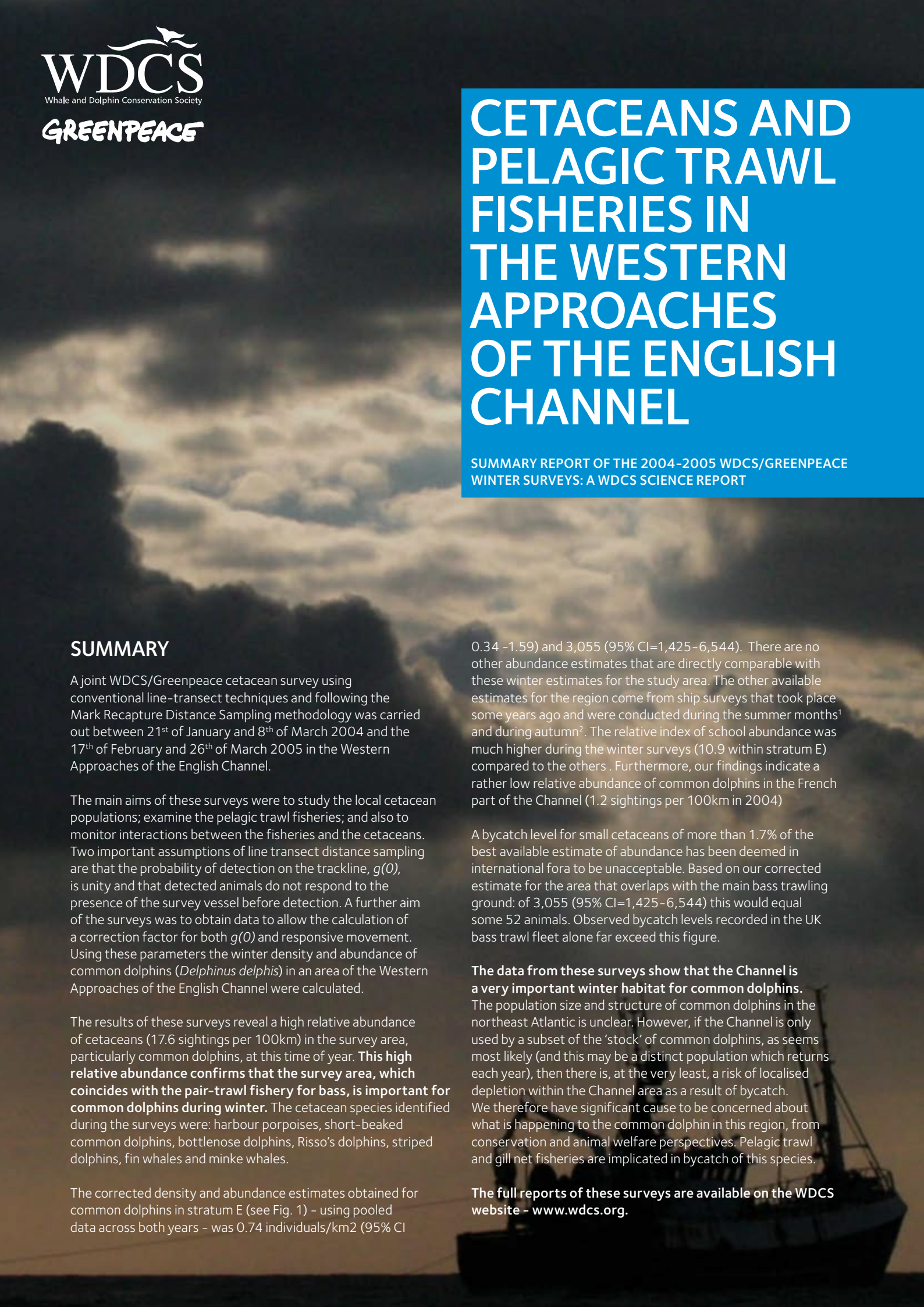
WDCS
Whale and Dolphin Conservation Society

GREENPEACE

CETACEANS AND PELAGIC TRAWL FISHERIES IN THE WESTERN APPROACHES OF THE ENGLISH CHANNEL

SUMMARY REPORT OF THE 2004-2005 WDCS/GREENPEACE WINTER SURVEYS: A WDCS SCIENCE REPORT



SUMMARY

A joint WDCS/Greenpeace cetacean survey using conventional line-transect techniques and following the Mark Recapture Distance Sampling methodology was carried out between 21st of January and 8th of March 2004 and the 17th of February and 26th of March 2005 in the Western Approaches of the English Channel.

