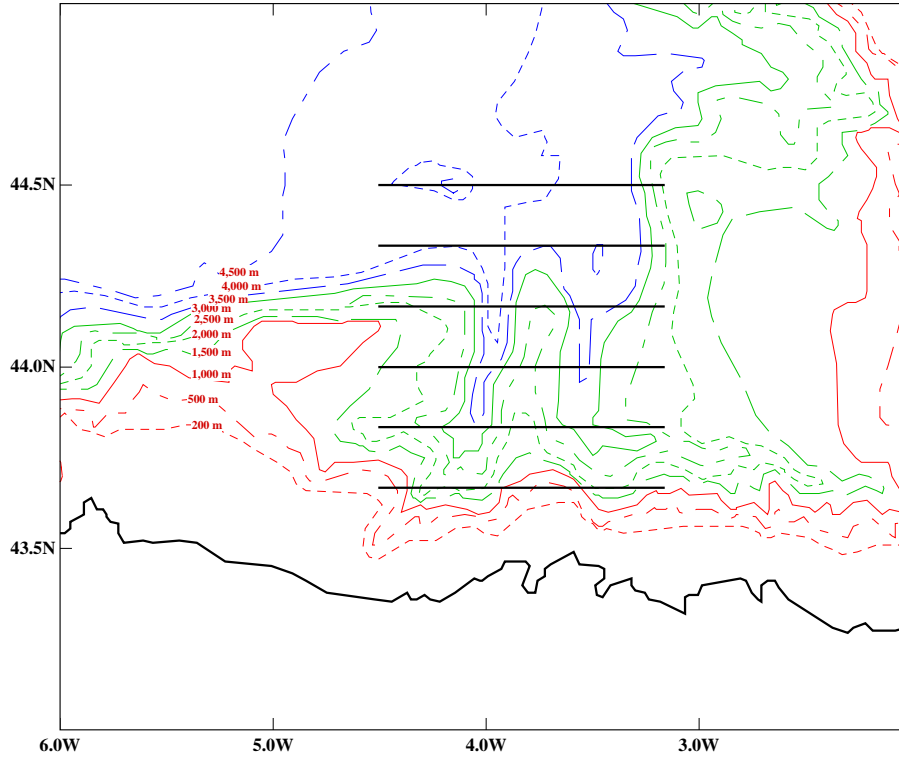


Figure 2. The layout of pre-determined transects during the survey

4) RESULTS

4.1 Survey Coverage

Although the survey vessel was chartered for the period 1st to 7th August 1999, bad weather over this period reduced the number of days spent at sea to four. The resulting decrease in time, along with difficult wind directions for sailing meant that the initial transects were revised to still achieve coverage over a wide area but at a much reduced density. The total cruise track covered during the survey is shown in Figure 2.

Surveys occurred on the 2nd, 3rd, 5th and 6th August (Figure 3). On each day, the boat was sailed along a track in whichever direction was most suitable in the prevailing wind and sea conditions. A total of 3110 minutes survey effort was achieved during the survey (Table 1).

Table 1. Minutes and hours of survey effort achieved during the survey

Date	Number of minutes survey coverage	Number of hours survey coverage
2 nd August	799	13 hrs 19 mins
3 rd August	685	11 hrs 25 mins
5 th August	841	14 hrs 01 mins
6 th August	785	13 hrs 05 mins
TOTAL	3110	51 hrs 50 mins

