Annual report on the implementation of Council Regulation (EC) No 812/2004 during 2013

Member State: United Kingdom

Reference Period: 2013

Date: April 2nd 2014

Authors: Simon Northridge[1], Al Kingston[1] and Len Thomas[2].

[1] Sea Mammal Research Unit / Scottish Oceans Institute, University of St Andrews.

[2] Centre for Research into Ecological and Environmental Modelling, University of St Andrews.

Summary

Based on the 2013 official fleet effort statistics, between 26 and 31 UK registered vessels may have been fishing in such a way as to require the use of pingers to meet the requirements of Regulation 812/2004 to help minimise cetacean bycatch.

All South West based over 12 metre (m) vessels now have pingers, and the Fisheries Inspectorate has been examining vessels to monitor compliance with no violations reported to date.

Logbook records are insufficiently detailed to identify exactly which vessels are required to use pingers, as individual net fleet lengths are not recorded (a criterion for pinger use in certain North Sea fisheries), and in the case of encircling gillnets, logbooks do not specify if they are fixed or not.

UK based vessels are mainly using DDD-03 pingers to minimise cetacean bycatch, though some of the ten UK registered gillnet vessels that are based in Spain may be using other makes. The UK authorised the use of the DDD pinger by the over 12 m fishing fleet if used in accordance with agreed operating procedures under Article 3 (2) of Regulation 812/2004, and notified the European Commission accordingly.

There are still insufficient data to determine to what extent pingers are effective for common dolphins in gillnet fisheries, but use of the DDD trawl pinger in the pelagic pair trawl fishery for bass suggests that common dolphin bycatch has been reduced in that fishery at least.

Monitoring of pinger use as required under Article 2 of Regulation 812/2004 continues in the UK set gillnet fleet, with 15 trips and 318 fishing operations monitored during 2013. DDD-03 pingers are effective (circa 90% reduction) as long as they are spaced along nets no more than 4 kilometres (km) apart. The mitigation effect is less marked at spacings greater than 4 km.

Monitoring during 2013 included 101 days on pelagic trawls and 346 days on static gear vessels (though not all days or trips resulted in any fishing).

Sampling levels in the major pelagic trawl fisheries for mackerel and herring have been reduced because several years of monitoring suggest that bycatch is low in these fisheries. Monitoring continued at a relatively high level in the bass pair trawl fishery. We have also increased monitoring levels in the smaller pelagic fisheries that were not routinely sampled in the past when the monitoring focus was on the larger fisheries.

Sampling of static net fisheries covered a wide variety of gear types and major fishing areas. Roughly 82% of static gear sampling was in the south and west of the UK (Subarea VII), and around 18% in the North Sea (Subarea IV). Among the static gears sampled 25 days were categorized as drift nets and 321 as fixed nets.

An additional 937 non-dedicated discard sampling days have also been collated, including 207 days and 575 net hauls among static net fisheries, without any record of cetacean bycatch. These records are useful for screening for protected species that may require more focused monitoring in certain places, times or for certain gears.

Bycatches recorded under the dedicated sampling programme included 18 harbour porpoises, 11 common dolphins, 1 (probable) white-beaked dolphin, 1 (probable) white-sided dolphin, 1 bottlenose dolphin and 2 striped dolphins. Six common dolphins were recorded in pelagic trawls. All other cetacean bycatches were recorded from static net fisheries.

Observed seabird bycatches were: cormorants (20), fulmar (1), gannet (2), guillemot (21), razorbill (11) and

unidentified gulls (7).

Preliminary bycatch estimates for the whole UK fleet provide conservative (high) estimates of porpoise bycatch of around 1600-1900 porpoises per year, depending on whether pingers are being used correctly or at all. These estimates require further refinement through a more detailed understanding of fishing effort metrics in vessels of different fleets, as well as a better understanding of spatial components of bycatch throughout the region being studied. Other bycatch estimates suggest around 320 common dolphins and around 470 seals may have been taken in 2013. Again these estimates are likely to be biased high because of the extrapolation method used.

ACOUSTIC DETERRENT DEVICES

1. General Information

The UK is fully implementing Article 2 of Regulation 812/2004. All relevant vessel owners and masters have been advised of the provisions of the regulation, and relevant training for enforcement officers has been provided. No additional legislative measures are needed. However, the Marine Management Organisation (MMO) has provided full guidance on the implementation of the regulation and the use of pingers available at: http://www.marinemanagement.org.uk/fisheries/monitoring/regulations_cetaceans.htm

Further, following notification to the Commission in line with the requirements of Regulation 812/2004 (Article 3) the UK authorises the use of the DDD-03 pinger and has issued a procedure for its use available at: http://www.marinemanagement.org.uk/fisheries/monitoring/documents/cetaceansinfopack.pdf to ensure that fishermen choosing this device deploy it correctly to be fully effective.

1.1 Description of the fleet

Official logbook records indicate that 31 UK registered over 12 m vessels used gillnets in ICES Divisions VIIdefghj and Subarea IV during 2013. 24 over 12 m vessels fished in VIIdefghj, all of which would have been obliged to use pingers. Of these 24 vessels, 19 smaller boats (under 25 m) predominantly landed to local ports (meaning UK or local French) and 5 larger boats (over 25 m) landed predominantly into Spanish ports or via more distant UK ports to overland the catch. These larger vessels typically fish further from UK coasts, mainly along the continental shelf break, upper slope and deep-water banks.

Among the 19 over 12 m vessels based in the South West, official logbook records suggest that three used “encircling gillnets” to catch small pelagic fish in VIIe and f. It is unclear whether this gear type should be covered by the regulation which states that “any bottom set gillnet or entangling net” used by over 12 m vessels in Divisions VIIdefghj requires pingers. It is likely that these vessels were actually using ring nets which would not require pinger use, but the description used in the logbook database of encircling gillnet is ambiguous and we cannot therefore be certain whether these 3 vessels should have been using pingers under Annex I of the Regulation.

Nine vessels over 12 m fished with gillnets in the North Sea, two of which also fished in Subarea VII. Of these 9 vessels, 7 reported the use of nets with meshes of more than 220 mm, which would require them to use pingers, while 2 UK based vessels used smaller meshed nets. These two vessels fished through the year including between August and October, and may have been fishing in such a way (with nets “the total length of which does not exceed 400 m”, indicative of nets fished on wrecks) that would require them to use pingers under the gear categories listed in Annex I of the Regulation. However, official logbook data do not contain this level of detail regarding net fleet lengths and we do not have information about whether these vessels were inspected at sea between August and October, the period during which pingers are required by wreck net boats (those using short net fleets).