The main aims of these surveys were to study the local cetacean populations; examine the pelagic trawl fisheries; and also to monitor interactions between the fisheries and the cetaceans. Two important assumptions of line transect distance sampling are that the probability of detection on the trackline, *g(0)*, is unity and that detected animals do not respond to the presence of the survey vessel before detection. A further aim of the surveys was to obtain data to allow the calculation of a correction factor for both *g(0)* and responsive movement. Using these parameters the winter density and abundance of common dolphins (*Delphinus delphis*) in an area of the Western Approaches of the English Channel were calculated.

The results of these surveys reveal a high relative abundance of cetaceans (17.6 sightings per 100km) in the survey area, particularly common dolphins, at this time of year. **This high relative abundance confirms that the survey area, which coincides with the pair-trawl fishery for bass, is important for common dolphins during winter.** The cetacean species identified during the surveys were: harbour porpoises, short-beaked common dolphins, bottlenose dolphins, Risso's dolphins, striped dolphins, fin whales and minke whales.

The corrected density and abundance estimates obtained for common dolphins in stratum E (see Fig. 1) - using pooled data across both years - was 0.74 individuals/km2 (95% CI 0.34 -1.59) and 3,055 (95% CI=1,425-6,544). There are no other abundance estimates that are directly comparable with these winter estimates for the study area. The other available estimates for the region come from ship surveys that took place some years ago and were conducted during the summer months[1] and during autumn[2]. The relative index of school abundance was much higher during the winter surveys (10.9 within stratum E) compared to the others . Furthermore, our findings indicate a rather low relative abundance of common dolphins in the French part of the Channel (1.2 sightings per 100km in 2004)

A bycatch level for small cetaceans of more than 1.7% of the best available estimate of abundance has been deemed in international fora to be unacceptable. Based on our corrected estimate for the area that overlaps with the main bass trawling ground: of 3,055 (95% CI=1,425-6,544) this would equal some 52 animals. Observed bycatch levels recorded in the UK bass trawl fleet alone far exceed this figure.

The data from these surveys show that the Channel is a very important winter habitat for common dolphins. The population size and structure of common dolphins in the northeast Atlantic is unclear. However, if the Channel is only used by a subset of the 'stock' of common dolphins, as seems most likely (and this may be a distinct population which returns each year), then there is, at the very least, a risk of localised depletion within the Channel area as a result of bycatch. We therefore have significant cause to be concerned about what is happening to the common dolphin in this region, from conservation and animal welfare perspectives. Pelagic trawl and gill net fisheries are implicated in bycatch of this species.

The full reports of these surveys are available on the WDCS website - www.wdcs.org.

INTRODUCTION

Little is known about cetacean communities in the Western Approaches of the English Channel during winter. Indeed, only a few studies to date have reported the relative abundance of the short-beaked common dolphin *(Delphinus delphis)* in the NE Atlantic or supplied an estimate or index of density and abundance[3]. However, the majority of these surveys differ in distribution of effort, vessel-type, survey methodology and the season in which they were carried out. The conservation status of the common dolphin in this region has been of great concern for many years because this species is subject to a high level of bycatch in fisheries[4].

The Western Approaches of the English Channel are intensively trawled by pelagic fisheries during the winter and early spring from October to May. **These fishing activities coincide with relatively high levels of cetacean strandings.** In recent winters several hundred corpses of short-beaked common dolphins in south west England, many clearly diagnosed as having died through capture in fishing nets. In many cases the external damage has been identified as being consistent with death in small-meshed mobile gear such as trawl netting[5].

