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CETACEAN MONITORING IN NORTH-WEST EUROPEAN WATERS

2001



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THE ATLANTIC RESEARCH COALITION (ARC)

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Atlantic Research Coalition

ARC Report Number 1 – 2001

Atlantic Research Coalition

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Routes: Portsmouth – Bilbao - Portsmouth

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1. Executive Summary

This report describes the establishment, objectives and first year results (2001) of cetacean surveys carried out by four cetacean research and conservation bodies under the umbrella of the Atlantic Research Coalition (ARC). The ARC partnership was established in 2001 as a collaborative, pan-European approach to the annual monitoring of cetaceans in west European waters. In 2001, the ARC partners were the Biscay Dolphin Research Programme (BDRP), and the Plymouth to Santander Marine Survey (PSMS) from Great Britain, the Irish Whale and Dolphin Group (IWDG) from Ireland and Sociedad para el Estudio y la Conservacion de la Fauna Marina (AMBAR) from Spain.

ARC partners undertake fixed-route transect surveys on commercial ferries through north-west European waters using effort-related and standardised scientific recording methods. The groups receive passage and other sponsorship from the commercial ferry-route operators, making the data collected highly cost-effective. In addition to effort-related cetacean recording, a range of other data is collected including location and numbers of sharks, seabirds and in some instances fishing activity.

The data generated enables the description of cetacean distribution and calculation of monthly, seasonal and annual abundance indices. During 2001, 34 surveys were made over 98 days with approximately 30,000km of search effort completed by the four research teams. Over this period, over 600 sightings were made, totalling approximately 10,000 animals of 15 species. Sightings of particular conservation significance including large numbers of Bottlenose Dolphin *Tursiops truncatus* on the Bay of Biscay continental slope and important seasonal populations of Common Dolphin *Delphinus delphis* and Harbour Porpoise *Phocoena phocoena* in the Celtic Sea, western English Channel and Irish Sea. In the Bay of Biscay, there were large numbers of Striped Dolphin *Stenella coeruleoalba* and Fin Whale *Balaenoptera physalus* and a number of scarce European species including False Killer Whale *Pseudorca crassidens*, presumed True's Beaked Whale *Mesoplodon mirus*, Cuvier's Beaked Whale *Ziphius cavirostris*, Northern Bottlenose Whale *Hyperoodon ampullatus* and Sei Whale *Balaenoptera borealis*.

The surveys have provided vital monitoring data on cetacean density and distribution in the Bay of Biscay, Irish Sea, Celtic Sea and English Channel and have already generated data of relevance to regional conservation issues. The surveys have generated data which can help inform the identification of offshore candidate marine protected areas (SACs) for two Annex II (priority) EU Habitats Directive species; Harbour Porpoise and Bottlenose Dolphin. ARC survey data also provides evidence for immigration of substantial numbers of Common Dolphin *Delphinus delphis* into the shelf waters off northern France and southern England in winter. The population may be at risk, as the movement coincides with the winter pelagic trawl fishing season for Sea Bass *Dicentrarchus labrax*, a suspected key source of bycatch.

The ARC partnership is a long-term monitoring programme, which in time has the potential (with an expanded network) to yield data on seasonal, annual and longer-term population trends of cetaceans.

Data of this type has the potential to identify early sign of decline or other changes of conservation concern, and to evaluate the effectiveness of protected area designations and conservation/policies in conserving cetaceans. Furthermore, cetaceans are flagship, top predators; thus annual abundance data may also act as an indicator to assess the overall health of marine biodiversity in north-west Europe. ARC welcomes further collaboration, as data will become more powerful through time and as spatial coverage improves through the establishment of more survey routes. Recorders keen to follow ARC protocols on new ferry routes in the region are urged to make contact with partners.

2. Introduction

The majority of offshore cetacean surveys in temperate waters are made from research vessels on sampling cruises in a narrow window of opportunity during the summer months, when weather conditions are most suitable and sightings rates are at their highest. These fixed-period surveys are important, because they can enable absolute population estimates to be generated for extensive marine habitats. However, they do not provide data on the overall occupancy of cetaceans within a region and can miss important seasonal distribution patterns. Furthermore, due to their high cost they generally preclude annual monitoring of cetacean populations, data that may be invaluable in the detection of early signs of distribution and population changes of potential conservation concern.

Commercial ships of opportunity (ShOps) provide a practical and cost-effective alternative to dedicated research cruises for the offshore survey and monitoring of cetacean populations. A number of international ferries are particularly suitable for marine monitoring programmes because:

1. They follow offshore routes.
2. They travel on fixed (transect) routes.
3. They travel year-round enabling assessment of seasonal changes in distribution and abundance.
4. They typically carry large numbers of passengers and are managed by international companies, which make them potentially receptive to providing sponsorship in the spare capacity available.

The routes may be fixed over a number of years providing the potential for assessment of trends in distribution and abundance through time.

Their large size provides stability & an elevated observation height, enabling recording in more extreme weather conditions than smaller, dedicated research vessels

A further advantage is that due to the large number of passengers, they offer tremendous potential for raising awareness of the ecology and conservation of cetaceans (Figure 2).

More than 800 ferries operate in Europe (Hydes et al, 2003). These and other ShOps are increasingly being used as for a variety of ecosystem monitoring programmes. Examples include the 'Cavasso' north Atlantic CO₂ uptake Project (Natalie, 2001) and the EU-funded Ferrybox project, which monitors a range of oceanographic parameters (water column temperature, surface salinity, plankton, and sea surface temperature) on eight routes across Europe (Colijn, 2003).

Recording of cetaceans from ShOps has been widely undertaken across Europe with survey method protocols having being developed for a range of recorder types by the UK Mammal Society Cetacean Group/Sea Watch Foundation (Evans, 1995). Methods of data analysis have also been developed (e.g. Bravington et al., 2001) and this is an active area of research. The majority of ShOp data has

been collected as part of one-off survey/research projects or to contribute to databases for distribution survey and atlas projects (e.g. Pollock et al., 2000, Reid *et al.*, 2003).