Overall we conclude that between 26 and 31 UK registered vessels may have been fishing in such a way as to require the use of pingers during 2013. As far as we are aware, the masters of all relevant vessels are aware of their obligations and all such vessels are subject to routine inspection at sea.

Table 1.1 Description of the UK fleet required to use pingers under Annex I of the Regulation (na = not available)

Metier	Fishing Area	No of vessels	% using pingers	No of trips	Days at Sea	Months of operation	Total length of nets	Total soak time
GNS-Cephalopods	VIIf	1	100	1	1	12-12	na	na
GNS-Crustaceans	VIIe	4	100	10	12	2-11	na	na
GNS-Crustaceans	VIIf	2	100	2	2	8-9	na	na
GNS-Crustaceans	VIIg	1	100	1	1	5-5	na	na
GNS-Crustaceans	VIIh	2	100	6	4	4-12	na	na
GNS-Crustaceans	VIIj	1	100	1	1	4-4	na	na
GNS-Demersal fish	VIId	1	100	1	0	1-1	na	na
GNS-Demersal fish	VIIe	15	100	155	176	1-12	na	na
GNS-Demersal fish	VIIf	10	100	73	82	1-12	na	na
GNS-Demersal fish	VIIg	11	100	185	243	1-12	na	na
GNS-Demersal fish	VIIh	14	100	131	126	1-12	na	na
GNS-Demersal fish	VIIj	10	100	43	43	1-12	na	na
GNS-Large Pelagic Fish	VIIj	1	100	1	1	11-11	na	na
GNS-Small pelagic fish	VIIe	3	?	63	63	1-11	na	na
GNS-Small pelagic fish	VIIf	2	?	109	109	1-12	na	na
GNS-Demersal fish	IVa	7	100	29	27	2-11	na	na
GNS-Demersal fish	IVb	2	?	17	17	1-12	na	na
GNS-Demersal fish	IVc	1	?	6	4	1-12	na	na

2. Acoustic Deterrent Devices (Article 2 and 3)

2.1 Mitigation measures

As far as we are aware, UK based over 12 m vessels operating from the South West of England are using DDD-03 pingers routinely. Anecdotal accounts suggest that other pinger models are also being used by the UK registered Spanish owned fishing fleet.

The majority of UK vessels fishing in the bass pair trawl fishery have been using a trawl version of the DDD-03 (03-H) on a voluntary basis for several years and cetacean bycatch rates remain very low (approximately 1/10th) in this fishery compared with the rates observed in the preceding period 2000-2006 when pingers were not used.

Table 2.1: Mitigation measures being used in the UK fleet

Metier	Fishing Area	Pinger Characteristics	Other mitigation measures
GNS-Crustaceans	VIIe	DDD-03L and possibly others	None known
GNS-Crustaceans	VIIf	DDD-03L and possibly others	None known
GNS-Crustaceans	VIIg	DDD-03L and possibly others	None known
GNS-Crustaceans	VIIh	DDD-03L and possibly others	None known
GNS-Crustaceans	VIIj	DDD-03L and possibly others	None known
GNS-Demersal fish	VIId	DDD-03L and possibly others	None known
GNS-Demersal fish	VIIe	DDD-03L and possibly others	None known
GNS-Demersal fish	VIIf	DDD-03L and possibly others	None known
GNS-Demersal fish	VIIg	DDD-03L and possibly others	None known
GNS-Demersal fish	VIIh	DDD-03L and possibly others	None known
GNS-Demersal fish	VIIj	DDD-03L and possibly others	None known
PTM-Bass	VIIe	DDD-03H on a voluntary basis	Fishery banned inside UK Territorial Waters (12 nm)

- Operating procedures for the use of the DDD-03L pingers in the Celtic Sea and English Channel were developed in 2012 in collaboration with the Cornish Fish Producers Organisation (CFPO) which represents most of the over 12 m vessels using static nets in this area. Vessel masters can use any device that is compliant with Annex II of the regulation, but due to practical handling benefits most vessel masters appear to favour the DDD-03 device over other available quieter models.

- The MMO and Marine Scotland, which are responsible for compliance and enforcement of fishery regulations in UK waters, have developed protocols for assessing vessel compliance through shore side and at sea inspections and naval officers have received training in the interpretation of Regulation 812/2004. Industry was reminded about the pinger requirements of the 812 Regulation during summer 2013.

- There are still insufficient data to say how effective DDDs might be in reducing common dolphin bycatch in fleets of static nets.

- The data collected to date do not suggest any increase in seal depredation associated with the use of DDDs, though data on seal depredation is routinely recorded by observers and this situation is regularly reviewed.

- Bycatch rates in the bass pair trawl fishery remain low in comparison to historical rates (less than 1/10th of observed rates from 2002-2006) but 6 common dolphins were recorded as bycaught during 2013 in 84 observed hauls.

- The issue previously raised by fishermen concerning the charging units that were supplied by the manufacturer of the DDD pinger, and which were considered unsuitable for these fisheries, has been addressed. The manufacturer supplied a newly designed robust multi-charger which can charge 10 DDDs simultaneously from a single power source and can be bolted to a suitable surface aboard a vessel. The unit also contains an integral voltage tester which allows battery voltages (a proxy for pinger functioning) to be tested quickly. The 10-way charger has been tested by several vessels in the fleet and appears to work well.

3. Monitoring and assessment

3.1 Monitoring and assessment of the effects of pinger use (Article 2.4)

We have continued to monitor trips by over 12 m vessels that are required to use pingers under Regulation 812/2004. During 2013, 15 such trips involving 318 hauls were observed. Porpoise and dolphin bycatch numbers and locations are recorded using GPS, and numbers of seal-damaged fish are also recorded as part of the scientific studies required under Article 2 (4). Bycatch rates in net fleets equipped with DDD-03 pingers are consistent with those observed during trials conducted in previous years and are considerably lower than rates in net fleets without pingers. The guidelines which were produced in 2012 and agreed with industry, state that DDD pingers should be placed no more than 4 km apart, either to the buoy ropes at each end of a net fleet, or if net fleets more than 4 km are used pingers should be attached to the floatline and/or buoy ropes so that no part of the net fleet is more than 2 km from an active pinger.

3.2. Report on measures to control specifications when pingers are in use by fishermen (Article 2.4)

Fishery Inspectors from the MMO and Marine Scotland check that pingers are being carried (and can be charged) by those vessels required to use them, during routine shore side and at sea inspections. The MMO and the Marine Scotland Compliance Enforcement Unit have also acquired pinger detection units that are being used to determine compliance at sea, including when nets are deployed.