Despite this, few data are available on bycatch in the fisheries that operate in these waters and there is an equally inadequate understanding of the distribution and abundance of the common dolphin population in the area, particularly during the winter months when these fisheries operate. In recent years the UK has conducted monitoring of the winter sea bass fishery, which has been found to be responsible for a high rate of common dolphin bycatch[6]. However, there are still no estimates of total annual bycatch for this species in all fisheries combined[7].

During the winters of 2004 and 2005, WDCS and Greenpeace carried out a cetacean survey in the Western Approaches of the English Channel with the main aim of collecting more information on the little-studied cetaceans that occur in these waters at this time of year.

METHODOLOGY

The methodology used in the 2004 survey[8] was based on the line-transect distance sampling method[9]. In the 2005 survey, the methodology also followed the Mark Recapture Distance Sampling method[10] - termed the BT (Buckland and Turnock) method hereafter. According to this method, observations are carried out from two platforms. Observers from the secondary or 'tracking' platform search an area ahead of the 'primary' survey area and sufficiently wide to ensure that animals are detected prior to any responsive movement to the ship, and to allow the tracking of animals until they are detected by the primary platform. The primary survey area is wider and possibly has a lower probability of detection. The observers from the primary platform search independently of the tracking platform.

Two important assumptions of line transect distance sampling are that the probability of detection on the trackline, g(0), is unity and that detected animals do not respond to the presence of the survey vessel before detection. The BT method does not require these assumptions because adjustments are made by a correction factor. Further, if sighting distances and angles of secondary detections are measured without error, the method is unbiased when sighting distances or angles recorded by the primary platform are subject to bias or error.

Data from the primary platform are used to estimate encounter rate (number of detections per unit distance), while data from the secondary platform allow the effective width of search from the primary platform to be estimated.

Transects were placed over two areas which were similar in size totalling an area of 8,872km^2 (between the Scilly Isles and Start Point; see Fig. 1). These areas were established following transect design of a previous study conducted during the autumn of 2002[11].

The surveys were conducted from the MV Esperanza, a 72.3m Expedition/Research vessel which traveled at either a 'fast' average speed of 8.6 knots or a 'slow' average speed of 5.3 knots. Data were collected mainly in the 'passing mode', where the vessel did not deviate from the track-line.

The surveys took place between 21st of January and 8th of March 2004 and between the 17th February and 26th March 2005 in the Western Approaches of the English Channel. The main Survey Area (an area where survey transects and strata were placed) was between 49°20'N-50°20'N and 3°26'W-6°10'W (see Fig. 1). The western stratum (Stratum W) extended to the west, between 49°26'N and 50°06'N and 006°06'W and 4°42'W and covered 4,743km^2. The eastern stratum (Stratum E) lay between 49°33' and 50°54'N and 005°02'W and 3°36'W and covered 4,129km^2.