More recently, longer-term monitoring programmes have been established on a number of ferry routes independently. The programmes collect effort-related data and enable assessment of annual and longer-term distribution and population trends. A limitation of these individual surveillance programmes is that they only sample one fixed area (though they may be extensive in linear terms).

The Atlantic Research Coalition (ARC) partnership was established in 2001 to gather data of this type together as a collaborative, pan-European approach to the annual monitoring of cetaceans in west European waters. The aims of ARC are:

1. To collate and analyse cetacean sightings data from fixed-route ferry and other ShOp monitoring programmes which adopt similar methods.
2. To gather data on the diversity, distribution and relative abundance of cetacean species in region.
3. To identify and detect changes in the seasonal, annual and long-term distribution and abundance of cetaceans in West European Waters.
4. To stimulate the establishment of new monitoring programmes on ShOps in West European waters.

It is hoped that ARC data will be of considerable use for cetacean conservation and marine biodiversity policy, designation and management. For example, the data has the potential to aid in the identification of key offshore areas for cetaceans, including offshore marine Special Areas of Conservation (SACs) required under the EU Habitats Directive. Furthermore, year-round sightings data will improve understanding of cetacean distribution/movements and enable a more informed evaluation of the relative importance of offshore regions for cetaceans. Thirdly, annual abundance indices will provide a tool for long-term monitoring of cetaceans in EU waters. Annual indices may help to identify early signs of species decline and trigger conservation action or a change in marine resource management policy before a population decline has reached a critical level.

During 2001 ARC was represented by four partners from three European countries: the **Biscay Dolphin Research Programme (BDRP)**, and the **Plymouth to Santander Marine Survey (PSMS)** from Great Britain, both of which carry out surveys from southern England to Spain, the **Irish Whale and Dolphin Group (IWDG)** from Ireland, which carries out surveys from eastern Ireland to western England/north Wales and the **Sociedad para el Estudio y la Conservacion de la Fauna Marina (AMBAR)** from Spain, which carries out surveys from northern Spain to England. The groups receive passage and other sponsorship from the commercial ferry-route operators, making the data collected highly cost-effective. Further information on each group is presented below.

3. ARC Founding Partners

1. Ambar

The Society for the Study and the Conservation of the Marine Fauna (AMBAR) was established by a small group of volunteers in 1996, interested in the study and the conservation of the marine fauna of the Basque coast. Initially, the focus of work was the establishment of a strandings network in the Basque Country of northern Spain.

The work of Ambar has grown in the region, to include research on Bottlenose Dolphins *Tursiops truncatus*, dedicated offshore surveys, and the establishment of a coastal sightings network. AMBAR is affiliated to the Spanish Cetacean Society. Monthly ferry surveys were established by the AMBAR Director Pablo Cermeno, on a P&O Ferries ferry route from Portsmouth to Bilbao in 2000. The surveys are carried out in partnership with the Biscay Dolphin Research Programme, under the sponsorship of P&O Ferries.

2. Biscay Dolphin Research Programme

The Biscay Dolphin Research Programme (BDRP) is a non-profit voluntary conservation body established by Andy Williams in 1995 that aims to further the conservation of cetaceans (whales and dolphins) and other marine life through scientific investigation and educational activities.

BDRP has a team of over 50 volunteer workers (in survey, research, education, publicity) and one paid staff member, who works full-time as a Wildlife Officer on the P&O ferry, the MV Pride of Bilbao. BDRP work includes monthly ferry surveys through the English Channel and Bay of Biscay (since 1995), co-ordinated by BDRP Director Clive Martin.

Other BDRP activities include ShOp surveys on other routes, marine wildlife education work; and research into the ecology of beaked whales and other cetaceans in north European waters. The Biscay Dolphin Research Programme receives sponsorship from P&O Ferries.

Further details are available at: www.biscay-dolphin.org.uk.



Fig. 1. BDRP and IWDG surveyors at work. (© Clive Martin & Dave Wall)

3. Irish Whale and Dolphin Group

The Irish Whale and Dolphin Group (IWDG) is a charity dedicated to the conservation and better understanding of cetaceans (whales, dolphins and porpoise) in Irish waters. The Group was founded in 1990 to establish an Irish stranding and sighting scheme and to campaign for the declaration of Irish territorial waters as a whale and dolphin sanctuary.

The current focus of IWDG work is the promotion of a better understanding of Irish cetaceans through education and research. Since 2001, IWDG has had an active programme of cetacean ferry and other ShOp surveys from Ireland to France, Wales and England, under the sponsorship of P&O Irish Sea Ferries, Irish Ferries and the Irish Marine Institute. The surveys are co-ordinated by ShOP Project Director Dave Wall.

Further details are available at: www.iwdg.ie/shopsurveys/

4. Plymouth to Santander Marine Survey

The Plymouth to Santander Marine Survey (PSMS) is a voluntary research body established in 1993 by Neil Fletcher, which carries out monthly cetacean transect surveys through the Bay of Biscay and English Channel. The PSMS carries out surveys exclusively on the Brittany Ferries route from Plymouth to Santander. Since 1996, survey efforts have been lead and co-ordinated by the PSMS Director, Dave Curtis. The PSMS receives sponsorship from Brittany Ferries.



Fig. 2: Clive Martin, BDRP Wildlife Officer on the MV Pride of Blbao. Large, international ferries provide a great platform to raise interest and awareness of cetaceans.

4. Survey Methods

The ARC partners collectively carry out survey work through four seas: the Bay of Biscay, Celtic Sea, English Channel, and Irish Sea (Figure 3). The survey routes travel through seven International Council for the Exploration of the Sea (ICES) fishing areas: VIIa, VIIe, VIId, VIIh, VIIIa, VIId and VIIIc. Fuller details of the survey routes monitored by ARC partners are given in the following section.