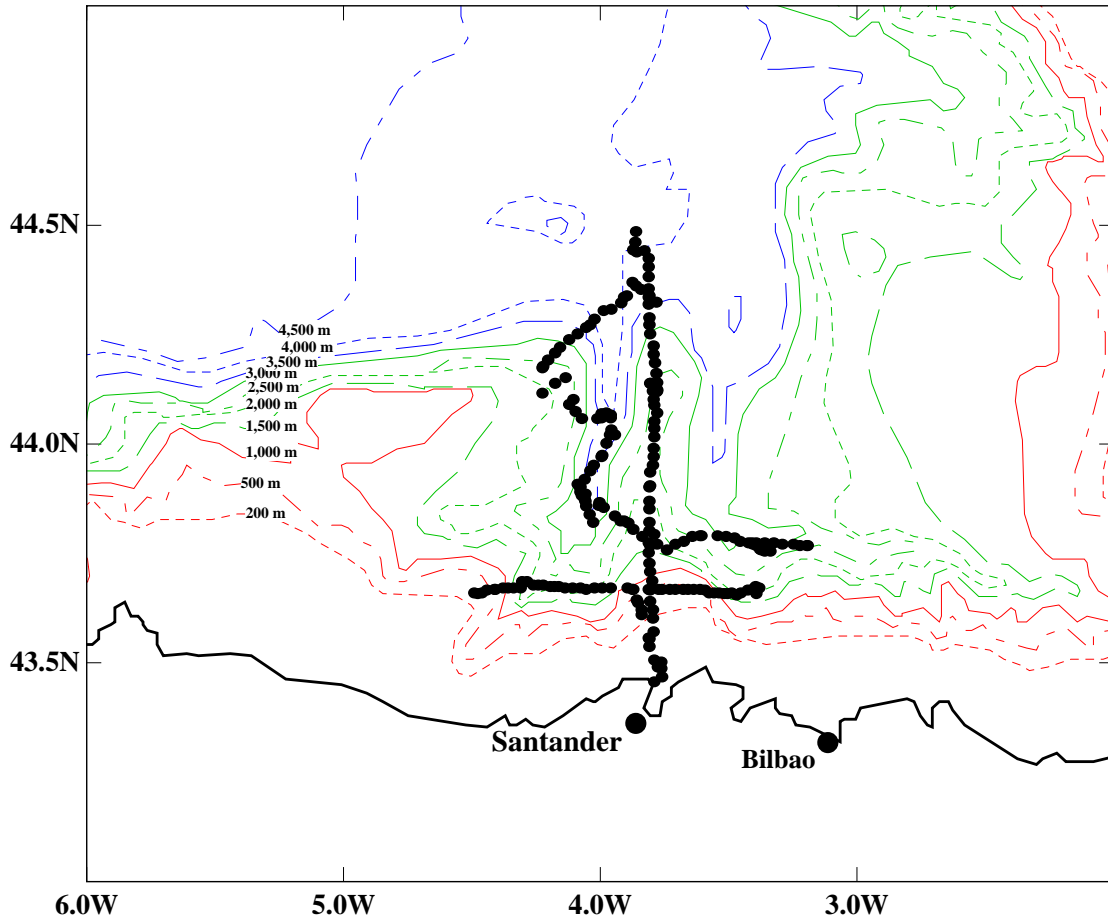


Figure 2. Location of the cruise track taken during the survey

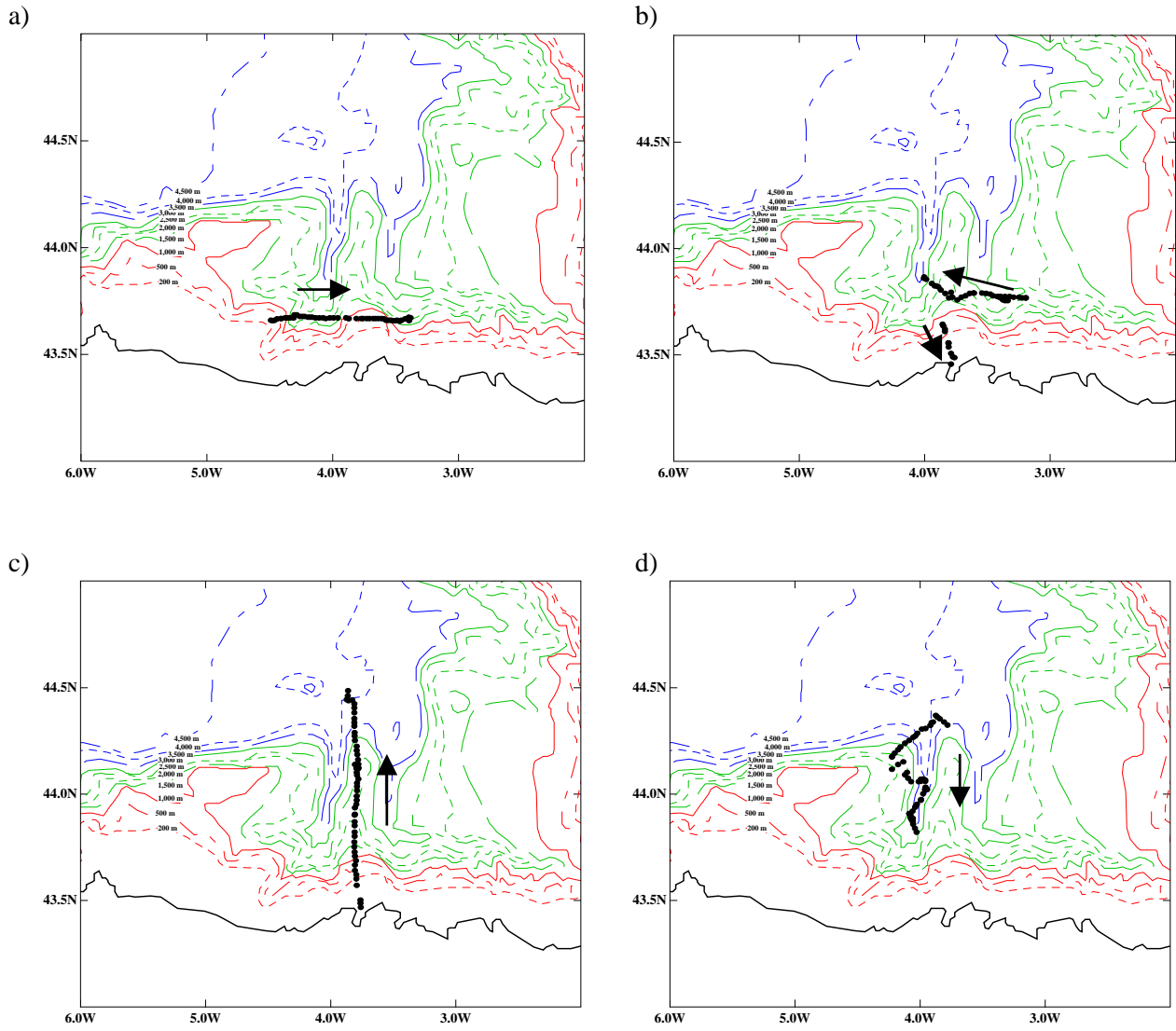


Figure 3. Location of cruise track during each day of the survey; a) 2/8/99, b) 3/8/99, c) 5/8/99 and d) 6/8/99. Arrows indicate direction of travel.

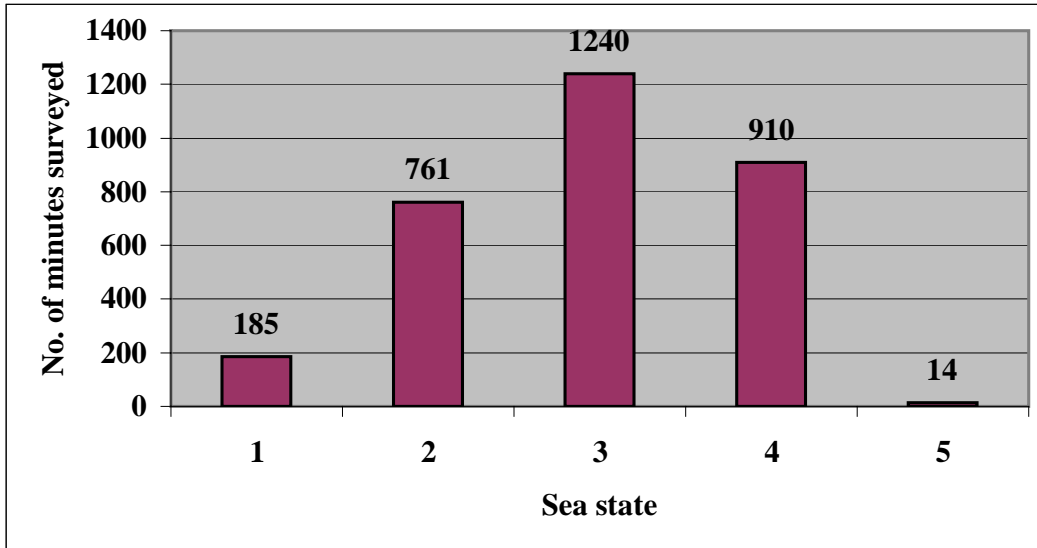


Figure 4. Number of minutes watched in each sea state

The majority of survey effort (69%) occurred in sea state 3 and 4, where the presence of white caps often reduces the detectability of cetaceans. On 3rd August the survey was stopped for 3hrs 20 mins when the sea state increased to 5.

The speed of the vessel during the survey varied from 2.3 to 8.1 knots, with an average of 5.2 knots. This average speed was usually achieved using the vessel’s motor, as conditions during the survey were generally unsuitable for sailing.