3.3. Derogation

In 2012 the UK authorised the use of DDD pingers if used in accordance with agreed operating procedures, under Article 3 (2) of Regulation 812/2004, and notified the European Commission accordingly.

3.4 Overall assessment

The UK industry has only recently adopted the routine use of pingers and it is too early to make a proper judgment about the effectiveness of the scheme. Logbook records make it difficult to ascertain which vessels should be using pingers according to the requirements of Annex I of the Regulation. Specifically, it is unclear whether 'encircling gillnets' are addressed by Annex I and it is not possible to determine from logbook records whether vessels are using any "bottom-set gillnet or entangling net, or combination of these nets, the total length of which does not exceed 400 metres".

OBSERVER SCHEMES

4. General information on implementation of Articles 4 and 5

No new procedures have been adopted regarding the implementation of the Observer Scheme during 2013. A dedicated protected species bycatch monitoring programme is managed and coordinated by the Sea Mammal

Research Unit (SMRU) at the University of St Andrews, in collaboration with the Centre for Environment, Fisheries and Aquaculture Science at Lowestoft (Cefas) and the Agri-Food and Biosciences Institute of Northern Ireland (AFBINI). Data provided by Cefas and AFBINI include discard sampling conducted under the Data Collection Framework (DCF), other specific research efforts and a limited number of dedicated sea days where protected species bycatch monitoring is the main focus for their observers.

The Bycatch Monitoring Programme fulfils UK monitoring obligations under Council Regulation 812/2004, as well as meeting the requirements of Article 12 of the Habitats Directive and international agreements including ASCOBANS, the International Whaling Convention (IWC) and OSPAR. Data collected under the programme are also increasingly being used to assess bycatch of other non-cetacean but protected or potentially vulnerable taxonomic groups or species, through the ICES Working Group on Protected Species Bycatch (WGBYC). The UK participates fully in the work of WGBYC.

5. Monitoring

Tables 5.1 and 5.2 list the fishing fleet effort by métier and ICES Division for mid-water or pelagic trawls and for gillnets and tangle nets respectively. Sampling focused on small or peripheral pelagic trawl fisheries (e.g. for boarfish and bass), and for a variety of reasons, official logbook records do not necessarily reflect actual fishing effort in these métiers; in several cases sampling levels actually exceeded official recorded levels of fishing effort.

Table 5.1 Description of fishing effort and observer effort in towed gear: rows in bold are metiers with cetacean bycatch (see Table 6.1)

"Type of Monitoring" codes: SS= Scientific Studies; PP = Pilot project; HDM= Habitats Directive Monitoring; PMS = Pilot Monitoring Scheme.

Metier	Fishing Area	Total fishing effort						Total observer effort achieved						Type of monitoring	Coverage
		No of vessels	No of trips	Days at Sea	Season	Hauls	Time	No of vessels	No of trips	Days at Sea	Season	No of hauls	Total towing time		
<15-OTM-Anchovy	VIIe	1	1	1	Apr-Nov	1									
<15-OTM-Anchovy	VIIe	1	2	2	Dec-Mar	2									
<15-OTM-Bass	VIIe	1	2	4	Apr-Nov	4									
<15-OTM-Demersal fish	VIIe	1	1	1	Dec-Mar	1									
<15-OTM-Herring	IVc	2	10	10	Apr-Nov	10									
<15-OTM-Herring	IVc	2	4	4	Dec-Mar	4									
<15-OTM-Herring	VIIe	2	8	8	Apr-Nov	8									
<15-OTM-Herring	VIIe	3	12	17.42	Dec-Mar	13									
<15-OTM-Mackerel	VIIe	1	1	1	Dec-Mar	1									
<15-OTM-Sardine	VIIe	1	1	0.43	Dec-Mar	1									
<15-OTM-Sprat	IVc	1	15	15	Dec-Mar	15									

<15-OTM-Sprat	VIIe	3	213	216.93	Apr-Nov	215									
<15-OTM-Sprat	VIIe	3	82	92.51	Dec-Mar	91									
<15-PTM-Sardine	VIIe	-	-	-	Dec-Mar			1	1	1	Dec-Mar	1		SS / PP	100%
<15-PTM-Demersal fish	IVc	0.5	0.5	0.5	Apr-Nov	1									
<15-PTM-Herring	IVc	1	8	8	Apr-Nov	8									
<15-PTM-Herring	IVc	1	8	8	Dec-Mar	9									
<15-PTM-Smelt	IVc	1	2	2	Apr-Nov	2									
<15-PTM-Sprat	IVc	1	20	20	Dec-Mar	20									
>15-OTM-Bass	VIIe	1	1	1	Dec-Mar	5									
>15-OTM-Blue Whiting	VIa	1	1	1	Apr-Nov	14									
>15-OTM-Blue Whiting	VIa	2	3	2.02	Dec-Mar	8									
>15-OTM-Blue Whiting	VIb	4	6	5.44	Dec-Mar	35									
>15-OTM-Blue Whiting	VIIc	4	6	5.54	Dec-Mar	39		1	1	2	Dec-Mar	1		PMS	36%
>15-OTM-Blue Whiting	VIIk	1	1	1	Dec-Mar	5									
>15-OTM-Boarfish	VIIc				Dec-Mar			1	1	2	Dec-Mar	1		PMS	100%
>15-OTM-Boarfish	VIIh	1	1	1	Apr-Nov	16		1	1	9	Apr-Nov	4		PMS	900%
>15-OTM-Boarfish	VIIh	1	1	1	Dec-Mar	15									
>15-OTM-Boarfish	VIIj	1	2	2	Apr-Nov	14		1	1	9	Apr-Nov	5		PMS	450%
>15-OTM-Boarfish	VIIj	1	1	1	Dec-Mar	13									
>15-OTM-Demersal fish	VIIa	3	13	13	Apr-Nov	45									
>15-OTM-Demersal fish	VIIa	2	3	3	Dec-Mar	17									
>15-OTM-Demersal fish	VIIg	1	1	1	Apr-Nov	4									
>15-OTM-Demersal fish	VIIg	1	2	2	Dec-Mar	9									
>15-OTM-Herring	IIa	1	1	0	Apr-Nov	0									
>15-OTM-Herring	IIa	12	18	18	Dec-Mar	57									
>15-OTM-Herring	IVa	22	115	95.62	Apr-Nov	313									
>15-OTM-Herring	IVb	4	6	4.26	Apr-Nov	14									
>15-OTM-Herring	IVc	1	1	0.11	Apr-Nov	0									
>15-OTM-Herring	VIa	18	30	22.51	Apr-Nov	77		1	1	4	Apr-Nov	3		PMS	18%
>15-OTM-Herring	VIa	1	1	1	Dec-Mar	5									
>15-OTM-Herring	VIIa	1	1	1	Apr-Nov	5									