Figure 3: ARC survey routes in 2001

1. Survey Routes and Vessels

Dublin Port, Ireland to Liverpool Docks, England / Mostyn, North Wales

In 2001, the IWDG carried out six monthly return surveys through the Irish Sea on the M.V. European Ambassador, between July and December under the sponsorship of P&O Irish Sea Ferries. The M.V. European Ambassador is a large 170m-long cruise-ferry operated by P&O Irish Sea Ferries, with a 24,500 gross tonnage, a service speed of 25 Knots and a passenger capacity of 405 (Figure 4). The ferry runs through the central Irish Sea from Dublin Port, Ireland (53°20'N, 6°15'W) to Liverpool Docks, England (53°25'N, 3°05'W). In 2001 this route changed to Mostyn Harbour (North Wales). Both outbound and return crossings take 8 hours (6 hours to Mostyn) and the ferry schedule facilitates survey effort in both directions, enabling 100% of the route to be sampled in daylight hours during the summer months and a minimum of 50% of the route surveyed during winter months.



Fig. 4: IWDG survey vessel, M.V. European Ambassador

The ferry route is located between the islands of Anglesey and the Isle of Man where the seabed comprises extensive areas of potential reef habitat; which is an Annex 1 habitat in the Habitats Directive. Over the course of the crossing water depths are generally shallow, being no more than 120m, although to the south of the central part of the route, 30km off the north-west coast of Anglesey water depths reach more than 200m. Adjacent to the ferry route (to the north), between Dublin and the Isle of Man, is the Western Irish Sea Front, a distinct oceanographic feature of season high productivity (March to October) and an important feeding ground for marine fauna. The Western Irish Sea Front has been proposed as a marine protected area by the World Wide Fund for Nature (WWF).

Portsmouth Harbour, England to Santurtzi Harbour, Spain

In 2001, Ambar and BDRP carried out transect surveys through the English Channel and Bay of Biscay on the MV Pride of Bilbao, under the sponsorship of P&O Ferries (formerly P&O Portsmouth at time of surveys). The ferry route runs between latitudes 43° to 51°N and 0 to 8°W, sampling up to 85 ICES rectangles, measuring 15' latitude by 30' longitude. The MV Pride of Bilbao is a luxury cruise-ferry, weighing 40,000 tons, with a length of 177m and capacity to carry more than 2500 passengers (Figure 5). The ferry sails year-round twice a week from Portsmouth, England (50.8° N, 1.1° W) to Santurtzi (Port of Bilbao), Spain (43.4° N, 3.0° W). The Portsmouth to Santurtzi sailing takes 36 hours, whilst Santurtzi to Portsmouth crossings take ca28 hours, with a mini-cruise return crossings extending over four days. The return crossings enabled the whole of the route to be sampled at least once during daylight hours in the summer and approximately 75% of the route in the winter. The gap in winter coverage is the northern Celtic-Biscay shelf-edge (45°N-46°30'N). In 2001, Ambar (travelling early in the month) completed eight return trips between April and November, whilst BDRP (travelling towards the month-end) completed 12 return sailing's between February and November.

A wide range of oceanographic features are sampled along the ca1000km ferry route including continental shelf waters (50-200m deep), submarine canyons, sea mounts, the slope of the Celtic-Biscay (water depth 200-3000m deep) and the abyssal plain of the Bay of

Biscay. The Celtic-Biscay shelf extends through the waters south of Ireland, southwest of England and west of France, within the 200 nautical mile zones of these countries and is an ecosystem of high primary productivity. The shelf break has been proposed as marine protected area by WWF.



Fig. 5: AMBAR / BDRP survey vessel, M.V. Pride of Bilbao

Plymouth Harbour, England to Santander, Spain

In 2001, the PSMS carried out surveys through the English Channel and Bay of Biscay on the MV Val de Loire, operated by Brittany Ferries (Figure 6). This large cruise-ferry sails from March to November twice a week from Plymouth, England (50°25' N, 4°15') to Santander, Spain (43°28'N, 3°49'W), with a crossing time of approximately 24 hours. In 2001, eight monthly 'mini-cruise' return surveys were completed between March and November, under the sponsorship of Brittany Ferries.



Fig. 6: PSMS survey vessel, M.V. Val de Loire

Mini-cruise return crossings extend over three days enabling the whole of the route to be sampled at least once during daylight hours in the summer and approximately 75% of the route in the winter. The gap in winter coverage is the northern Celtic-Biscay shelf-edge (45°N-46°30'N).

The Val de Loire travels across similar oceanographic features to the MV Pride of Bilbao, albeit further west in latitude. These include continental shelf waters, submarine canyons (north of Santander), sea mounts, the slope of the Celtic-Biscay shelf and the abyssal plain of the Bay of Biscay.

2. Generic Methods Employed by ARC Partners

Each ARC partner carries out systematic surveys along fixed ferry routes, on a monthly basis, over the whole period of the available sailing schedule. Cetacean survey work by each group is carried out by a team of experienced volunteer surveyors, the majority of whom work professionally in nature conservation or ecological research, leading to a high standard of data collected.

Each monthly survey comprises a return crossing, with the return following directly on from the outward crossing (known as a 'mini-cruise on overnight routes'). Compared to conventional offshore cetacean surveys, ARC surveys are characterised by recording at relatively high speed (>15 knots) and height of eye (>15 meters) (Figure 7).



Fig. 7: The 32 metre high bridge of the MV Pride of Bilbao. (© Clive Martin)

Recording is made by a team of two to three experienced observers scanning ahead of the ship during all daylight hours. Recording positions include from the Bridge (AMBAR, BDRP, IWDG), and above the Bridge (PSMS). On watches, the search area is from 22.5 degrees ahead of the beam on either side to dead ahead. The priority is to ensure that near sightings are not missed, as this can bring bias in the analysis of absolute density.