4.2 Cetacean sightings

All cetacean sightings recorded during the survey are shown in the distribution maps. Three sightings occurred outwith the dedicated survey and these have been noted in the species accounts. A total of 50 cetacean and five large fish effort-related sightings occurred during the survey period (Table 2). This included eight species of cetacean and several further sightings which were not identified to species. A definite species identification was only attempted when animals were close enough to the vessel to be positive. For this reason, a number of large whale blows and distant sightings were not specifically identified. A total of two baleen whale species, two beaked whale species and four dolphin species were observed.

Table 2. Total number of individuals and sightings observed during the August 1999 survey

SPECIES	TOTAL NUMBER OF INDIVIDUALS	TOTAL NUMBER OF SIGHTINGS
Unidentified species:-		
Cetacean sp.	2	2
Large whale sp.	8	8
Medium whale sp.	2	2
Small whale sp.	2	2
Blue/fin/sei whale	2	2
Dolphin sp.	1	1
Common/striped dolphin	2	1
Identified species:-		
Blue whale	1	1
Fin whale	22	12
Northern bottlenose whale	2	1
Cuvier's beaked whale	2	1
Long-finned pilot whale	3	1
Bottlenose dolphin	37	2
Common dolphin	184	11
Striped dolphin	78	3
TOTAL CETACEANS	348	50
Large fish sightings:-		
Shark sp.	2	2
Sunfish	5	3
TOTAL FISH	7	5

4.2.1 Unidentified cetacean species

Two sightings during the survey were of unidentified cetacean species (Figure 4). Both records occurred on 6th August, the first involving a disturbance in the water caused by a cetacean, and the second a splash probably from a breaching cetacean 1 kilometre from the vessel.

4.2.2 Unidentified whale species

The location of sightings of unidentified whale species is shown in Figure 4.

An animal which surfaced three times 1.5 kilometre from the vessel on 2nd August, was either a large dolphin or a small whale species. A single unidentified medium whale surfaced once on 3rd August. A splash from a probable small whale was seen 1 kilometre from the vessel on 6th August.

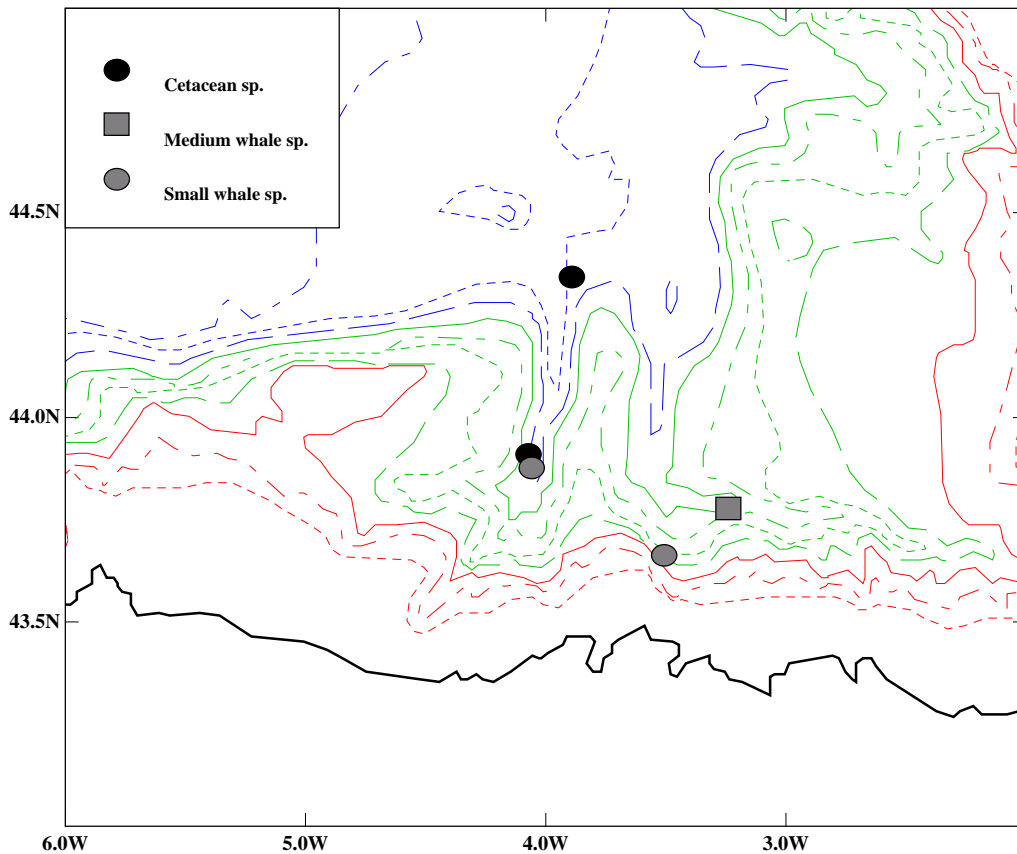


Figure 4. Location of unidentified cetacean, medium and small whale species

Bathymetry (shallow to deep): dot, 200 m; dotdash, 500 m; solid, 1,000 m; dash, 1,500 m; dot, 2,000 m; dotdash, 2,500 m; solid, 3,000 m; dash, 3,500 m; dot, 4,000 m; dotdash, 4,500 m

Several large whale blows were observed during the survey (Figure 5). These were recorded at distances of between 0.6 and 10 kilometres from the vessel, and were too brief or too far from the vessel for a definite species identification. One individual was recorded on the 5th August, while seven unidentified individuals were seen on 6th August.

Two large whale blows were tall and straight enough to eliminate the possibility of humpback (*Megaptera novaeangliae*) or sperm whales (*Physeter macrocephalus*), and were therefore recorded as blue/fin/sei whales. One very distant blow was recorded on 5th August, and two blows 4 kilometres away on 6th August were probably from a fin whale.