>15-OTM-Herring	VIIb	1	1	0.03	Apr-Nov	1									
>15-OTM-Herring	VIId	1	1	0.46	Apr-Nov	13									
>15-OTM-Herring	VIId	1	1	0.99	Dec-Mar	18									
>15-OTM-Herring	VIIe	1	1	0.01	Dec-Mar	0									
>15-OTM-Horse mackerel	Distant	1	1	0.06	Dec-Mar	1									
>15-OTM-Horse mackerel	IVb	1	1	0.61	Dec-Mar	2									
>15-OTM-Horse mackerel	VIa	1	2	2	Apr-Nov	6									
>15-OTM-Horse mackerel	VIa	3	6	5.23	Dec-Mar	42									
>15-OTM-Horse mackerel	VIIb	1	2	0.43	Dec-Mar	10									
>15-OTM-Horse mackerel	VIIh	1	1	0.05	Dec-Mar	1									
>15-OTM-Horse mackerel	VIII	1	1	0.14	Dec-Mar	3									
>15-OTM-Horse mackerel	VIIj	1	1	0.5	Dec-Mar	12									
>15-OTM-Mackerel	IVa	21	63	62.98	Apr-Nov	165									
>15-OTM-Mackerel	IVb	1	1	0.17	Apr-Nov	1									
>15-OTM-Mackerel	VIa	2	3	1.85	Apr-Nov	8									
>15-OTM-Mackerel	VIa	24	67	67	Dec-Mar	259		1	2	10	Dec-Mar	6		PMS	15%
>15-OTM-Mackerel	VIIb	5	5	5	Dec-Mar	22									
>15-OTM-Pearlsides	VIa				Dec-Mar			1	1	2		2		PMS & SS	100%
>15-OTM-Pearlsides	VIb				Dec-Mar			1	1	2	Dec-Mar	1		PMS & SS	100%
>15-OTM-Pearlsides	VIIc				Dec-Mar			1	1	2	Dec-Mar	1		PMS & SS	100%
>15-PTM-Bass	VIId	0.5	0.5	0.46	Dec-Mar	2		2	3	8	Dec-Mar	11		PMS & SS	1739%
>15-PTM-Bass	**VIIe**	**1.5**	**5.5**	**5.04**	**Dec-Mar**	**23**		**2**	**13**	**36**	**Dec-Mar**	**73**		**PMS & SS**	**714%**
>15-PTM-Demersal fish	VIIa	0.5	0.5	0.14	Apr-Nov	1									
>15-PTM-Demersal fish	VIIe	0.5	0.5	0.5	Dec-Mar	2									

>15-PTM-Demersal fish	VIIg	0.5	0.5	0.36	Apr-Nov	3									
>15-PTM-Herring	IVa	1	6	3.15	Apr-Nov	33									
>15-PTM-Herring	IVb	1	9	4.45	Apr-Nov	40									
>15-PTM-Herring	VIa	2.5	8	6.39	Apr-Nov	38									
>15-PTM-Herring	VIIa	1	12.5	12.5	Apr-Nov	37		2	6	8	Apr-Nov	14		PMS	64%
>15-PTM-Horse mackerel	IVc	1	1	0.17	Apr-Nov	2									
>15-PTM-Horse mackerel	IVc	1	1	0.14	Dec-Mar	2									
>15-PTM-Horse mackerel	VIId	1	2	1.54	Apr-Nov	24									
>15-PTM-Horse mackerel	VIId	1	5	3.9	Dec-Mar	41									
>15-PTM-Horse mackerel	VIIe	1	2.5	1.12	Apr-Nov	12									
>15-PTM-Horse mackerel	VIIe	1	3	0.96	Dec-Mar	11									
>15-PTM-Horse mackerel	VIIh	1	1	0.17	Apr-Nov	4									
>15-PTM-Mackerel	Distant	1	3	1.79	Dec-Mar	24									
>15-PTM-Mackerel	IVa	1	1.5	1.5	Apr-Nov	4									
>15-PTM-Mackerel	VIa	1	2	2	Dec-Mar	9									
>15-PTM-Mackerel	VIIe	1	3	1.21	Dec-Mar	15									
>15-PTM-Mackerel	VIIj	1	1	1	Dec-Mar	7									
>15-PTM-Sprat	VIa	2.5	16.5	16.5	Apr-Nov	20									
>15-PTM-Sprat	VIa	2	13	13	Dec-Mar	16									
Total				**820**						**95**					**12%**

Table 5.2 Description of fishing effort and observer effort in static gear: rows in bold are metiers with cetacean bycatch (see table 6.1)

"Type of Monitoring" codes: SS= Scientific Studies; PP = Pilot project; HDM= Habitats Directive Monitoring; PMS = Pilot Monitoring Scheme.

Metier		TOTAL FLEET EFFORT						TOTAL OBSERVED EFFORT							
	Fishing Area	No of vessels	No of trips	Days at Sea	Season	Total length of nets	Total soak time	No of vessels	No of trips	Days at Sea	Season	Total length of nets	Total soak time	Type of monitoring	Coverage
>15-Gill-Demersal fish	IVb	2	16	115	1-12										
>15-Gill-Demersal fish	IVc	1	6	18	1-12										
>15-Gill-Demersal fish	VIIe	6	35	100	1-11			1	3	8	2	93	2822	SS	8%
>15-Gill-Demersal fish	VIIf	7	19	74	1-12										
>15-Gill-Demersal fish	**VIIg**	**8**	**23**	**127**	**1-12**			**2**	**4**	**11**	**4-11**	**99**	**2219**	**SS**	**9%**
>15-Gill-Demersal fish	VIIh	8	61	316	1-12										
>15-Gill-Demersal fish	VIII	1	3	13	5-6										
>15-Gill-Demersal fish	VIIj	5	12	79	1-12										
>15-Gill-Large Pelagic Fish	VIIj	1	1	9	11										
>15-Gill Hake-Demersal fish	Distant	1	3	2	8-12										
>15-Gill Hake-Demersal fish	VIIe	2	2	6	7-11										
>15-Gill Hake-Demersal fish	VIIf	6	20	75	1-11										
>15-Gill Hake-Demersal fish	VIIg	8	90	542	2-12			2	3	13	6-11	136	3395	SS	2%
>15-Gill Hake-Demersal fish	VIIh	4	8	31	3-12										
>15-Gill Hake-Demersal fish	VIII	1	7	53	7-12										
>15-Gill Hake-Demersal fish	VIIj	2	11	70	1-12										
>15-Gill Hake-Demersal fish	VIIk	1	6	41	9-11										

