

Incidental mammal catches in pelagic trawl fisheries of the North east Atlantic

by

Y. Morizur, N. Tregenza, H. Heessen, S. Berrow and S. Pouvreau

Yvon Morizur and Stephane Pouvreau: IFREMER, Centre de Brest, BP 70, 29280 Plouzané, France [tel: +33 02 98 22 44 81, fax: +33 02 98 22 46 53, e mail: first initial.surname@ifremer.fr]. Nick Tregenza: Cornwall Trust for Nature Conservation, Five Acres, Allet, Truro, Cornwall, TR49DJ, U.K [tel: +44 1736 711783, fax:+44 1736 753467, e mail: njctrege@exeter.ac.uk]. Henk Heessen: RIVO-dlo, Haringkade 1, Postbus 68, 1970 AB Ijmuiden, The Netherlands [tel: +31 255 564692, fax: +31 255 564644, e mail: h.j.l.heessen@rivo.dlo.nl]. Simon Berrow: University College of Cork, Department of Zoology, Cork, Ireland [Simon Berrow<SDBE@pcmail.nerc-bas.ac.uk>, fax:+ 353 21 27].

Abstract

The marine mammals catch rate of pelagic trawling in the North-east Atlantic has not previously been assessed by direct observation. A study was funded by the European Commission to collect information on the catches of fish and mammals by several pelagic trawl fisheries from England, France, Ireland and Netherlands. This paper presents a summary of the results, as far as the bycatch of marine mammals is concerned, between 1994-1995. It was not possible to carry out observations of all the pelagic trawl fisheries but a total of eleven fisheries were investigated in this study. In one fishery (Irish herring trawling), four grey seals were caught in separate trawls during slightly more than 100 hours trawling. Cetaceans (dolphins) were incidentally caught in four pelagic fisheries (Dutch horsemackerel, French tuna, French hake, French sea bass trawling). Eleven different trawls caught a total of eighteen dolphins. These catches were observed during 1300 hours of deployment of the trawls. Visual inspection of pelagic trawl emptied using fish pumps was thought to be unreliable for the detection of cetacean bycatch. The extent of observation and number of observed bycatches is however too small to make a reliable assessment of overall bycatch rates. In those fisheries where cetacean bycatch occurred rates were between 1.1 and 1.5 cetaceans per 100 hours of trawling.

Keywords: bycatch, dolphin, mammal, North east Atlantic, pelagic trawling, seal.

Introduction

There has been little study of bycatch and discarding in mid-water trawl fisheries in Europe. These fisheries are of recent origin, beginning in France in the early 1980's. Corten (1991) investigated fish discards in Dutch pelagic fisheries (Eastern Channel herring fishery and English Channel-Celtic Sea horsemackerel fishery). A European Commission report (anon., 1992) on discard practices does provide no information at all on discards in French pelagic fisheries, and not sufficient quantitative information on discards in the other pelagic fisheries. A more recent report of the FAO (Alverson et al., 1994) underlines the lack of information on discarding in pelagic fisheries in the North-east Atlantic. The reasons for fish discarding need to be known in order to diminish discarding through better management of the fisheries.

The incidental catch of marine mammals is an important aspect of bycatch in marine ecosystems (Northridge, 1984). Interactions between marine mammals and fisheries are complex and often become emotive issues. There is evidence that elsewhere pelagic trawlers incidentally capture large numbers of cetaceans (Waring et al., 1990). Anecdotal information suggests that up to 50 dolphins may be taken in a single tow by

RESULTS

1. Sampling effort by fishery

A total of 379 fishing days was observed. The fisheries investigated are ranked in the Table 1 below according to the total duration of the sampled tows in each. Total landings from official statistics are also shown. The areas fished during this study are shown in the map (Fig. A at the end of this document).

Table 1 : Number of boats, landings of target species and duration of the observations in each fishery investigated.