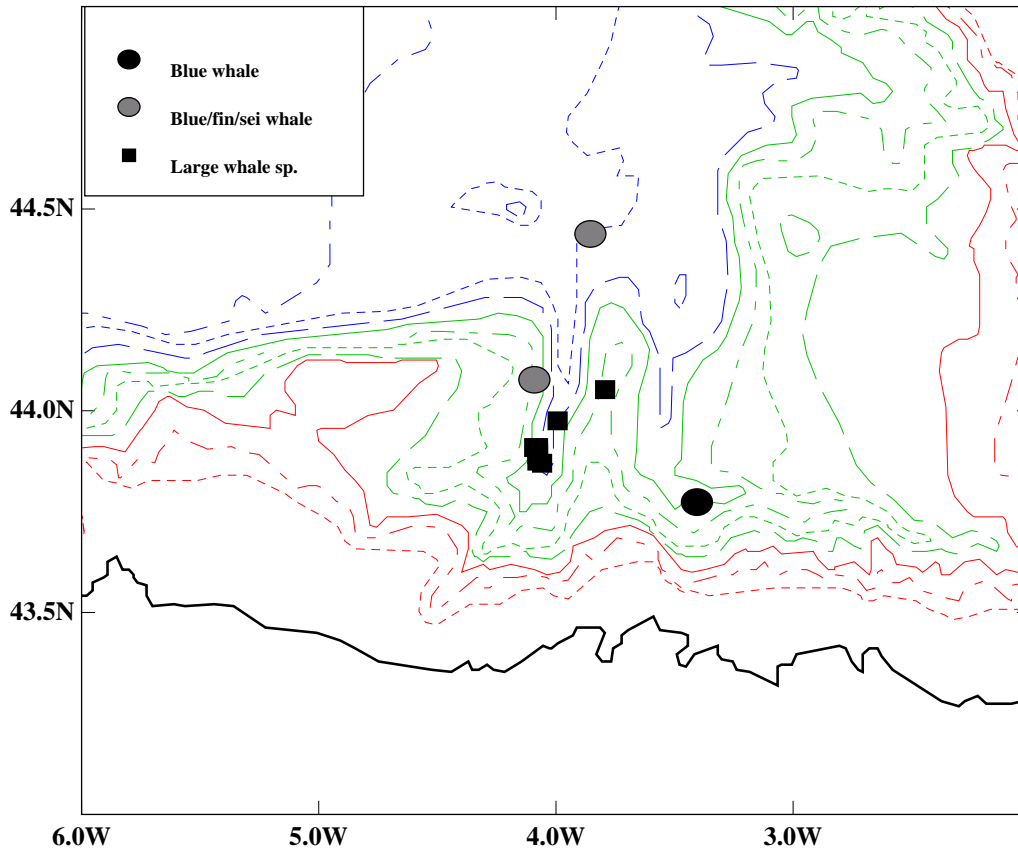


Figure 5. Location of blue and large unidentified whale sightings

Bathymetry (shallow to deep): dot, 200 m; dotdash, 500 m; solid, 1,000 m; dash, 1,500 m; dot, 2,000 m; dotdash, 2,500 m; solid, 3,000 m; dash, 3,500 m; dot, 4,000 m; dotdash, 4,500 m

4.2.3 Blue whale *Balaenoptera musculus*

A single blue whale was recorded in good weather conditions on the 3rd August. The initial sighting occurred in over 3,100 m of water in the Torrelavega Canyon, approximately 48 kilometres north-east of Santander (Figure 5). The animal was transiting south-eastwards at a steady speed of about five knots. The whale surfaced three to five times before embarking on shallow dives of about five minutes duration. The encounter lasted for just under an hour and both video footage and photographs (Figure 6) were taken. The whale was last recorded approximately eight kilometres south-east of the initial sighting, over the 3,000 m isobath at the south-eastern edge of the canyon and continuing to travel south-eastwards.

The blue whale is severely depleted in the North Atlantic following over-exploitation (Evans, 1992); however this encounter and other reported sightings of blue whales in the Bay of Biscay (Fletcher, 1995; Williams, pers. comm.) suggest that a small number of animals may be using the region on an annual basis.

a)



b)



Figure 6. Photographs of blue whale in southern Bay of Biscay; a) back and dorsal fin, b) head and blow (Photos copyright of C. Weir)

4.2.4 Fin whale *Balaenoptera physalus*

Fin whales were recorded on every day of the survey, with a total of 12 sightings. Group size of fin whales varied from single animals to a close group of five animals (average group size was 1.8 animals). Fin whales were aged in 10 sightings, and consisted mostly of adult animals. Juveniles were recorded on three occasions; one each in a pod of three and five animals, and a single juvenile seen alone on 5th August. The distribution of fin whales appears to be centred on the waters in and around the Santander and Torrelavega Canyons, in water depths of between 1,500 m and 4,000 m (Figure 7).

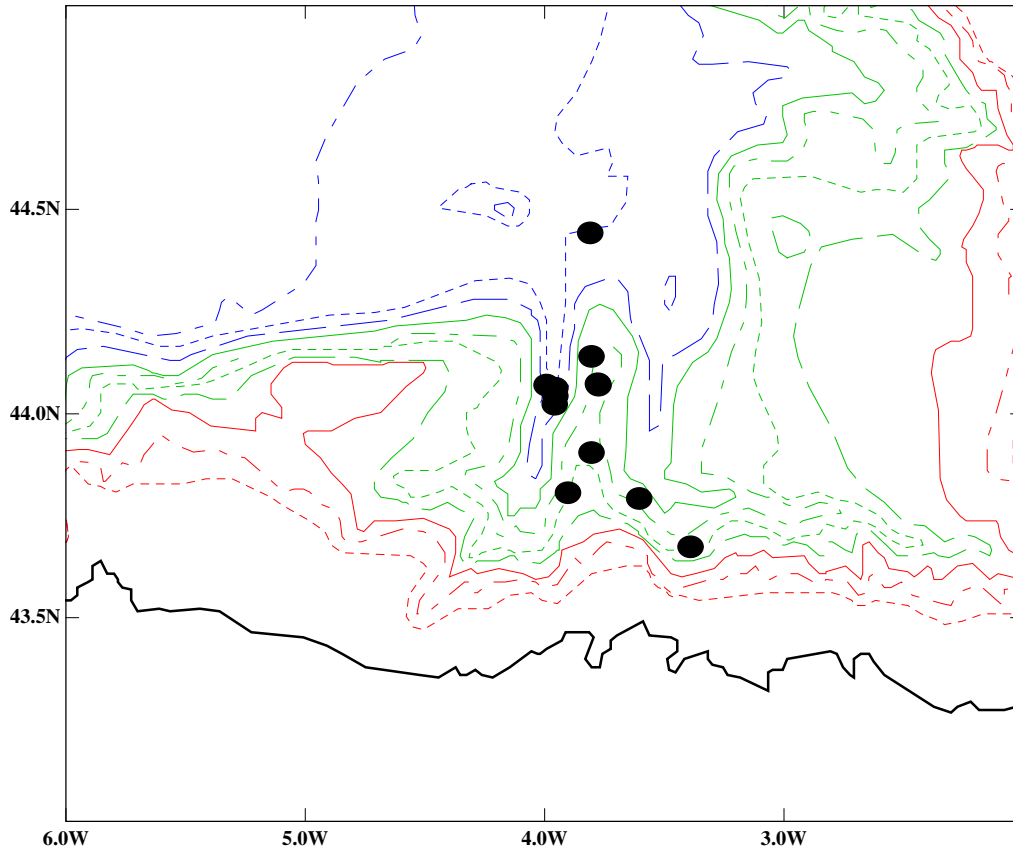


Figure 7. Location of fin whale sightings

Bathymetry (shallow to deep): dot, 200 m; dotted, 500 m; solid, 1,000 m; dash, 1,500 m; dot, 2,000 m; dotted, 2,500 m; solid, 3,000 m; dash, 3,500 m; dot, 4,000 m; dotted, 4,500 m