>15-Gill light-Demersal fish	VIIe	2	2	6	1-3										
>15-Gill light-Demersal fish	VIIf	1	1	2	7-7										
>15-Gill light-Demersal fish	VIIg	2	2	8	2-7										
>15-Gill light-Demersal fish	VIIh	2	2	10	1-3										
>15-TangTram-Crustaceans	VIIe	2	3	11	2-10										
>15-TangTram-Crustaceans	VIIf	2	2	9	8-9										
>15-TangTram-Crustaceans	VIIh	2	6	23	4-12										
>15-TangTram-Crustaceans	VIIj	1	1	6	4-4										
>15-TangTram-Demersal fish	Distant	1	1	15	1-1										
>15-TangTram-Demersal fish	IIa	1	1	48	3-3										
>15-TangTram-Demersal fish	**IVa**	**7**	**29**	**917**	**2-11**			**1**	**1**	**49**	**3-5**	**1080**	**71047**	**PMS & SS**	**5%**
>15-TangTram-Demersal fish	VIa	1	1	2	3-3										
>15-TangTram-Demersal fish	VIb	2	5	226	1-9										
>15-TangTram-Demersal fish	VIIa	1	3	8	7-7										
>15-TangTram-Demersal fish	VIIb	1	2	41	3-9										
>15-TangTram-Demersal fish	VIIc	2	7	222	1-11										
>15-TangTram-Demersal fish	**VIIe**	**4**	**17**	**76**	**1-10**			**2**	**4**	**10**	**2-10**	**174**	**13709**	**SS**	**13%**

>15-TangTram-Demersal fish	VIIf	6	23	155	4-10			1	1	3	9	22	2592	SS	2%
>15-TangTram-Demersal fish	VIIg	5	43	341	3-12			2	3	11	4-11	207	18722	SS	3%
>15-TangTram-Demersal fish	**VIIh**	**8**	**54**	**361**	**1-12**			**1**	**2**	**4**	**10**	**59**	**2832**	**SS**	**1.1%**
>15-TangTram-Demersal fish	VIII	2	21	183	1-12										
>15-TangTram-Demersal fish	VIIj	4	15	271	1-12										
>15-TangTram-Demersal fish	VIIk	2	9	191	1-12										
>15-TangTram-Demersal fish	Distant	1	1	2	2-2										
<15-Drift Oth-Cephalopods	VIIe	2	2	2	5-11										
<15-Drift Oth-Crustaceans	IVc	4	11	11	1-10										
<15-Drift Oth-Demersal fish	IVc	50	501	507	1-12			1	1	1	8	2	4	HDM	0.2%
<15-Drift Oth-Demersal fish	VIIa	1	16	16	1-12										
<15-Drift Oth-Demersal fish	VIId	24	372	372	1-12										
<15-Drift Oth-Demersal fish	VIIe	21	56	56	1-12										
<15-Drift Oth-Demersal fish	VIIf	1	1	1	12										
<15-Drift Pel-Anadromous	IVb	2	45	45	6-8										
<15-Drift Pel-Anadromous	IVc	1	1	1	7-7										
<15-Drift Pel-Small pelagic fish	IVc	43	239	239	1-12			1	1	1	8	1	1	HDM	0.4%

<15-Drift Pel-Small pelagic fish	VIId	14	111	111	2-12			4	14	24	11	43	210	HDM	22%
<15-Drift Pel-Small pelagic fish	VIIe	50	336	336	1-12										
<15-Drift Pel-Small pelagic fish	VIIf	12	15	15	1-11										
<15-Gill-Deep-water species	VIId	5	9	9	4-6										
<15-Gill-Deep-water species	VIIe	5	19	19	1-12										
<15-Gill-Demersal fish	IVb	35	174	174	1-12			1	1	1	1	1	4	HDM	0.6%
<15-Gill-Demersal fish	IVc	57	414	416	1-12			2	3	3	3-11	3	43	HDM	0.7%
<15-Gill-Demersal fish	VIa	1	1	1	9-9										
<15-Gill-Demersal fish	VIIa	5	16	16	1-12										
<15-Gill-Demersal fish	VIId	156	896	896	1-12										
<15-Gill-Demersal fish	**VIIe**	**170**	**1341**	**1462**	**1-12**			**1**	**2**	**2**	**4**	**4**	**109**	**HDM**	**0.1%**
<15-Gill-Demersal fish	**VIIf**	**108**	**657**	**685**	**1-12**			**2**	**2**	**1**	**1-9**	**2**	**19**	**HDM**	**0.1%**
<15-Gill-Demersal fish	VIIg	7	34	97	1-12			1	1	4	4	3	45	HDM & SS	4%
<15-Gill-Demersal fish	VIIh	3	9	51	1-9										
<15-Gill-Demersal fish	VIIj	1	5	32	8-10										
<15-Gill-Large Pelagic Fish	VIIe	1	1	1	7-7										
<15-Gill Hake-Demersal fish	VIIe	3	6	11	3-10										
<15-Gill Hake-Demersal fish	VIIf	2	6	30	1-10										
<15-Gill Hake-Demersal fish	VIIg	1	8	51	2-12										
<15-Gill Hake-Demersal fish	VIIh	1	1	3	10										
<15-Gill light-Anadromous	VIIe	1	1	1	6-6										

<15-Gill light-Cephalopods	IVc	1	2	2	6-6										
<15-Gill light-Cephalopods	VIId	76	247	247	5-7										
<15-Gill light-Cephalopods	VIIe	13	63	63	4-11										
<15-Gill light-Cephalopods	VIIf	3	7	7	4-5										
<15-Gill light-Demersal fish	IVb	8	16	16	1-12										
<15-Gill light-Demersal fish	IVc	84	814	819	1-12			2	2	3	6-8	3	8	HDM	0.4%
<15-Gill light-Demersal fish	VIIa	29	380	380	1-12			1	2	2	10	1	2	HDM	0.5%
<15-Gill light-Demersal fish	VIId	266	2991	2993	1-12										
<15-Gill light-Demersal fish	VIIe	249	1856	1858	1-12			1	1	1	4	2	5	HDM	0.1%
<15-Gill light-Demersal fish	VIIf	118	989	990	1-12			4	5	5	1-11	6	44	HDM	0.5%
<15-Gill light-Demersal fish	VIIg	20	200	202	1-12										
<15-Gill light-Small pelagic fish	IVb	3	5	5	5-8										
<15-Gill light-Small pelagic fish	IVc	11	15	15	3-12										
<15-Gill light-Small pelagic fish	VIIa	12	31	31	6-11										
<15-Gill light-Small pelagic fish	VIId	53	180	180	1-12										
<15-Gill light-Small pelagic fish	VIIe	98	514	584	1-12										
<15-Gill light-Small pelagic fish	VIIf	40	278	358	1-12			1	1	1	5	1	7	HDM	0.3%