At regular intervals (30 minutes) or whenever the ship's course changes, measures of recording effort (Figure 8) are made by collecting the following information:

1. Time
2. Ship position (latitude and longitude)
3. Ship's course over the ground (in degrees)

4. Ship speed (knots)
5. Sea state
6. Swell height
7. Visibility
8. Wind direction and speed
9. Precipitation
10. Cloud Cover

On sighting a cetacean, the same ship and environmental variables listed above are made in addition to the following:

1. Observer names (for the trip).
2. Species identity including degree of certainty (definite, probable, possible).
3. Number of individuals max, min and best estimate
4. Number of adults, juveniles and calves (# or %)
5. Angle to sighting (from ships bow)
6. Distance to sighting (assessed by a Heinemann stick)
7. Observed behaviour (Fast Swim, Leap/Splash, Breaching, Bow Ride, Slow Swim, Stationary/Milling, Tail Slap, Lobtailing, Blow Only, or other to the recorder.
8. Associated seabirds (species and number).

On BDRP surveys an identification description is required for the following species: Sei Whale *Balaenoptera borealis*, Northern Bottlenose Whale *Hyperoodon ampullatus*, False killer whale *Pseudorca crassidens*, Pygmy Killer Whale *Feresa attenuata*, Beaked whales (other than Cuvier's) *Mesoplodon* spp.

5. Results

1. Survey effort

During 2001, 34 surveys were made over 98 days between February and December with approximately 30,000km of search effort completed by the four research teams. The surveys represented more than 270 man-hours of survey effort.

2. Overall results

Over the ARC survey period, over 600 cetacean sightings were made, totalling approximately 10,000 animals and a remarkable 15 species.

The sightings included a significant number of sightings of two EU Habitats Directive Annex II species, Harbour Porpoise *Phocoena phocoena* and Bottlenose Dolphin *Tursiops truncatus*. Relatively large numbers of Striped Dolphin *Stenella coeruleoalba* and Fin Whale *Balaenoptera physalus* were recorded in the in the Bay of Biscay and important seasonal populations of Common Dolphin *Delphinus delphis* and Harbour Porpoise *Phocoena phocoena* were detected in the Celtic Sea, Western Approaches of the English Channel and Irish Sea.

All of the 15 species recorded in 2001 were seen in the Bay of Biscay, including a number rare/locally distributed in European waters such as False Killer Whale *Pseudorca crassidens*, presumed True's Beaked Whale *Mesoplodon mirus*, Cuvier's Beaked Whale *Ziphius cavirostris*, Northern Bottlenose Whale *Hyperoodon ampullatus* and Sperm Whale *Physeter macrocephalus*. Other species recorded in the Bay of Biscay included Killer Whale *Orcinus orca*, Long-finned pilot whale *Globicephala melas* and Risso's dolphin *Grampus griseus* (Figure 9). The high diversity of species recorded confirm that the Bay of Biscay is of European importance of for cetaceans.

Table 1: Number and variety of cetaceans recorded by ARC on ferry surveys in 2001

Cetacean Species	Species Name	Tot. No. Animals	Total No. Sightings
Minke whale	<i>Balaenoptera acutorostrata</i>	6	6
Sei Whale	<i>Balaenoptera borealis</i>	2	1
Fin Whale	<i>Balaenoptera physalus</i>	117	61
Sperm Whale	<i>Physeter macrocephalus</i>	11	7
Cuvier's Beaked Whale	<i>Ziphius cavirostris</i>	24	7
True's Beaked Whale	<i>Mesoplodon mirus</i> ¹	1	1
Northern Bottlenose Whale	<i>Hyperoodon ampullatus</i>	2	2
Bottlenose Dolphin	<i>Tursiops truncatus</i>	1306	60
Striped Dolphin	<i>Stenella coeruleoalba</i>	3308	90
Common Dolphin	<i>Delphinus delphis</i>	3747	196

Risso's Dolphin	<i>Grampus griseus</i>	14	3
False Killer Whale	<i>Pseudorca crassidens</i>	6	1
Killer Whale	<i>Orcinus orca</i>	7	2
Long-finned Pilot Whale	<i>Globicephala melas</i>	281	48
Harbour Porpoise	<i>Phocoena phocoena</i>	149	56