Fin whales were regularly approached during the survey to confirm species identification and to collect photographs for individual identification. The animals appeared to be inquisitive towards the vessel and frequently approached to within 100 m, often staying in the vicinity of the boat for lengthy periods. The dorsal fin shape of fin whales was highly variable (Figure 8 and title page) and may facilitate photo-identification studies during future research surveys in the area.

a)



b)



c)



Figure 8. Dorsal fin variability in three individual fin whales (a-c) in the southern Bay of Biscay. (Photos copyright of C. Weir)

4.2.5 Unidentified beaked whale species

On 6th August an unidentified beaked whale was seen to breach four times in rough sea conditions. The sighting occurred in approximately 2,500 m water to the west of the Santander Canyon (Figure 9). The animal was over 1 kilometre from the vessel, but was probably a northern bottlenose whale.

4.2.6 Northern bottlenose whale *Hyperoodon ampullatus*

One sighting of northern bottlenose whales occurred during the survey, when two animals surfaced together three times on 2nd August. The sighting was made in 1,300 m of water to the south-west of the Santander Canyon (Figure 9). The large heads and steeply sloped foreheads suggested that both animals were adult males. Northern bottlenose whales may have been under-recorded during the survey; their long dive times of over 70 minutes (Hooker & Baird, 1999) and adverse sea conditions may reduce the likelihood of their detection.

4.2.7 Cuvier's beaked whale *Ziphius cavirostris*

Cuvier's beaked whale was recorded once during the survey when two adults surfaced in close proximity to one another on 2nd August (Figure 9). The animals were sighted in 2,000 m water to the south of the Torrelavega Canyon. The vessel's engine was switched off and the vessel allowed to drift at position 43°40'N 03°24'W. The animals remained within 1 kilometre of the vessel for 48 minutes, when the transect was continued. During this time, dives of 15 to 20 minutes were interspersed by three or four rapid surfacings.

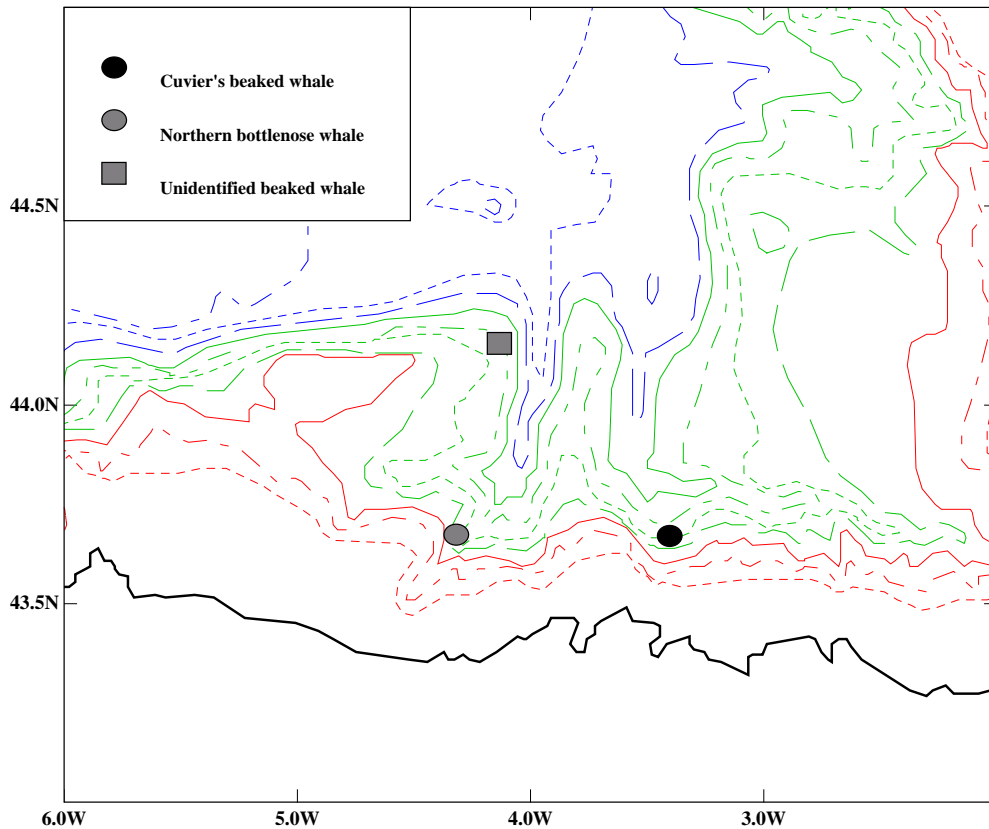


Figure 9. Location of beaked whale sightings. Bathymetry (shallow to deep): dot, 200 m; dotdash, 500 m; solid, 1,000 m; dash, 1,500 m; dot, 2,000 m; dotdash, 2,500 m; solid, 3,000 m; dash, 3,500 m; dot, 4,000 m; dotdash, 4,500 m

4.2.8 Long-finned pilot whale *Globicephala melas*

A small pod of three pilot whales was observed transiting rapidly westwards in over 2,000 m water depth on 2nd August (Figure 10). The pod comprised one adult male and two females or immature males.

4.2.9 Bottlenose dolphin *Tursiops truncatus*

Two groups of bottlenose dolphins were recorded during the survey (Figure 10). One large group of 25 individuals (including at least three juveniles) were observed 22 kilometres off the coast of Santander on 2nd August. The animals were widely dispersed in small sub-groups and did not approach the vessel closely enough to allow photo-identification. The second group were recorded on the 3rd August, inside Santander Harbour. The group of 12 animals included three sub-adults and two calves. Bottlenose dolphins were not observed in deep, offshore waters. Both sightings occurred in relatively shallow water of 200 m and less than 20 m water.