<15-Gill light-Small pelagic fish	VIIg	6	6	6	7-12										
<15-Gill light flatfish-Demersal fish	IVb	4	9	9	1-11										
<15-Gill light flatfish-Demersal fish	IVc	79	1118	1121	1-12			1	1	1	6	2	2	HDM	0.1%
<15-Gill light flatfish-Demersal fish	VIIa	15	43	43	4-12			1	2	2	6	2	35	HDM	5%
<15-Gill light flatfish-Demersal fish	**VIId**	**244**	**8585**	**8583**	**1-12**			**5**	**22**	**22**	**2-6**	**51**	**1231**	**HDM**	**0.3%**
<15-Gill light flatfish-Demersal fish	VIIe	176	1177	1193	1-12			4	5	6	1-8	30	576	HDM	0.5%
<15-Gill light flatfish-Demersal fish	VIIf	47	247	247	1-12			2	3	3	3-11	7	216	HDM	1.2%
<15-Gill light flatfish-Demersal fish	VIIg	3	4	4	7-10										
<15-TangTram-Cephalopods	IVc	1	1	1	9										
<15-TangTram-Cephalopods	VIId	3	3	3	1-8										
<15-TangTram-Cephalopods	VIIe	44	140	140	1-12										
<15-TangTram-Cephalopods	VIIf	15	21	21	2-12										
<15-TangTram-Crustaceans	IVb	19	102	102	1-12										
<15-TangTram-Crustaceans	IVc	29	82	82	1-12										
<15-TangTram-Crustaceans	VIIa	5	6	6	5-7										
<15-TangTram-Crustaceans	VIIb	1	7	15	6-8										
<15-TangTram-Crustaceans	VIId	69	222	222	1-12										

<15-TangTram-Crustaceans	VIIe	113	617	673	1-12			2	2	1	6-7	6	631	HDM	0.1%
<15-TangTram-Crustaceans	VIIf	87	814	820	1-12			1	2	2	6	7	808	HDM	0.2%
<15-TangTram-Crustaceans	VIIg	4	29	33	3-12										
<15-TangTram-Demersal fish	IVb	4	4	4	2-8			4	5	5	1-8	8	461	HDM	125%
<15-TangTram-Demersal fish	IVc	63	322	320	1-12			2	2	2	4-11	2	50	HDM	0.6%
<15-TangTram-Demersal fish	VIIa	10	44	44	1-12			1	2	2	7-9	7	270	HDM	5%
<15-TangTram-Demersal fish	VIId	138	593	593	1-12			5	12	12	2-6	28	899	HDM	2%
<15-TangTram-Demersal fish	**VIIe**	**156**	**1361**	**1466**	**1-12**			**11**	**61**	**104**	**1-11**	**376**	**29496**	**HDM**	**7%**
<15-TangTram-Demersal fish	**VIIf**	**83**	**898**	**921**	**1-12**			**7**	**14**	**15**	**1-11**	**52**	**5080**	**HDM**	**2%**
<15-TangTram-Demersal fish	VIIg	11	38	122	1-10			2	2	10	4-6	97	10383	HDM	8%
<15-TangTram-Demersal fish	VIIh	1	3	34	3-9										
Total				**36046**						**341**					**0.9%**

6. Estimation of incidental catches

During 2013, 18 harbour porpoises, 11 common dolphins, 1 (probable) white-beaked dolphin, 1 (probable) white-sided dolphin, 1 bottlenose dolphin and 2 striped dolphins were reported as bycaught in the following metiers.

Table 6.1 Incidental catch rates by fleet segment and target species

Metier	Fishing Area	Main target species	Incidentally caught cetacean species	No of incidents	No of individuals incidentally caught by species		Incidental catch rates		Total incidental catch estimate	CV
					With pingers	Without pingers	With pingers	Without pingers		
<15-GNS-Demersal	VIId	Dover sole	Harbour Porpoise	1	0	1	0	0.009		
<15-GNS-Demersal	VIIe	Mixed	Harbour porpoise	1	0	1	0	0.034		
<15-GNS-Demersal	VIIe	Anglerfish	Harbour porpoise	1	0	1	0	0.006		
<15-GNS-Demersal	VIIf	Haddock	Harbour porpoise	2	0	2	0	0.333		
<15-GNS-Demersal	VIIf	Mixed	Harbour porpoise	1	0	1	0	0.036		
<15-GNS-Demersal	VIIf	Anglerfish	Harbour porpoise	4	0	4	0	0.167		
>15-GNS-Demersal	VIIe	Anglerfish	Harbour porpoise	5	5	0	0.208	0		
>15-GNS-Demersal	VIIg	Mixed	Harbour porpoise	1	1	0	0.033	0		
>15-GNS-Demersal	VIIh	Anglerfish	Harbour porpoise	2	2	0	0.5	0		
Totals and Mean rates				***18***	***8***	***10***				
>15-GNS-Demersal	IVa	Anglerfish	W-S dolphin	1	0	1	0	0.009		
>15-GNS-Demersal	IVa	Anglerfish	W-B dolphin	1	0	1	0	0.009		
>15-GNS-Demersal	VIIe	Anglerfish	Common dolphin	1	1	0	0.042	0		
>15-GNS-Demersal	VIIe	Anglerfish	Striped dolphin	1	2	0	0.084	0		
>15-GNS-Demersal	VIIe	Anglerfish	Bottlenose dolphin	1	1	0	0.042	0		
>15-GNS-Demersal	VIIh	Anglerfish	Common dolphin	4	3	1	0.75	1		
Totals				***9***	***7***	***2***				
>15-PTM-Demersal	VIIe	Bass	Common dolphin	6	3	3	0.047	0.43		
Totals and Mean rates				***6***	***3***	***3***	***0.047***	***0.43***		

No total mortality estimates have been generated by stratum in Table 6.1, as these are too narrowly defined to provide useful estimates of bycatch, and because care is needed in interpreting the bycatch rates in pingered vs. unpingered nets. Particularly regarding how these are extrapolated to the total fleet in the absence of information on how pingers were actually being used during fishing operations that were not observed.