Unidentified Cetaceans

Dolphin sp.		333	39
Whale sp.		22	21

¹ Presumed identity

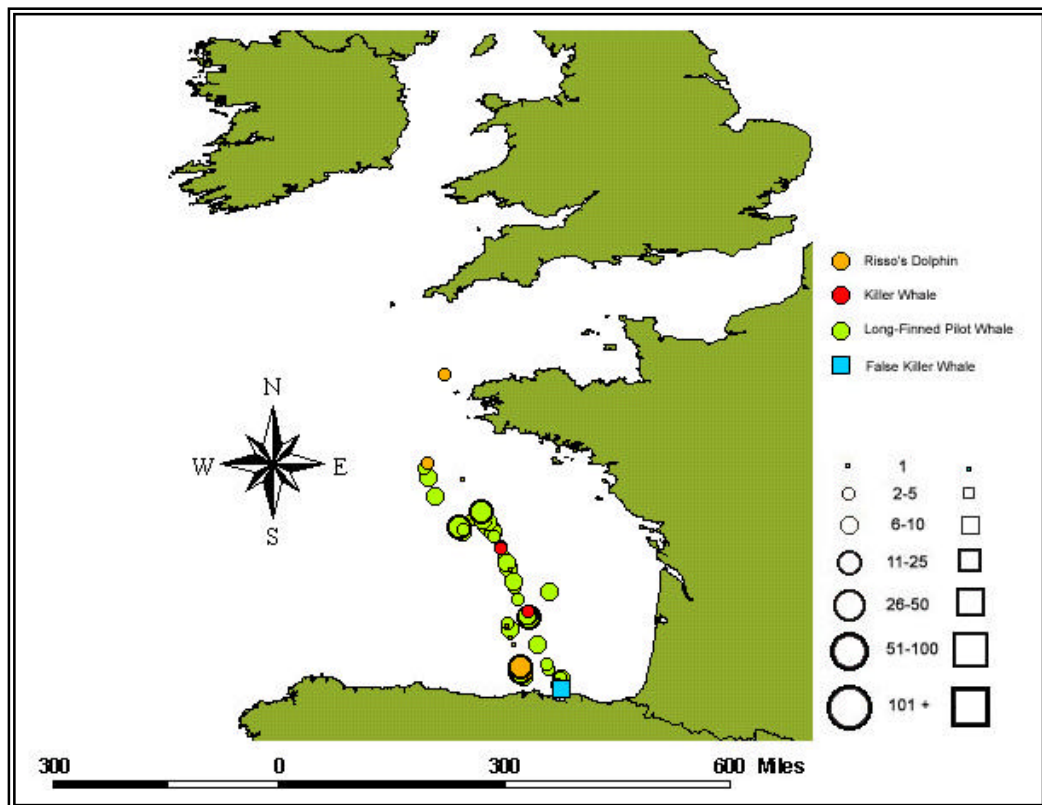


Fig. 9: Distribution and relative abundance (total number of individuals per sighting) of Risso's dolphin *Grampus griseus*, Killer Whale *Orcinus orca*, Long-finned pilot whale *Globicephala melas* and False killer whale *Pseudorca crassidens* recorded on ARC surveys in 2001.

This was the first year of the ARC partnership. Given the early stages of the survey effort, it was not considered appropriate to undertake effort-related analyses. Similarly, detailed seasonal distribution patterns were not assessed, because survey effort was not uniformly distributed through the year.

1. Selected Species Accounts

a. Harbour Porpoise *Phocoena phocoena*

Conservation Status:

The Harbour Porpoise *Phocoena phocoena* (figure 10) has extensive legislative protection at a European level. It is listed on Appendix II of CITES (allowing controlled trade), Appendix II of the Bern Convention and Annexes II and IV of the EC Habitats Directive. Under Annex IV of the latter, the keeping, sale or exchange of such species is banned, as well as deliberate capture, killing or disturbance.



Fig: 10: Harbour Porpoise *Phocoena phocoena*, likely to be under recorded this species is listed in the IUCN Red List of Threatened Species as vulnerable. (© Simon Berrow)

Annex II classification requires that Special Areas of Conservation (SACs) (protected sites) be created for the species by the appropriate European states. The Harbour Porpoise *Phocoena phocoena* is also on Appendix 2 of the Bonn Convention and is covered by the terms of the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), a regional agreement under the Bonn Convention. It is also a candidate species for inclusion on the Oslo and Paris Convention (OSPAR) list of threatened and declining species. Harbour Porpoises are listed in the IUCN Red List of Threatened Species as *vulnerable* (VU A1c, C1+2b) throughout their range, although two regional populations the North-East Atlantic and the Mediterranean and Black Sea are a special cause of concern.

ARC Sightings:

In 2001, 56 sightings totalling 149 individuals (maximum group size 12) were made between May and December. Sightings were recorded in three main areas: the Irish Sea, Western English Channel and 100-200m deep shelf waters north of the Celtic-Biscay shelf break (Figure 11).

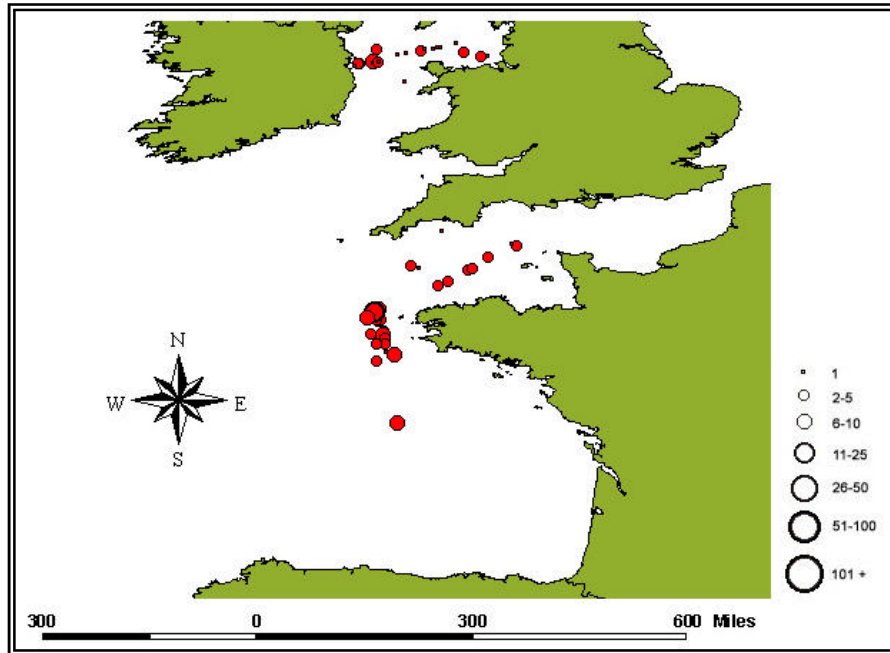


Fig. 11: Distribution and relative abundance (total number of individuals per sighting) of Harbour porpoise *Phocoena phocoena* recorded on ARC surveys in 2001.