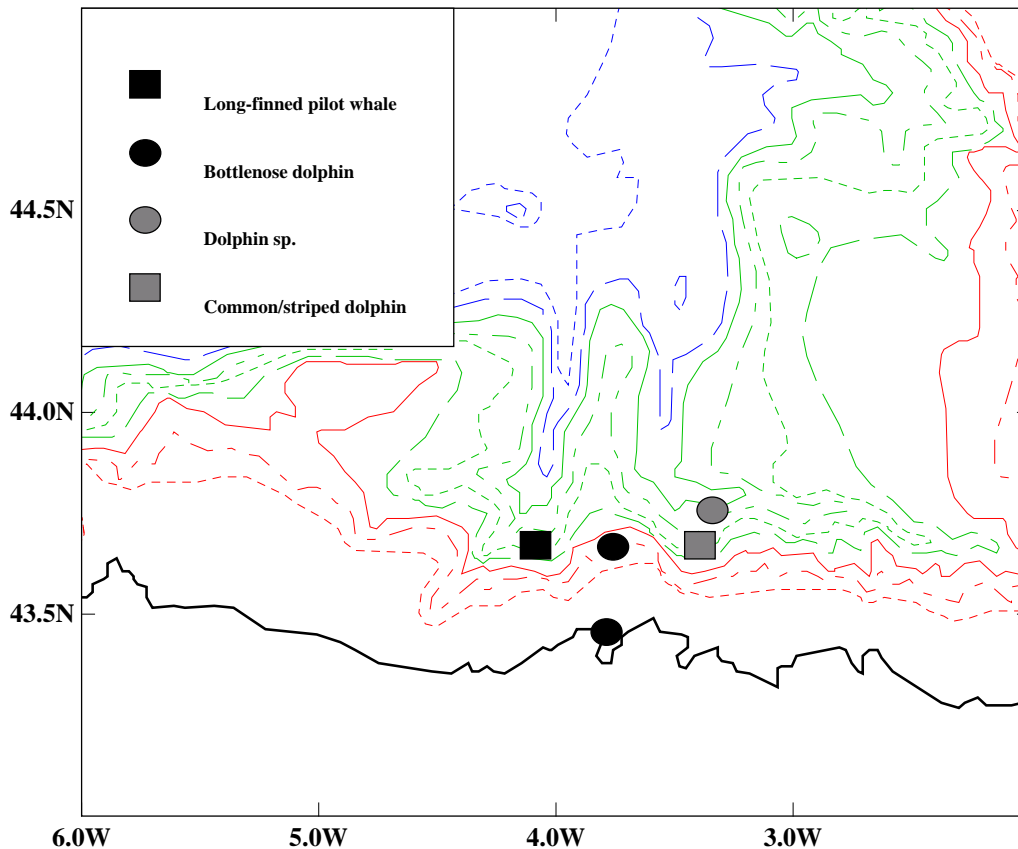


Figure 10. Location of pilot whale, bottlenose dolphin and unidentified dolphin sightings
Bathymetry (shallow to deep): dot, 200 m; dotdash, 500 m; solid, 1,000 m; dash, 1,500 m; dot, 2,000 m; dotdash, 2,500 m; solid, 3,000 m; dash, 3,500 m; dot, 4,000 m; dotdash, 4,500 m

4.2.10 Unidentified dolphin species

Unidentified dolphin sightings are shown in Figure 10. A single dolphin recorded on 3rd August was not identified to species. Two dolphins observed on 2nd August were either common or striped dolphins.

4.2.11 Short-beaked common dolphin *Delphinus delphis*

Common dolphins were both the most frequently sighted and the most numerous cetacean species during the survey, with a total of 11 sightings and 184 individuals. Eight of the 11 sightings occurred on 2nd August, when feeding groups were encountered. The group size of common dolphins ranged from five to 40 animals, with an average group size of 16.7 animals. Juveniles were recorded in all common dolphin schools that were aged (n=5). The time of the survey period occurred during the calving season for common dolphins (Evans, 1991).

The distribution of common dolphins appeared to be further inshore than that of the striped dolphin. Sightings were recorded in water depths ranging from 261 m to 2,500 m, but common dolphins seemed to favour the continental slope off the coast of Santander rather than deep waters along the Canyons (Figure 11). The high number of sightings of this species may partly result from their conspicuous behaviour; dolphins regularly approached the vessel to bow-ride and were often highly visible during bouts of feeding and breaching. Common dolphins were present around the vessel for much of the night on 1st August as the vessel steamed out from Santander towards the first transect. Unfortunately these animals were not recorded, but one off-effort record occurred on 6th August while steaming back into Santander.