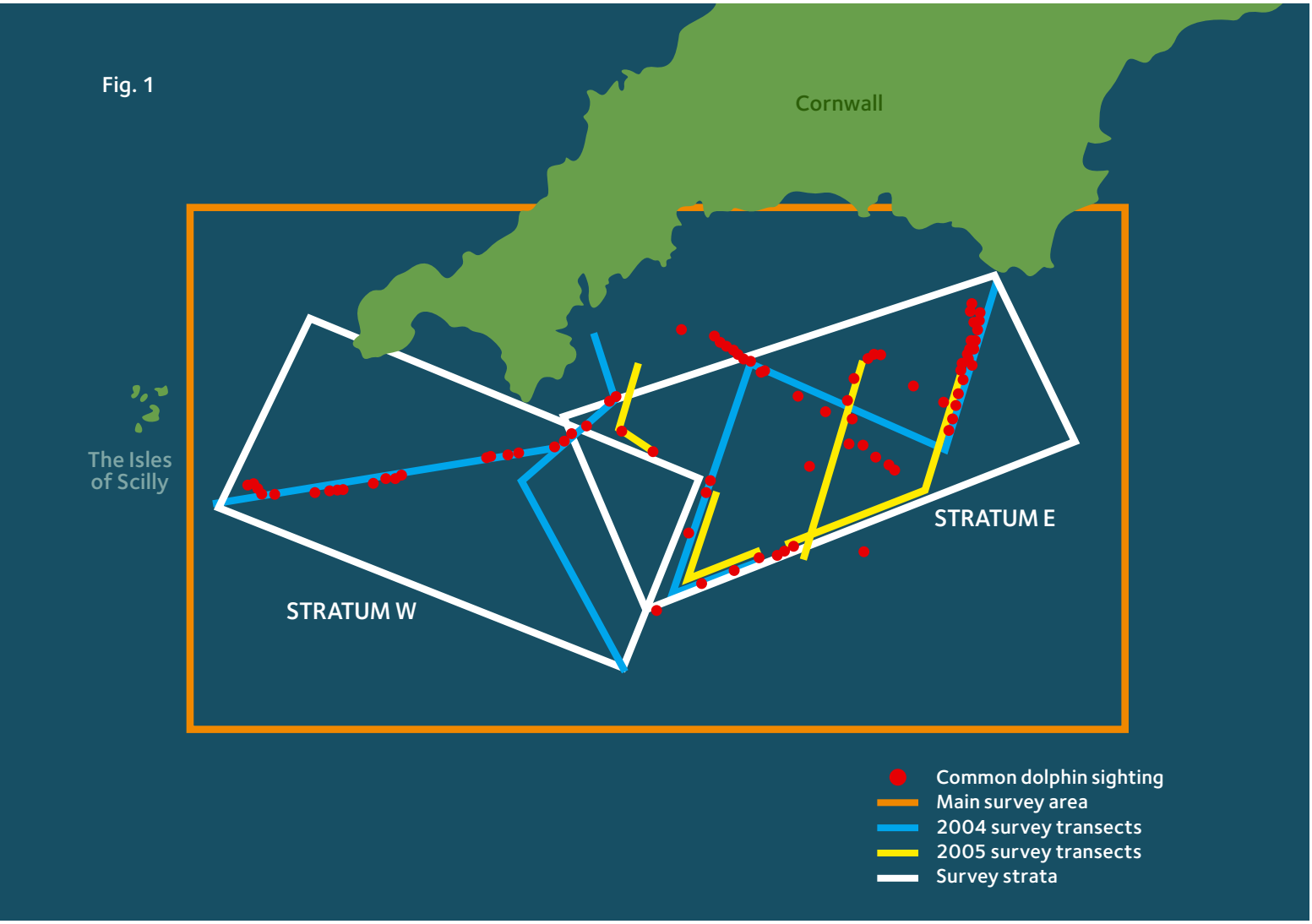
PRIMARY PLATFORM

Two observers were located on the outer bridge deck (which served as the primary platform with an approximate eye-height of 11.3m), one on port and one on starboard. Observers scanned backwards and forwards whilst on watch in a 90 degrees sector (on port and starboard), forming an approximately 180 degrees combined survey area in front of the ship. Scanning was done with the naked eye with occasional scans along the horizon using 7X50 binoculars.

SECONDARY PLATFORM

The secondary (or tracking) platform was situated in the ship's crow's-nest, with an approximate eye height of 19.5m,

Fig. 1



housing one observer searching an area of 30 degrees on either side of the trackline using Nikon 7X50 reticule marine binoculars mounted on a tripod. A digital voice recorder with a built-in digital camera (Olympus W-10) was attached to the binoculars and used to record the following sightings data: reticule count, heading, species ID and group size. The camera faced down when photographing the angle to the sighting. Reference lines on the photographs were used to calculate the accurate angle to the sighting (Leaper and Gordon, 2001). A laptop with the data-logging program 'Logger 2000' (developed by IFAW to promote benign, non-invasive research) was used to record the exact time (hh:mm:ss) for each sighting. The tracker concentrated beyond 1,000m ahead of the vessel (prioritising sightings >1,500m), trying to detect animals before they had responded to the approaching vessel, and recording re-sightings (tracking) until the animals had passed abeam.