Sightings were especially prominent in the latter area, suggesting that it should be investigated as a candidate offshore SAC for this species. The Harbour Porpoise *Phocoena phocoena* is likely to be under-recorded on ARC surveys due to the relatively fast speed of travel, high observation height and frequent travel (especially during the autumn/winter months) in unsuitable recording conditions (sea state >2).

b. Bottlenose Dolphin *Tursiops truncatus*

Conservation Status:

The Bottlenose Dolphin (figure 12) is listed on Appendix II of CITES, Appendix II of the Bern Convention and Annexes II and IV of the EC Habitats Directive. It is also on Appendix 2 of the Bonn Convention and is covered by ASCOBANS.



Fig. 12: Bottlenosed Dolphin *Tursiops truncatus*, concentration of sightings along continental shelf edge. (© Simon Berrow)

The Bottlenose Dolphin *Tursiops truncatus* status is classified as data deficient in the 1994 IUCN Red List of Threatened Animals (Baillie & Groombridge, 1996).

ARC Sightings:

In 2001, 60 sightings totalling 1306 individuals (maximum group size 150) were made from February through to December (Figure 13). Sightings included two substantial and significant counts each of ca150 individuals on the continental shelf-break, north of Bilbao in February. Four substantial counts (25-60 individuals) were recorded between August and October on the Celtic-Biscay shelf break, whilst a group of 60 was recorded on the Armorican Shelf (ca100-km west of the NW tip of the Brittany Peninsula, France) in October.

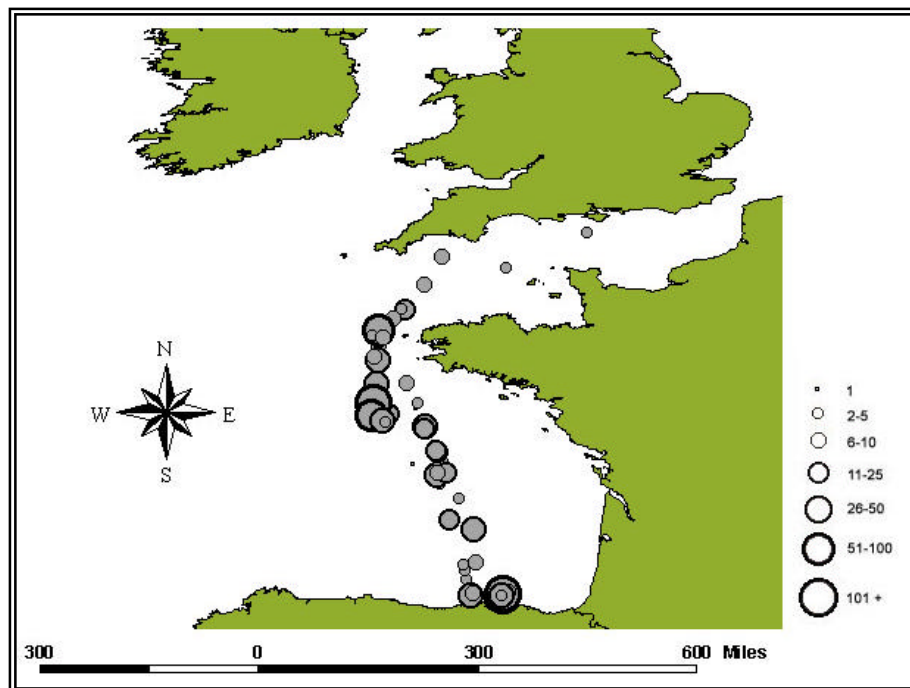


Fig. 13: Distribution and relative abundance (total number of individuals per sighting) of Bottlenose dolphin *Tursiops truncatus* recorded on ARC surveys in 2001.

In particular, the preliminary survey results highlight the importance of the continental slope for this species. Further survey, research and analysis is required to determine if this area should be considered as an offshore SAC for this species.

c. Common Dolphin *Delphinus delphis*

Conservation Status:

The Common Dolphin *Delphinus delphis* (Figure 14) is listed on Appendix II of CITES, Appendix II of the Bern Convention and Annexes IV of the EC Habitats Directive. It is also on Appendix 2 of the Bonn Convention, is covered by ASCOBANS and is listed as lower risk 'conservation dependent' in the 1996 IUCN Red List of Threatened Animals (Baillie & Groombridge, 1996).

ARC Sightings:

In 2001, 196 sightings totalling 3747 individuals were made over the period February through to December (Figure 15). These data identified Common Dolphin *Delphinus delphis* as the most frequent (32% of sightings) and abundant (40% of individuals) cetacean species in the region. Four schools of more than 100 individuals were recorded, three along the Celtic-Biscay shelf break between June and August and one to the north in Armorican shelf waters west of Brittany, France in November.



Fig: 14: Common Dolphin *Delphinus delphis*, the most widespread and abundant cetacean species recorded on surveys made by ARC partners, but at risk through incidental capture in fishing nets (© Tom Brereton)

Of particular conservation significance, the majority of Common Dolphin *Delphinus delphis* records (72% of sightings, 86% of individual, Table 2) were made in shelf waters off the south coast of England and north-west coast of France (Western Approaches, the western English Channel and Armorican Shelf), during the winter months, despite more recording effort being made in the summer.

The year-round effort related recording carried out by ARC partners strongly indicates that this higher sightings rate reflects a seasonal immigration into the region. Of concern, this immigration coincides with the winter pelagic trawl fishing season for Sea Bass *Dicentrarchus labrax*, which has been suspected of being a key fishery causing bycatch of Common Dolphin *Delphinus delphis* in the region during the winter months (see later).