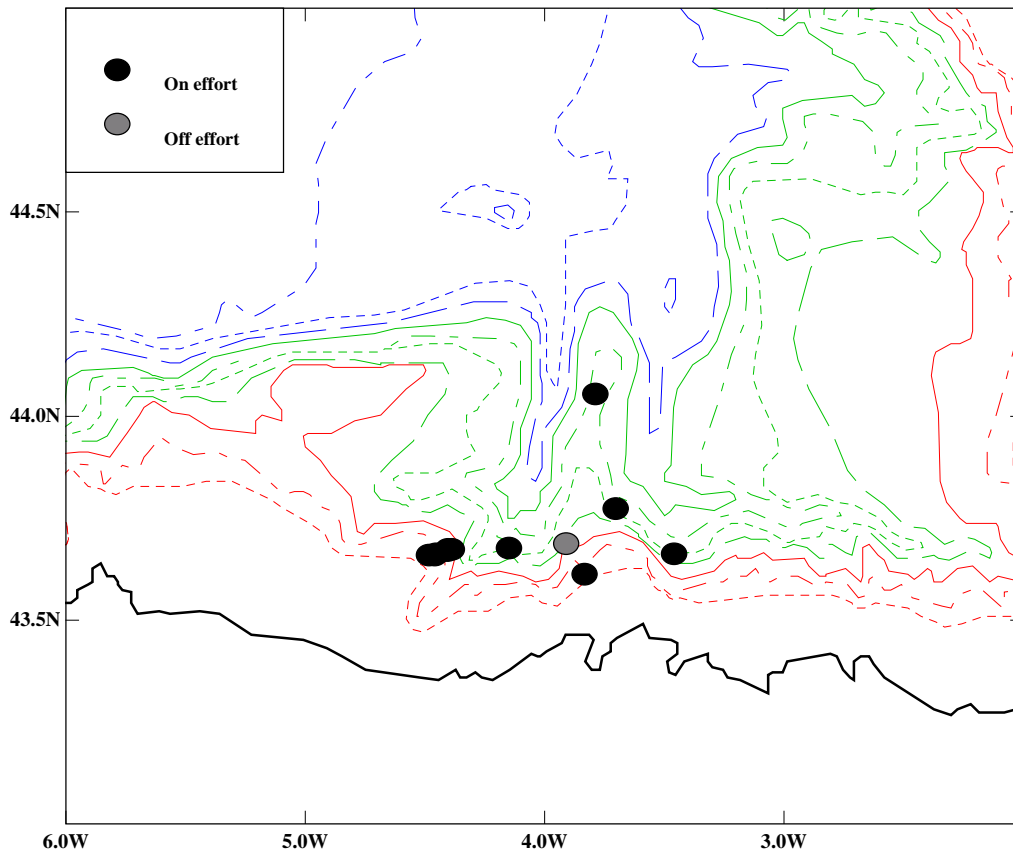


Figure 11. Location of common dolphin sightings
Bathymetry (shallow to deep): dot, 200 m; dotdash, 500 m; solid, 1,000 m; dash, 1,500 m; dot, 2,000 m; dotdash, 2,500 m; solid, 3,000 m; dash, 3,500 m; dot, 4,000 m; dotdash, 4,500 m

Several common dolphins encountered during the surveys bore individual distinguishing marks, including one with an obvious scar on its left/right flank (Figure 12).



Figure 12. Short-beaked common dolphin with obvious scar on left flank (C. Weir).

4.2.12 Striped dolphin *Stenella coeruleoalba*

Striped dolphins were recorded three times during the survey, and on a further two occasions while the vessel was steaming into port. The distribution of striped dolphins during the survey is shown in Figure 13. The off-effort sightings occurred on 6th August when small pods of five and 15 animals approached the vessel to bow-ride. Although the sightings were made during the evening, the animals were clearly identifiable as striped dolphins as they rode the bow-wave. These sightings occurred much closer to the Santander coastline than the other sightings of striped dolphins during the survey.

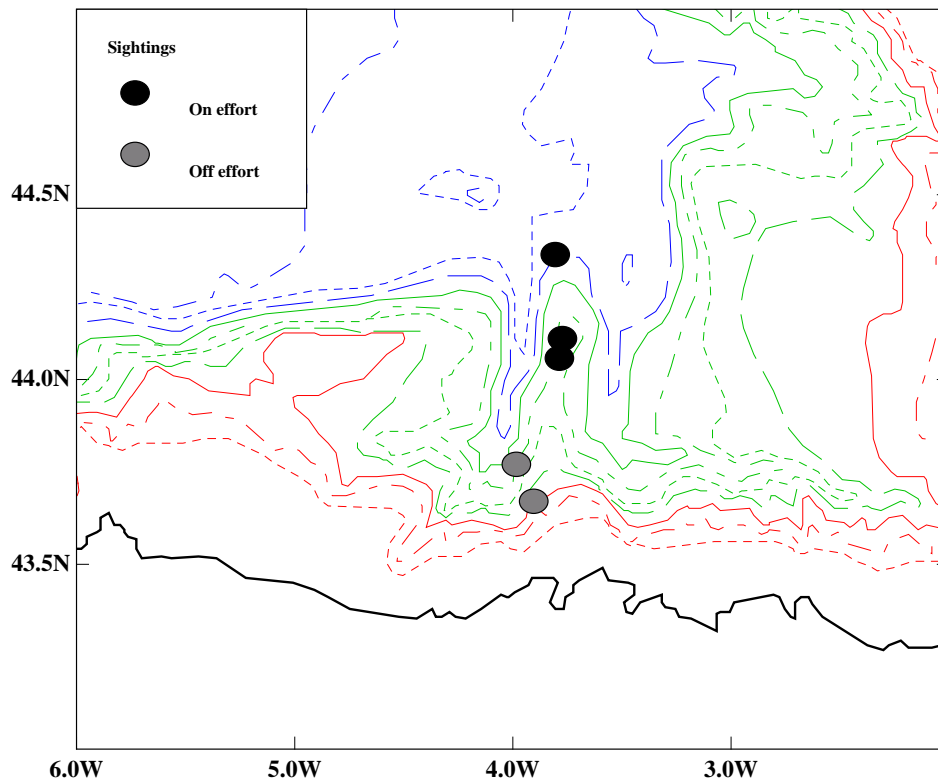


Figure 13. Location of striped dolphin sightings. Bathymetry (shallow to deep): dot, 200 m; dotdash, 500 m; solid, 1,000 m; dash, 1,500 m; dot, 2,000 m; dotdash, 2,500 m; solid, 3,000 m; dash, 3,500 m; dot, 4,000 m; dotdash, 4,500 m

During periods of dedicated effort, striped dolphins were only sighted in deep water of between 2,340 m and 3,500 m depth. Group size of these sightings was 35 and 40 animals, with one sighting of three distant breaching individuals which may have included more animals. The only pod that was aged contained 40 animals, which included a high proportion of juveniles (n=18). Pods of striped dolphins may segregate by sex or age (Evans, 1991), and this particular school may have been composed mainly of females and their calves.

4.3 Large fish species

4.3.1 Unidentified shark species

Two individual sharks were observed, neither of which could be identified to species (Figure 14). Both animals were seen passing under the vessel and did not break the surface. The first animal was 8-10 feet in length (5/8/99), while the second shark was smaller at 6 feet (6/8/99).

4.3.2 Ocean sunfish *Mola mola*

Ocean sunfish were recorded three times during the survey (Figure 14). All individuals were seen in close proximity to the vessel at distances of 4 to 15 m, and it is probable that many sunfish at greater distance went unobserved. One small sunfish was recorded on 5th August, while a single individual and a group of three were recorded on 6th August.