The secondary platform was not in operation throughout the survey as this was dependent on sea state. However, it was used whenever possible and when the ship was going at 'fast speed mode' in a straight line and was therefore not committed to following predetermined transects only.

SURVEY EFFORT MODES

Effort during the survey was divided into several types (see Table 1). Survey effort continued throughout all daylight hours but was suspended when the Beaufort sea state exceeded 4.5 or visibility was considered poor. Sightings made during bad weather or when no systematic observations were being conducted (i.e. low and off effort), were regarded as incidental sightings.

TABLE 1. Information and abbreviations for different survey modes conducted at either fast (~8.5 knots) or slow (~ 5.3 knots) speed of the survey vessel.

Effort mode	Abbreviation	Speed mode	Description
Transect	T	Fast	Systematic surveys following pre-determined transects
	TS	Slow	
High effort	S	Fast	Systematic surveys not following pre-determined transects whilst on transit
	Slow	Slow	
Fisheries Observations	FOF	Fast	Data collected during non-systematic surveys that were specifically aimed at monitoring fisheries within 2 nautical miles
	FOS	Slow	
Low effort	L	n/a	Dedicated observations made during bad weather (sea state>4.5) or when visibility was poor
Off effort	X	n/a	No dedicated observers on watch

RESULTS & DISCUSSION

A total of 755 sightings of approximately 4,997 animals were made during the expeditions. The results of these surveys reveal a high relative abundance of cetaceans (17.6 sightings

We have significant cause to be concerned about bycatch of common dolphins in this region from conservation and animal welfare perspectives.

per 100km) in the survey area at this time of year, particularly common dolphins. Our findings indicate a rather low relative abundance of common dolphins in the French part of the Channel (1.2 in 2004). The cetacean species identified during the survey were: harbour porpoises, short-beaked common dolphins, bottlenose dolphins, Risso's dolphins, striped dolphins, fin whales and minke whales. Table 2 shows an overview of visual effort during different survey effort modes for the main survey area and elsewhere.

Information on mean water temperature, depth, distance to shore of common dolphin sighting location and group size of definite and probable sightings encountered within the main survey area during different effort modes are shown in Table 3. More common dolphin calves and juveniles were sighted during the 2005 survey, particularly in Stratum E and further inshore.

Group sizes of common dolphins ranged between 1 and 22 individuals (2005) with a mean of 5.2. This is lower than the 2004 survey (7.1) and there is some evidence that at the 10% level this is significant (7.1; Students T, p=0.067). Common dolphin group sizes in both our surveys were markedly lower than those of other studies. For example, during the SCANS survey, of their Block A, the mean group size of common dolphins was 10.8[12]. Macleod and Walker (2004) also reported a higher mean group size of 37.7 (SD 70.8). However, they noted that group size varied seasonally and reported a relatively low mean group size of 16.9 (SD 34.7) during winter. This difference merits further investigation, as the group size and also foraging strategies are likely to affect the number of bycaught animals in nets.

During those parts of the survey focused on monitoring fisheries, we recorded the position of the pair trawlers hourly. In 2005, two sub areas of fishing effort were evident, the Scottish trawlers to the north and the French fleet further south. A considerable overlap between an area used by both fleets and the occurrence of common dolphins was evident.

TABLE 2. Extent of visual effort and tracks lined for various survey modes within the Survey Area unless stated otherwise (e.g. the total expedition area (Total), the French part of the English Channel and an area off Portland). 1Include fisheries observations which differ from FOS and FOF because of the presence of ≥1 rigged-hulled inflatables in vicinity of survey vessel and pair trawlers.