FISHERIES	Number of boats	Landings of the target species (tonnes)	Sampled locations	Number of hours of sampled tows
<i>Dutch horsemackerel trawling</i>	~ 12 (1995)	110000 (1994)	(VII d, e, h, j)	841
<i>French hake trawling</i>	~ 120 (1992)	3310 (1994)	(VIII a, b)	338
<i>French tuna trawling</i>	~ 50 (1992)	1907 (1994)	(VIII a, b, c, d)	265
<i>Irish herring trawling</i>	~ 49 (1994)	50000 (1992)	(VII g)	101
<i>French sea bass trawling</i>	~ 70 (1992)	217 (1994)	(VII e, VIII b)	73
<i>UK mackerel trawling</i>	~ 12 (1990)	4800 (1990)	(VII e)	72
<i>UK pilchard trawling</i>	~ 12 (1990)	1330 (1990)	(VII e)	37
<i>French horsemackerel trawling</i>	~ 130 (1992)	3235 (1994)	(VIII a)	19
<i>French anchovy trawling</i>	~ 130 (1992)	14500 (1994)	(VIII a, b)	15
<i>French black bream trawling</i>	~ 15 (1992)	691 (1994)	(VII e)	9
<i>French pilchard trawling</i>	~ 90 (1992)	3700 (1994)	(VIII a)	3

2. Bycatch observed

Three species of marine mammal were definitely observed as bycatches. There were Common dolphin, *Delphinus delphis*, Atlantic white-sided dolphin, *Lagenorhynchus acutus*, Atlantic Grey Seal, *Halichoerus grypus*, and one uncertain identification of a Bottlenose dolphin, *Tursiops truncatus*. Distribution by fishery is reported in the Table 2 below :

Table 2 : number of mammals caught by fishery

Pelagic fishery	Species of marine mammals	number
<i>French tuna trawling</i>	Bottlenose dolphin?	1
<i>French tuna trawling</i>	Common dolphin	3
<i>French hake trawling</i>	Common dolphin	4
<i>French bass trawling</i>	Common dolphin	1
<i>Dutch horsemackerel trawling</i>	Common dolphin	4
<i>Dutch horsemackerel trawling</i>	Whitesided dolphin	5
		18 cetaceans
<i>Irish herring trawling</i>	Atlantic grey seal	4 seals

All bycaught mammals were apparently healthy, most were adult which is in striking contrast with the drifnet fishery (Antoine et al, 1997). All were free within the lifting bag of the net except for one dolphin which was entangled in the forward lines of the net. The Dutch observer recorded body temperatures of cetaceans and found most of them to be only a few degrees below normal temperature in life for tows having a minimum duration of 4h 30' and a maximum of 12h40'. No temperature measurements were made on seals.

(Kuiken *et al.*, 1994) indicate that the study may have been in a winter of low bycatches for the UK mackerel fishery. In this study dolphin bycatches were clearly correlated to sightings of live dolphins. Extrapolation has been made for the seal bycatch in the Irish herring fishery, as this is more uniform in terms of location and bycaught species than other fisheries studied. This yields an estimate of 60 seals in the winter of '94/95.

DISCUSSION

The number of mammal bycatches is too low to allow confident discrimination of most of the factors which are thought to lead to entrapment of mammals in the NE Atlantic, but the pattern of bycatch can usefully be compared with the published data for pelagic trawl bycatches in the NW Atlantic. These have been studied by the US government since 1977, and the results reported up to 1988 by Waring *et al.* (1990) include observation of 538 bycatches. Their findings indicate that each of these factors may be significant determinants of cetacean bycatch :

- Target species of the fishery
- Prevalence of mammals coincident with the fishery
- Susceptibility of mammal species to entrapment
- Tow duration
- Level of tow in water column
- Size of net opening
- Haulback speed
- Gear design
- Daylight

Target species of the fishery

In the Irish study grey seals were observed feeding on the target fish species around the nets, and this may be true in many fisheries. Waring *et al.* (1990) found in mackerel and squid fisheries that bycatch rates for pilot whales, *Globicephala melas*, and common dolphins varied with the target species and catch. In these fisheries the cetaceans caught had usually been eating the target species of the fishery in which they were caught. In this study the experience of the Dutch fishery indicates common dolphins and white-sided dolphins having a preference for mackerel over horse mackerel, since bycatches of these cetaceans started to occur when mackerel began to appear in the catches. Data on the prey species of cetaceans caught in this study are not yet available but some stomach contents were collected. Tuna caught in the tuna fishery are probably too large to be the prey of the dolphins caught in that fishery.

Prevalence of mammals

The prevalence of mammals in the area of the fishery clearly must, at some level, be a determinant of bycatch rates. The Irish study was the only one to record the presence of seals in the area of the fishery and the only one to record their capture. In this study the UK mackerel fishery had no cetacean bycatch although 72 hours of towing were observed. This is consistent with the very low prevalence of dolphins in the area during the study. Dolphin sightings in winter (Berrow *et al.*, 1994) in 1992 and 1993 around 100 km to the west of the UK mackerel fishery were approximately 25 times as frequent as recorded in this study, and the stranding of very fresh dolphins in the area of the mackerel fishery indicates that in some years dolphins do enter the area of this fishery. Dolphin sightings were made on three Dutch trips, while the only trip which caught horse mackerel as the predominant species had no dolphin sightings and no bycatch of dolphins. The Irish study recorded no dolphin sightings and no dolphin bycatch.