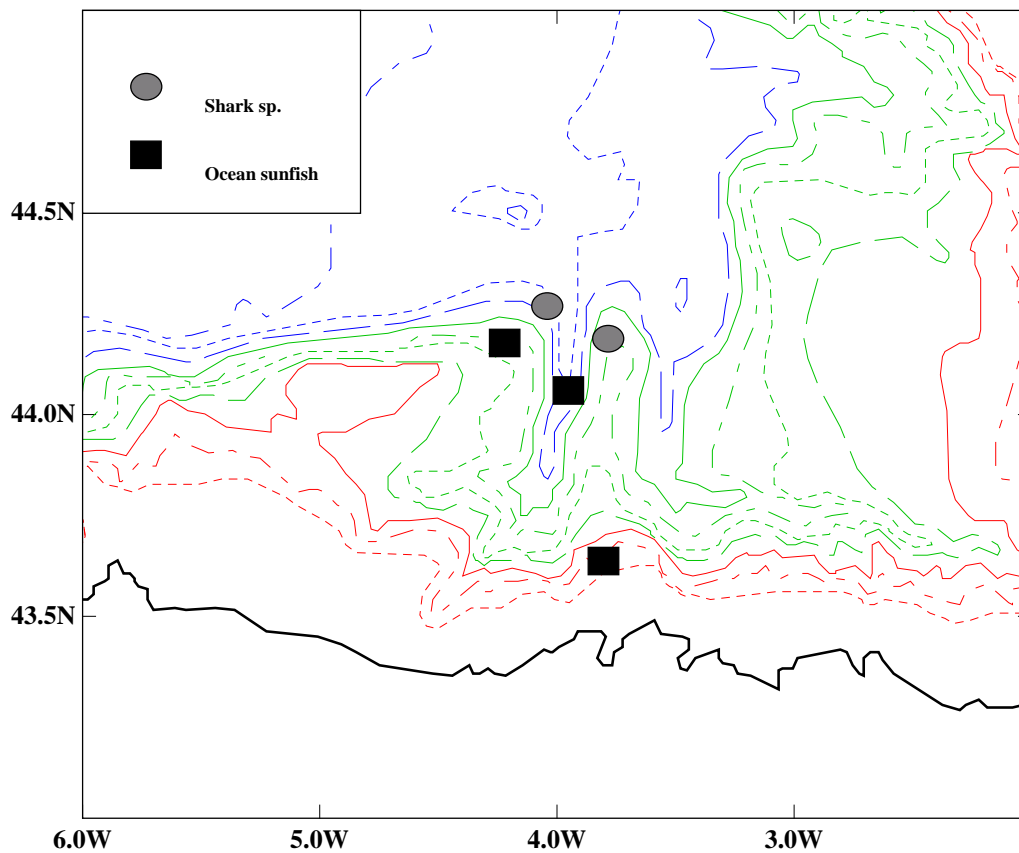


Figure 14. Location of large fish sightings during the survey

Bathymetry (shallow to deep): dot, 200 m; dotdash, 500 m; solid, 1,000 m; dash, 1,500 m; dot, 2,000 m; dotdash, 2,500 m; solid, 3,000 m; dash, 3,500 m; dot, 4,000 m; dotdash, 4,500 m.

5) DISCUSSION

Despite a survey period of only four days, the survey recorded a total of 50 cetacean sightings including eight species of cetacean. At approximately one sighting every hour, the southern Bay of Biscay appears to be a rich area for a range of cetacean species. In other areas of Europe such as the UK, both the number of sightings and the number of individuals of many cetacean species peak during August (Evans, 1992) and it is likely that the present survey occurred during the peak season for recording cetaceans in the Bay of Biscay. August is also the peak calving period for some species, and juvenile animals were recorded during sightings of fin whales, bottlenose dolphins, common dolphins and striped dolphins.

Despite the survey occurring during August, adverse weather conditions limited the number of survey days and probably also restricted the number of sightings recorded. The detectability of certain species such as the common dolphin which show a tendency to approach vessels, may not have been badly affected by increased sea state. However less conspicuous species such as beaked whales show a much reduced sighting rate as sea state increases (Clarke, 1982), and are likely to have been overlooked during rough sea conditions. No apparent difference was noted between the approachability of cetaceans when the vessel was under sail or steaming by motor. However, the vessel under sail was generally much slower than when the motor was running, and less survey coverage was achieved. The vessel was also less manoeuvrable under sail, and animals were therefore less frequently approached for identification.

During the present survey, there was insufficient survey coverage over the whole area to draw any firm conclusions about the relationship between cetacean species and environmental variables such as depth, but certain trends were apparent. The most frequently sighted species, the common dolphin and the fin whale, were both found over a wide range of depths. In contrast, the bottlenose dolphin sightings were of a more inshore nature and striped dolphin sightings were primarily offshore over deep water. Depth of water has been identified as a key factor associated with the distribution of cetacean species in several other studies (Davis *et al.*, 1998; Hooker *et al.*, 1999), and it is likely to also be of major influence in the southern Bay of Biscay.

The distribution of cetaceans and the correlation of sightings with depth are probably a result of the distribution of their prey species. Both the fin whale and the common dolphin are amongst the more generalist species in terms of diet, which may account for their wide distribution throughout a large depth range. The fin whale takes a range of crustaceans and fish (Evans, 1991), while the common dolphin may take a variety of fish species and cephalopods (González *et al.*, 1994).

Three relatively uncommon species were sighted during the survey. The two beaked whale species, the northern bottlenose whale and Cuvier's beaked whale do not appear to be particularly rare within the Bay of Biscay, being regularly sighted from the ferries during the summer months. However, their successful detection from the much lower platform of the yacht suggests that both species may be amenable to more detailed studies. Both the northern bottlenose whale (Lick & Piatkowski, 1998) and Cuvier's beaked whale (Podestà & Meotti, 1991) feed on deep water cephalopods, and it is likely that their distribution in deep water is related to that of their cephalopod prey. Both sightings of these species occurred relatively close to the Santander coastline rather than in much deeper water further offshore, suggesting that high seabed relief along the slope edge bordering the canyons may be important habitat for beaked whales. Deep water canyons have been recognised as core habitats for both the northern bottlenose whale and Sowerby's beaked whale in Nova Scotia (Whitehead *et al.*, 1997; Hooker & Baird, 1999), and the canyons in the southern Bay of Biscay may present similar oceanographic conditions and prey species. It was not possible to approach beaked whale species for photo-identification, since the animals only spent short intervals at the surface. Despite species of *Mesoplodon* having been recorded in the Bay of Biscay, none were sighted during the present survey. This is probably a result of the adverse weather conditions encountered during much of the trip.

The blue whale was the rarest species of cetacean recorded within the region. The occurrence of the blue whale in an area that supports a large number of fin whales and other rorquals, suggests that the southern Bay of Biscay is a region of high productivity for baleen whale species during the summer months.

Although this report attempts to describe the distribution of cetacean species found in the southern Bay of Biscay, the data must be treated as a one off survey at a time when seasonal peaks of some species are known to occur. Much more research will be required within the region before any trends identified here can be confirmed.

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