Survey mode		Effort (nautical miles)		Effort (km)		Survey effort (hr:min)		Proportion of effort (%)	
		2004	2005	2004	2005	2004	2005	2004	2005
Fast mode	T (in survey area)	226.1	167.3	418.7	309.8	26:02	22:16	3.39	20.20
	S (in survey area)	232.6	251.8	430.2	466.3	27:18	08:59	3.56	8.15
	S (French Channel)	137.6	109.6	254.8	203	15:26	10:39	2.01	9.66
	S (Portland)	15.9	0	29.4	0	01:53	0	0.25	0
	FOF	29.1	1.4	53.7	2.6	05:16	00:14	0.69	0.21
Slow mode	TS	25.2	15.3	47.1	28.4	4:40	02:20	0.61	2.12
	SLOW	164.2	36	303.7	66.7	25:52	05:53	3.37	5.32
	SLOW (French Channel)	30.8	0	57	0	06:13	0	0.81	0
	SLOW (Portland)	26.7	0	49.6	0	05:21	0	0.70	0
	FOS	68.5	21.8	127	40.3	16:38	05:07	2.17	4.64
N/A	Low effort (total)	608.9	613.9	1128	1137	112:10	03:48	14.62	3.45
	Odd effort (total)	226.1	1783	4186	3301	369:29	20:03	48.16	18.19
	Monitoring dead dolphins	25.6	44.5	47.4	82.5	08:16	09:58	1.08	9.04
	Other[1]	730.5	196.9	1353	364.6	153:00	20:59	19.94	19.03
	Total track	4582	3241	8486	6002	767:14	110:15	100	100

The data from these surveys show that the Channel is a very important winter habitat for common dolphins.

Intensive trawling during winter and early spring coincides with relatively high levels of cetacean strandings.

TABLE 3. Water temperature, depth, distance to shore of common dolphin sighting location and group size of definite and probable sightings encountered within the main survey area during different effort modes, where 'ALL' represents pooled effort. Information on fisheries-related sightings collected in 2005 are not shown here as the survey effort was not compatible with the mode used in 2004 (FOS).

Common dolphin									
Effort mode		**Temperature (°C)**		**Water depth (m)**		**Distance to shore (n miles)**		**Group size**	
		2004	**2005**	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**
Fast (T+S)	*n*	68	94	85	112	100	130	100	125
	x	9.38	9.4	75.82	69.1	13.02	14.9	6.4	5
	SD	0.66	0.63	8.01	15.7	6.05	8.9	8.48	4.2
	Range	8–10.3	8.1–10.3	61–93.9	30–96.4	3.29–32.1	4–40.7	1–45	1–22
Slow (TS+SLOW)	*n*	19	6	16	6	25	12	26	12
	x	9.07	8.6	66.02	60.4	14.31	11.3	5.73	5.75
	SD	0.67	0.83	9.54	31.3	6.57	9.9	6.97	4.1
	Range	8.1–9.9	7.8–9.5	43.9–81.3	32.2–94.3	2.8–20.5	3.3–31	1–33	1–15
Fisheries (FOS)	*n*	30	0	12	0	30	0	30	0
	x	9.36		73.16		19.46		11.53	
	SD	0.41		6.7		5.76		12.49	
	Range	9–10		67.9–92		14–37.9		1–45	
ALL	*n*	117	100	112	118	155	142	155	137
	x	9.32	9.38	73.62	68.6	14.51	14.5	7.32	5
	SD	0.61	0.67	10.5	16.8	6.54	9.1	8.27	4.2
	Range	8-10.3	8.1–10.3	43.9–93.9	30–96.4	2.8–37.9	3.3–40.7	1–45	1–22

During fisheries monitoring, a total of 115 sightings of cetaceans were reported. Interactions between fisheries and cetaceans were also observed, including instances when common dolphins were seen around trawlers during hauling and towing procedures. A fin/Sei whale, a minke whale, Risso's dolphins, bottlenose dolphins and porpoises were seen in areas where pelagic trawling was taking place. In addition, basking sharks were sighted twice in the vicinity of pair trawlers.

The post mortems of the dead common dolphins retrieved at sea revealed that all animals had died as a result of bycatch in fishing gear. The majority of the dolphins showed markings consistent with gillnet fisheries. However, it should be noted that the post-mortem programme in the UK has not yet had the opportunity to examine fresh carcasses known to have been caught in pelagic trawls in order to establish definitive signs. There was a marked presence of injuries that appear to have been caused by nets recorded on live common dolphins observed during the survey. This suggests that some may be wounded during encounters with nets but nonetheless survive. This marked presence of injury clearly deserves further investigation.