We conclude that low or zero bycatch rates may reflect a low or zero prevalence of mammals at the time of observation. Clearly mammal distribution does not mirror that of their prey species, and variations in this relationship may account for variability in catch rates in pelagic fisheries. This factor makes extrapolation of bycatch rates across widespread fisheries very uncertain.

Susceptibility of mammal species to entrapment

In this study the Irish herring fishery was operating in an area where porpoises are known to be present throughout the year, and was targeting species they are known to eat. (Berrow *et al.* 1994; Evans, 1992) The species has even been called the 'herring hog' in some localities. However none were caught in the herring fishery, or in Dutch trip 3 or the UK fisheries which also operated in areas with porpoises. Porpoises are known

Stock assessment of these species is still very limited. Stock boundaries are not known for any cetacean species affected by these fisheries. Population estimates have been made for the Celtic Shelf in the multinational SCANS survey of 1994 (Hammond *et al.*, 1995) and for the area of the tuna drift net fishery. For common dolphins these were 61 888 (Goujon *et al.*, 1993) in the area of the tuna fishery and 74 449 on the Celtic Shelf and for *Lagenorhynchus* dolphins (whitesided and whitebeaked dolphins) 833 on the Celtic Shelf. Recent estimates of the natural rate of increase of otherwise unstressed populations of small cetaceans have ranged from 4% (Palka, 1994; Woodley, 1991) to a maximum of 10% each year (Barlow *et al.*, 1991).

Other observations : Cetacean strandings and pelagic trawling

The review of cetacean strandings in France (Collet *et al.*, 1995) shows a striking pattern of irregular winter strandings of large numbers of adult common dolphins on the Atlantic coast. The greatest peak, of more than 600 cetaceans reported in two days at the end of February 1989 in Landes and Vendee (France), was entirely unprecedented in the strandings record. A proportion of animals in recent years have had signs of capture. No evidence was noted of infectious disease, which is the only natural cause of sudden increases in mortality known to affect cetaceans in winter. It is thought that location of death, wind and sea conditions strongly affect whether a dead cetacean strands. More recently, a high number of strandings (around 350 individuals) was observed in february 1997 on the coasts of the Bay of Biscay with signs of capture on most of them.

No close correlation exists between quarterly figures for French pelagic trawling fishing effort (not provided here) and strandings but the analysis is subject to several confounding factors - variable wind strengths and directions, inequalities of reporting effort, etc.- and a correlation may exist on a finer scale than tested.

A similar pattern of irregular winter strandings of adult common dolphins has appeared in recent years on the coast of Cornwall, SW England. Few animals had clear external signs of capture in fishing gear but very detailed post-mortem examination, with toxicology, histology etc. by Kuiken *et al.* (1994) lead to the conclusion that the peak in mortality of 1991/92 was due to a winter mackerel trawl fishery. A study of causes of death of harbour porpoises in the UK (Baker *et al.*, 1992) has shown that for that species fishery interactions are the main cause of death of stranded animals. However tagging experiments by the Cornwall Trust for Nature Conservation on porpoises discarded in the Celtic Sea showed no stranding of tagged animals on the coasts around the Celtic Sea, indicating that stranding may only reflect bycatch close to the coast (Berrow *et al.*, 1994)

Our interpretation is that pelagic fisheries fit the available evidence significantly better than any other possible cause for the winter peaks in common dolphin strandings.

Avoidance of cetacean bycatches

At present no feasible action has been identified which would enable pelagic trawl fisheries to avoid cetacean bycatches. Confining trawling to daylight hours is impossible to enforce and not yet of established benefit. Shortening trawl duration would require more trawls to be made, and if there is a higher risk at the end of trawling this would increase bycatches.

Other possibilities include transmission of sounds to frighten dolphins away; large mesh nets across the net mouth to discourage cetacean entry; and cod-end escape devices. All these might affect fish catches. The European Commission is at present funding the CETA-SEL project which is attempting to discover the behaviour of dolphins around the net using acoustic and other methods (De Haan *et al.*, 1997).