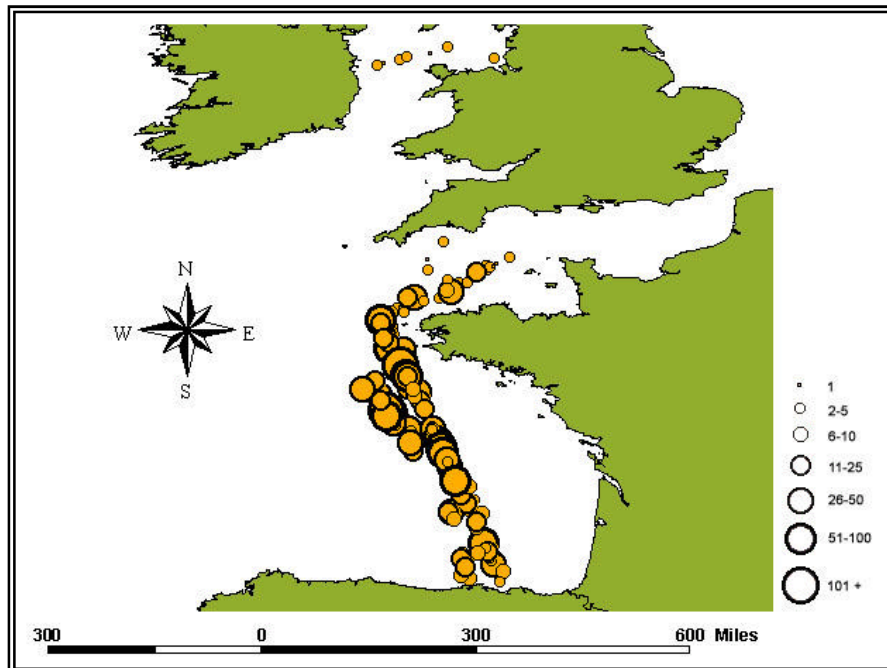


Fig. 15: Distribution and relative abundance (total number of individuals per sighting) of Common dolphin *Delphinus delphis* recorded on ARC surveys in 2001.

Table 2: Changing seasonal frequency and abundance of Common dolphin *Delphinus delphis* in the Western Approaches and the western English Channel

Period	No. Sightings	No. Individuals
Winter (November to April)	40	522
Summer (May to October)	16	86

6. Conservation Applications of ARC Data

1. Identification of Key Areas and Candidate Marine Protected Areas

The year-round, effort-related scientific monitoring employed by ARC partnership surveyors has already generated an important dataset on the diversity and distribution of cetaceans in the waters between France, Great Britain, Ireland and Spain. The recording of 15 species and approximately 10,000 individual animals confirms the conservation importance in European terms of these waters for cetaceans. The Bay of Biscay is particularly important, with all 15 species being recorded there, including several species rare in European waters such as False killer whale *Pseudorca crassidens*, and presumed True's beaked Whale *Mesoplodon mirus* (Weir et al., In Press).

This distribution and abundance data has the potential to make an important contribution to the selection criteria for marine protected areas, such as SACs under the EU Habitats Directive. A recent high court case in Britain established that this Directive applies to all territorial waters and that this is likely to be applicable to other EU countries. As yet no offshore SACs have been identified in north-west European waters for either of the two Annex II species Harbour Porpoise *Phocoena phocoena* and Bottlenose Dolphin *Tursiops truncatus*. The ARC surveys provide new information of relevance to offshore SAC selection for both species. For example, in February 2001, approximately 300 Bottlenose Dolphins *Tursiops truncatus* were seen in close proximity, on the continental slope in the southern Bay of Biscay north of Bilbao, Spain. This is a highly significant count, for example being greater than the population estimate for two proposed SACs for this species in Great Britain; the Moray Firth (population estimate 130 individuals, Wilson et al., 1999) and Cardigan Bay (population estimate less than 200 individuals Grellier et al., 1995).

2. Seasonal Distributions and Assessing Conservation Threats

Year-round, effort-related recording of the sort undertaken by ARC partners can provide information on the overall use of a marine region by cetaceans, especially when they are related to oceanographic data. The data can highlight seasonal distribution patterns of conservation importance that may not be detected by far more costly absolute population surveys. For example, most recent absolute population estimations for Common Dolphin *Delphinus delphis* and other small cetaceans were made during the Small Cetacean Abundance in the North Sea (SCANS) survey in 1994, conducted over the summer months (Hammond et al., 1995). The surveys did not record a single Common Dolphin *Delphinus delphis* in the Western Approaches or the western English Channel. However, ARC surveys in 2001 indicate that there is a substantial winter immigration into these waters, concordant with the pelagic trawl fishery for Sea Bass.

The accidental capture (bycatch) of dolphins and porpoises in fishing nets is widely considered to be one of the main threats to cetacean populations in north-west European

waters (Kirkwood et al. 1997, Bennett et al., 2002, Tregenza and Collet, 1998). Pelagic trawling for Sea bass and other fish has been widely implicated as a chief cause of Common Dolphin *Delphinus delphis* bycatch, indicated by increasing numbers of strandings along French and English coasts during the winter months. There have been no systematic surveys to assess winter Common Dolphin *Delphinus delphis* absolute populations or bycatch levels in the Western Approaches/Western English Channel/Armorican Shelf region. However, ARC data suggests that Common Dolphins *Delphinus delphis* due to their seasonal movement patterns are highly at threat.

3. Using Annual Cetacean Abundance Data as a Biodiversity Indicator

Many west European governments have recently made ambitious commitments to sustainable development and wildlife conservation as a result of signing up to the Global Convention on Biodiversity (Rio Earth Summit) in 1992. Biodiversity indicators are being adopted to measure progress in these areas. In the UK, for example, the Government headline biodiversity indicator is populations of wild birds, which is used both a measure of progress towards sustainable and quality of life (DETR, 1999). The wild bird index utilises annual abundance index data on UK bird species from a network of sites across the UK. In the European marine environment, Biodiversity Indicators are required to assess progress in these areas and the effectiveness of protected area designations, and conservation and marine resource management policy. Cetaceans have a number of attributes, which make them strong candidate biodiversity indicators for the European marine environment.