Instead synoptic estimates of bycatch of harbour porpoises, dolphins and seals are presented in Annex 1 of the report, based on a larger sample size of observations made over several years and in a wider range of metiers.

Several porpoise and dolphin bycatches were recorded from net fleets equipped with DDD pingers. In all cases these animals were taken in long net fleets (up to 11 km) that had pingers attached only to the buoy ropes. The estimated positions of these bycatches in relation to pinger positions support our current understanding of this devices effective range. It should be noted that the agreed operating procedures for the DDD device was fully implemented in September 2013 and prior to that vessels were under no obligation to adhere to the spacing guidance.

6.2 Recording of incidental catches

Bycatches were recorded according to standard data collection procedures by experienced on-board fishery observers. Not all hauls are observed on all trips, especially when hauling is more or less continuous. In one instance a dolphin bycatch was reported to the observer by crew members who were able to provide a probable identification from a field guide. In one other case the animal dropped from the net before reaching the deck and species identification could not be made with absolute certainty. Other bycaught specimens were sampled at sea (external measurements including length, girth and sex determination and blubber thickness were recorded and teeth and skin samples were collected for age determination and genetic analysis) and some other whole marine mammal specimens (x5) were returned to shore for more detailed analysis under a complementary sub-project.

Whereas most observations (416 days in 2013 or 90%) are made by trained SMRU observers on 'dedicated trips', we also include observations made by Cefas and AFBINI observers on dedicated protected species trips (44 days in 2013) – where the main aim is to ensure all protected species are recorded, and where the SMRU data collection protocol is followed.

Additionally we have reviewed and tabulated data from 937 non-dedicated discard sampling days conducted by AFBINI and Cefas on a variety of vessel types (See Annex 2). We rely solely on the dedicated protected species trips to estimate bycatch rates for protected species, but the additional discard sampling days are useful to screen other fisheries and areas for protected species bycatches that may warrant further focus.

7. Discussion

The target for monitoring effort during 2013 for the dedicated protected species monitoring programme was 425 days and the achieved total was 460 days, though on 5 trips totalling 13 days no fishing was carried out because of bad weather, breakdowns or deck equipment failure. Actual sampling covered 22 trips (101 days) on pelagic trawlers and 166 trips (346 days) on static gear vessels.

Sampling in the main pelagic trawl fisheries for mackerel and herring has been reduced to a lower level than in preceding years, but continues at a relatively high level in the bass pair trawl fishery which has a known dolphin bycatch issue but where pinger use appears effective and is being monitored, and in some other smaller pelagic trawl fisheries (e.g. blue whiting, boarfish, scad) that have not been routinely sampled in the past.

Sampling of static nets covered a variety of gear types and major fishing areas. Roughly 82% of static gear sampling was in the south and west of the UK (Subarea VII), and around 18% in the North Sea (IV). Among the static gears sampled 25 days were categorized as drift nets and 321 as fixed nets.

Marine mammals recorded included grey seals, harbour porpoises, and common dolphins as well as one bottlenose dolphin, two striped dolphins and two *Lagenorhychus* dolphins, probably one white beaked and one white sided dolphin. The observations of these latter three species are the first recorded under the UK protected species observer programme, bringing the total number of cetacean species recorded since 1995 to eight (others were Risso's dolphin and minke whale). The only marine mammal bycatches observed in pelagic trawls in 2013 were 6 common dolphins in the bass pair trawl fishery, which we believe is most likely the total number of animals killed in this fishery in 2013. Details of estimates of bycatch of marine mammals in gillnet fisheries are given in Annex 1. For porpoises, estimates were generated for two scenarios where no pingers were used and where all vessels required to use pingers were using them correctly throughout 2013. Totals are most likely over-estimates for reasons explained in the Annex to do with extrapolation methods. Total estimates were 1917 porpoises assuming no pingers used (CV=0.126) and 1652 porpoises if all boats over 12 m used pingers correctly (CV=0.147). Additionally, around 322 (CV=0.95) common dolphins and 469 seals (CV=0.117) were estimated killed in all UK gillnet fisheries. Caveats apply (see Annex 1) to these estimates, which are broken down further in Annex 1 by métier and by area.

We note that our estimates in Annex 1 are highly dependent on assumptions made about gillnet fishing effort per day at sea. The only reliable measures of effort in the official logbook data is the number of days at sea or days fished. We have estimated bycatch based on the number of animals observed caught per fishing operation (haul). In order to raise our observations to the fleet level we need to estimate actual fishing effort (number of hauls) and apply this to the reported number of days at sea by fishery stratum. This is not a straightforward task, but one that could be greatly assisted by careful analysis of existing and ongoing observer data. On board observer programmes would seem the only reliable way to sample fishing fleets in order to be able to estimate functional fishing effort rather than relying on much cruder statistics available from the logbook data.

At least six species of seabird were also recorded bycaught in 2013. Several species of shark were also recorded, including basking shark, porbeagle shark, thresher shark, tope and six-gilled shark. Twaite and unidentified shad species were also reported. These observations are summarized below in Table 7.1 by ICES Divisions and Table 7.2 by gear type.

Table 7.1 – Species of possible conservation concern identified during 2013 bycatch observations-individuals by ICES Division

Species of potential conservation concern	IVa	IVb	IVc	VIId	VIIe	VIIf	VIIg	VIIh	Total
Seabirds									
Cormorant				1		1			**2**
Fulmar					1				**1**
Gannet	2								**2**
Guillemot				12	8	1			**21**
Razorbill				11					**11**
Sea gull spp.	7								**7**
Sharks									
Basking shark					1		1		**2**
Blue Shark					4	4	18	1	**27**
Porbeagle						2	12	1	**15**

Shark spp.	1								**1**
Six-gilled shark							2		**2**
Thresher shark							1		**1**
Tope		1	1	3	5	4	5		**19**
Other fish									
Shad spp.				30					**30**
Twaite shad				3					**3**
Total	**10**	**1**	**1**	**60**	**19**	**12**	**39**	**2**	**144**

Table 7.2 Species of possible conservation concern identified during 2013 bycatch observations-individuals by gear type

Row Labels	**Drift net**	**Drift Trammel**	**Gill nets unspec**	**Tangle net**	**Trammel net**	**Wreck net**	**Total**
Seabirds							
Cormorant				1	1		2
Fulmar			1				1
Gannet				2			2
Guillemot	12		2	6	1		21
Razorbill	11						11
Sea Gull				7			7
Sharks							
Basking shark			1	1			2
Blue Shark			13	1	13		27
Porbeagle			4		11		15
Shark spp.				1			1
Six-gilled shark			1		1		2
Thresher shark			1				1
Tope	3	1	7	3	1	4	19
Other fish							
Shad spp.					30		30
Twaite shad					3		3
Total	**26**	**1**	**30**	**22**	**61**	**4**	**144**

We have so far refrained from trying to estimate bird bycatch rates and totals, because our perception is that this is much more ‘patchy’ than marine mammal bycatch. However, sufficient data now exist that seabird bycatch could be investigated in more detail using a statistical modelling approach. A similar approach might be attempted for some of the fish species of most conservation concern.