Results indicated that the *primary* observers missed 7% of the dolphins on the trackline, but that there was also a strong responsive movement of dolphins towards the boat. Comparing initial locations of animals detected by binocular (by *secondary* observers) to those detected by naked eye (*primary* observers) showed that just using naked eye observations would result in apparent densities 1.5 times too large. Using these factors to adjust the *primary* density estimates, the corrected winter density and abundance of common dolphins in Stratum E across both years was 0.74 dolphins/km^2 (CV = 0.39) and 3,055 dolphins (95% CI=1,425-6,544). The corrected abundance estimates for stratum E in 2004 was 1,916 (95% CI 706-5,190) and in 2005 was 5,417 (95% CI 2,457-11,949). However, it is believed that these estimates are positively biased because there was evidence from the distribution of animal headings that responsive movement frequently occurred before animals were detected by the *secondary* observers.

CONCLUSION

The winter diversity of the cetacean community in the Western Approaches of the English Channel, with a total of seven different species seen during both surveys, highlights the fact that the area includes important winter cetacean habitats.

Only few studies to date have reported the relative abundance of common dolphins in the NE Atlantic or supplied an estimate of density and abundance for them. Caution should be applied when comparing such estimates, as surveys differ in their distribution of effort, the vessel used, survey methodology and the season in which they are carried out.

The abundance estimates calculated for this survey provide a reference for comparison with estimated bycatch removals and future studies. The results clearly show that responsive movement towards the vessel is an important consideration for surveys of common dolphins. In particular, it seems likely that surveys relying purely on naked eye observations are unlikely to give reliable results. However, the narrow angle of observations of the Tracker observers on this survey probably resulted in an underestimate of the strip width and so it is likely that the estimates presented are still positively biased due to responsive movement. Although sample sizes were rather small, the results suggest that the 7x50 binoculars may have been adequate to detect common dolphins prior to responsive movement to our survey vessel, at least at lower sea states. However, this distance may be vessel specific and the use of higher powered binoculars should be considered wherever possible.

Our results provide a pooled corrected abundance estimate for Stratum E (the area overlapping with the current main fishing grounds) of 3,055 (95% CI=1,425-6,544). While it cannot be assumed that these common dolphins represent a discreet population, it is at least possible that they are part of a sub-population of animals, as yet of undetermined size, that moves into this area each winter.

Given the paucity of knowledge on population structure in this area, it is appropriate to apply precaution in the interpretation of data relating to conservation measures. A bycatch level for small cetaceans of more than 1.7% of the best available estimate of abundance has been deemed in international fora to be unacceptable. Applying this criterion to our abundance estimate for Stratum E would provide a precautionary limit of some 52 animals. During the 2004/2005 fishing season, a bycatch of 95 common dolphins was recorded, producing an extrapolated total estimated mortality of 139 animals (SMRU, 2005). Observation of the bottom set gillnet fishery for hake further west in the Celtic Sea in 1992-94 also recorded common dolphin catches, estimated to total 200 animals per year. However, few bycatch data are available from the many other fishing fleets operating in this area. Under EU legislation, statistically robust observer programs should have been introduced in the pelagic trawl fisheries in this area from January 2005. However, the requirement for observation of the gill and tanglenet fisheries in this area is much less stringent, and non-existent for vessels of less than 12m.

A more comprehensive and wide-ranging assessment of bycatch, including statistically robust observer programs in both pelagic trawl and gillnet fisheries is urgently needed. The data from this survey show that the winter population of common dolphins in the English Channel could well become depleted as a result of bycatch.

The winter diversity of the cetacean community in the Western Approaches of the English Channel, with a total of seven different species seen during both surveys, highlights the fact that the area includes important winter cetacean habitats.

A more comprehensive and wide-ranging assessment of bycatch levels is urgently needed.

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ENDNOTES

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