CONCLUSION

Bycatches of oceanic dolphins in pelagic trawling are not insignificant and require continued monitoring, because of the continuous changes in fishing practises, target species and fishing areas. Observation should not be restricted to those fisheries offering to take observers, and policy development could usefully seek to support fisheries that have obtained or actively assisted ecological impact evaluation. In any further research directed at marine mammal bycatches some measure of cetacean prevalence is important to aid the interpretation of the results.

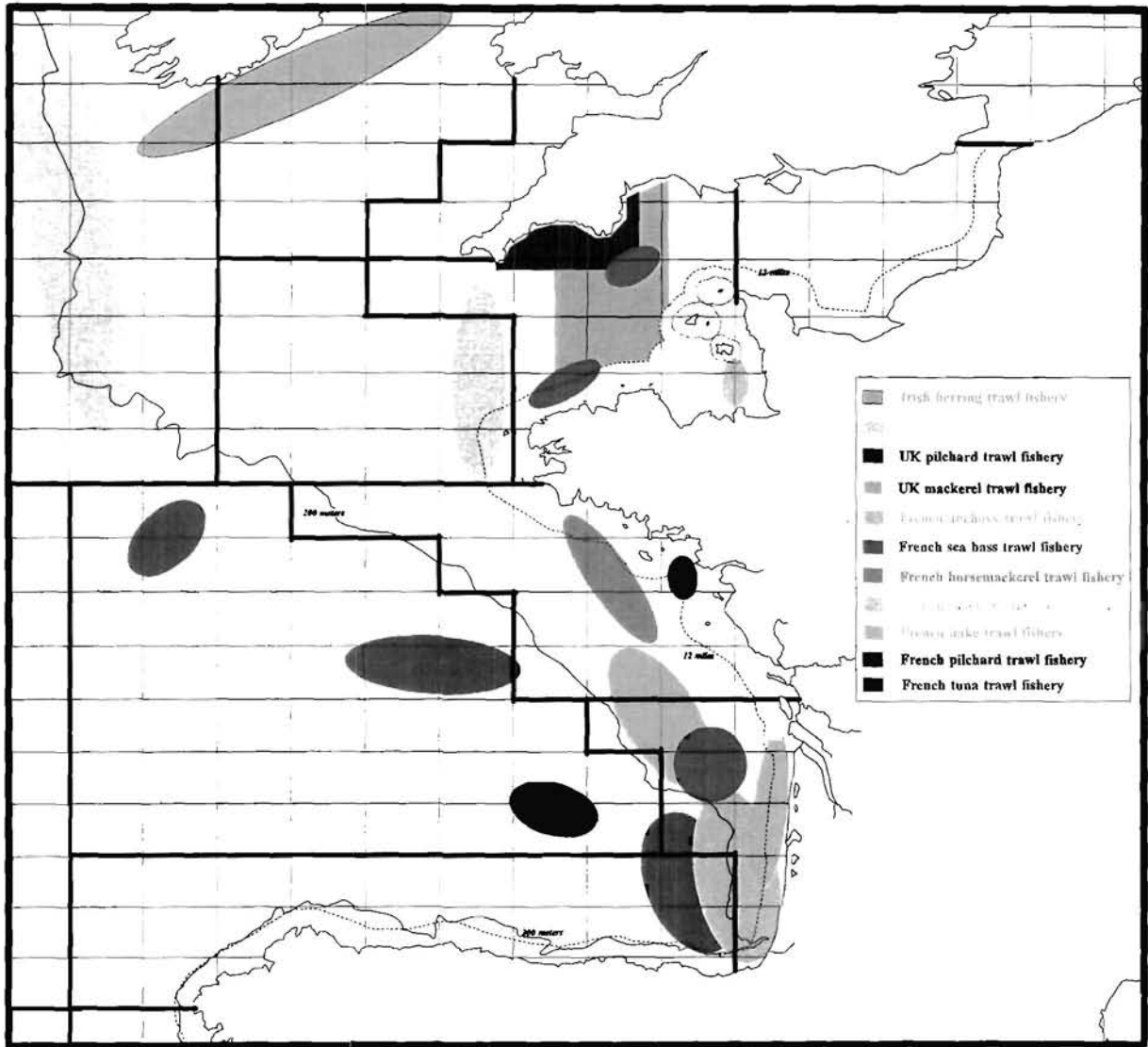


Figure A : Map of the fishing areas prospected during the study.