Cetaceans have considerable potential to be used as flagship indicators to monitor the changing state of the marine environment and marine biodiversity because they:

1. Are at or near the top of the food chain.
2. Occupy a wide range of habitats.
3. Are amongst the most popular of all wildlife taxa.
4. Are highly susceptible to environmental changes (e.g. anthropogenic noise, changing fishery practices, chemical pollution).

and because there is a growing body of annual population data available.

The ARC partnership dataset has the potential generate composite annual indices of cetacean abundance, which could be employed as a more general marine biodiversity indicator. With the establishment of additional monitoring to ARC standards on other routes (improved spatial coverage), the case for using this data as a biodiversity indicator will be strengthened.

7. Future Work

In 2002 and beyond, ARC survey partners will continue to collaborate over cetacean monitoring to provide baseline data for conservation purposes on the diversity, distribution and seasonal movements of cetaceans in the seas between Great Britain, France, Ireland and Spain.

More detailed data analysis methods will be employed from 2002 to generate effort based distribution and abundance maps for all species recorded.

A key long-term aim of the ARC survey partnership is to generate robust collated annual abundance indices to monitor the changing status of cetaceans in these seas at a local scale (e.g. by ICES quarter rectangle) up to a 'whole sea' scale (e.g. by combining data from several transect routes).

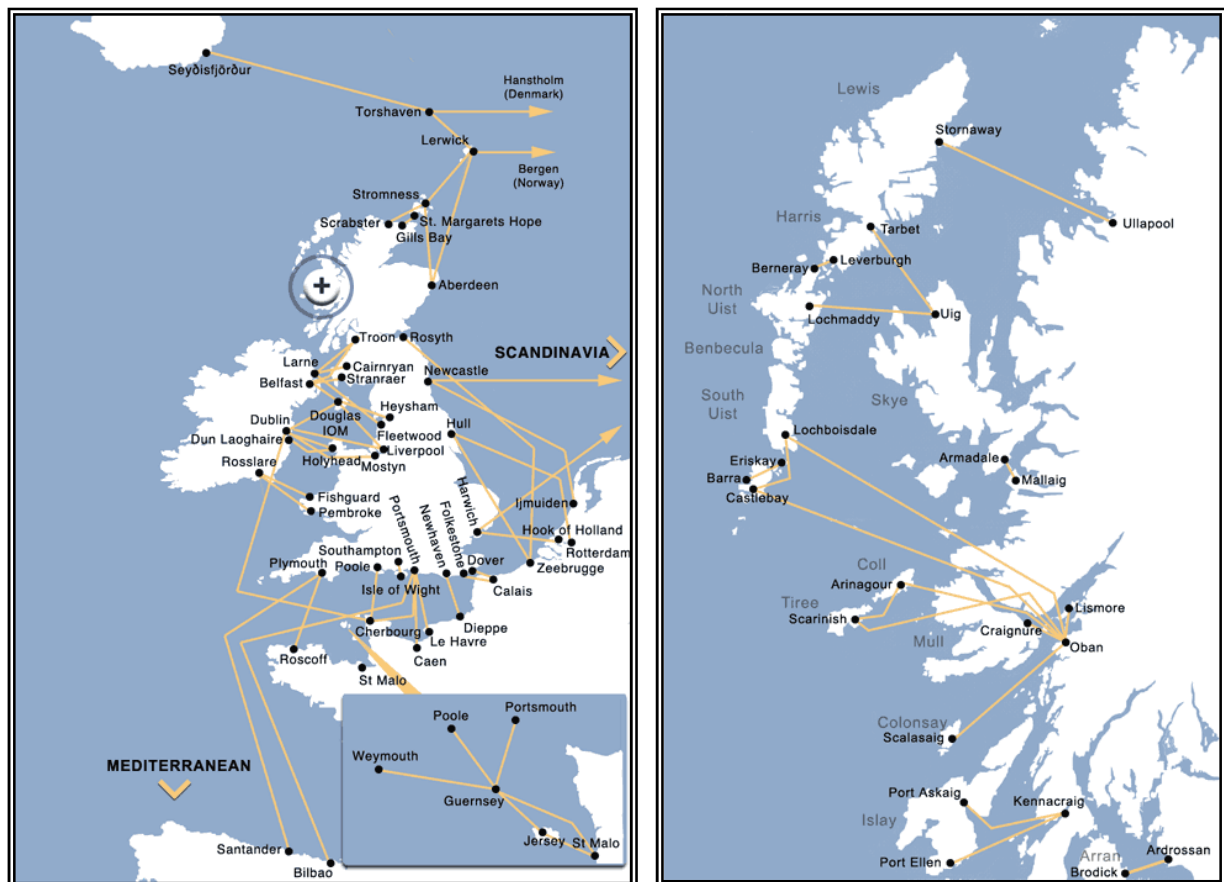


Fig. 16: Map showing the location of ferry routes from the UK, Ireland and northern France (2003). The map illustrates the great potential for ShOp cetacean monitoring in north-west Europe.

Both short and long-term ARC aims will require the establishment of new monitoring programmes on the many ferry and other ShOp routes, which traverse the region (Figure 16). From 2002, the IWDG ShOps survey programme will be expanded (Figure 17) on a new important route: from Dublin/Rosslare, south-east Ireland through the Irish and Celtic Seas, Western Approaches and English Channel to Cherbourg, Normandy, Brittany, northern France. There are also encouraging developments in north-west Scotland, with the establishment of ShOp surveys on a number of the Hebridean ferries (Colin MacLeod pers. comm.).

The ARC partners actively encourage data sharing and partnership in ShOp surveys to ensure that the benefits of the data gathered for conservation are maximised, and welcome correspondence with recorders interested in establishing new surveys.



Fig. 17: Proposed ARC survey routes in 2002, showing new proposed Dublin / Rosslare to Cherbourg route.

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