8. Conclusions

Sampling has focused in ICES Subarea VII, though increasing numbers of observer trips have been made in the North Sea. Annex 1 provides estimates of bycatch for porpoises in the UK North Sea fleet (267 animals), but bycatch rates have been stratified by métier and are pooled over a wider area, and we cannot therefore be confident that they are unbiased.

Bycatch estimates for porpoises are considerably higher in this report than they have been for UK fisheries in previous reports (typically around 800 per year previously). There are several reasons for this. Firstly we have this year estimated porpoise mortalities in all UK gillnet fisheries whereas in previous years we only provided estimates for fisheries where we had done sufficient sampling. This year's estimates are therefore possibly less reliable, because we have extrapolated observed bycatch rates to all peripheral areas. It is likely that we have overestimated bycatch rates in some of these areas, notably in VIId where observed bycatch rates remain lower than in the rest of subarea VII and where porpoise densities may be lower too. Secondly it appears that porpoise bycatch rates may have increased – at least in Subarea VII over the past decade. This may be partly linked to the third reason why total annual mortality estimates are larger than before, which is that in recent years we have observed porpoise bycatches in some fisheries (e.g. drift nets and light gillnets for flatfish such as sole) which in previous years we may not have sampled at a level that would lead to a high likelihood of observing a bycatch. These métiers were therefore excluded from our previous estimates. The UK total of around 1600-1900 porpoise per year suggested by the present analysis is probably still an overestimate because of the way we have extrapolated our observations to the fishing fleet level, using porpoise bycatch per haul with estimates of the number of hauls per day at sea based on our observations. There may be a bias in this process which will require some further analysis. Nevertheless these figures provide a conservative likely maximum for porpoise bycatch in all UK gillnet fisheries, which should be compared with similar figures for neighbouring EU member states in order to provide an adequate assessment of the conservation threats to porpoises in EU waters.

Bycatch estimates for common dolphins in UK fisheries in 2013 include 6 for the bass pair trawl fishery, and around 320 in static net fisheries. DDD pingers are still being used voluntarily in the bass pair trawl fishery, but are not used all the time, but mostly when the skipper or crew believe they are in an area where dolphins are prevalent. This makes rigorous testing of their efficacy extremely difficult, though we note that dolphin bycatch rates are a fraction of what they were before pingers were used regularly in this fishery.

Seal bycatch totals in static net fisheries are estimated at around 470 individuals, mostly grey seals and mostly in Subarea VII. Estimates for preceding years have been of a similar magnitude. Given the relatively low pup production for seals in southern Ireland, Wales, Cornwall and France, it is difficult to see how this level of removal can be occurring solely from seal populations breeding locally. It is feasible that fisheries in the Celtic Sea are also taking seals from breeding colonies further afield, possibly in Scotland where breeding numbers continue to increase.

Annex 1: Estimating Bycatch Totals in UK gillnet fisheries

We have not provided estimates of bycatch in Table 6.1 because we do not believe these will be useful or realistic. Among the 117 metiers listed in Table 5.2 for example, bycatch of cetaceans was recorded in just nine metiers in 2013; extrapolating estimates within these metiers using data from 2013 will produce small and unrealistic bycatch estimates at the metier level, with large CVs, and furthermore would ignore information collected in previous years. Here, instead, we explore likely levels of cetacean bycatch throughout UK gillnet fisheries based on data going back to 2000. This analysis should be treated as preliminary, and is presented here to demonstrate our current and evolving understanding of the issues, which are likely to change as further analyses are carried out and as more data are collected.

In our previous 812/2004 annual report (Northridge *et al* 2013) we noted that ongoing statistical analysis had suggested a possible increasing trend in porpoise bycatch rate over time since the present sampling programme began in 2005. Re-analysis of the data up to 2013 supports this impression, though the trend is difficult to quantify at this time.

Analysis of porpoise bycatch rate data – modelling approach

We used observations from 10008 static net hauls made between 2000 and 2013 collected from 13 ICES Divisions and combined into 7 notional metiers that are based on combinations of target species and net type. We have isolated 3117 hauls on which pingers were deployed or where critical data were missing. There were 6891 unpingered hauls.

A series of Generalised Additive Models (GAMs) was run to explore the existing data, and Akaike Information Criterion (AIC) values were used to determine the best fitting models using 10 parameters as listed in Table A1.1 below. AIC scores provide a measure of the relative quality of a statistical model by comparing the goodness of fit with model complexity and thus provides a useful means for model selection. Two drift net metiers were combined due to low sample sizes, and the 13 ICES Divisions were also grouped into 7 larger areas (Northern North Sea, North Sea, Eastern Channel, Cornwall, Irish Sea, West of Scotland and 'Offshore'). Vessels were also categorised by length, with boats over 12 m being classed as 'big boats' and those under 12 m as 'small boats'.

Table A1.1: GAM results for 10 competing single factor models to explain porpoise bycatch rate (number of porpoises per haul)

Model	Degrees of Freedom (DF)	AIC	Difference from lowest AIC (Δ-AIC)
Fleet length	2.900	1022	0.000
Vessel length	4.000	1028	5.382
Metier (6 levels)	6.000	1056	33.068
Month	7.885	1060	37.562
ICES Divisions	13.000	1064	41.943
Big or Small boat (12m)	2.000	1066	43.927
Pooled ICES Division	7.000	1076	53.964
Year	9.000	1078	55.372
Smoothed year	2.001	1078	55.575
Pingered net	2.000	1082	59.360

Among single factor models, net fleet length (fleet length – the length of netting in a single haul) was the best fitting model. The results also suggest that grouping ICES Divisions in the way we did does not help, that metier as described is a less effective predictor of bycatch rate (number of porpoises per haul) than straightforward net fleet length, that year is not important as a single factor and neither is the presence or absence of a pinger.

This preliminary model helps us to identify a single overriding factor that looks likely to explain much of the variation in bycatch rates. It is noteworthy that boat length category and pinger use have little power to explain catch rates, emphasising the need for multi-factor models, where interactions between some of these variables are considered.

A series of two and three factor models was therefore also tested. Results for the different models are provided in Table A1.2 below:

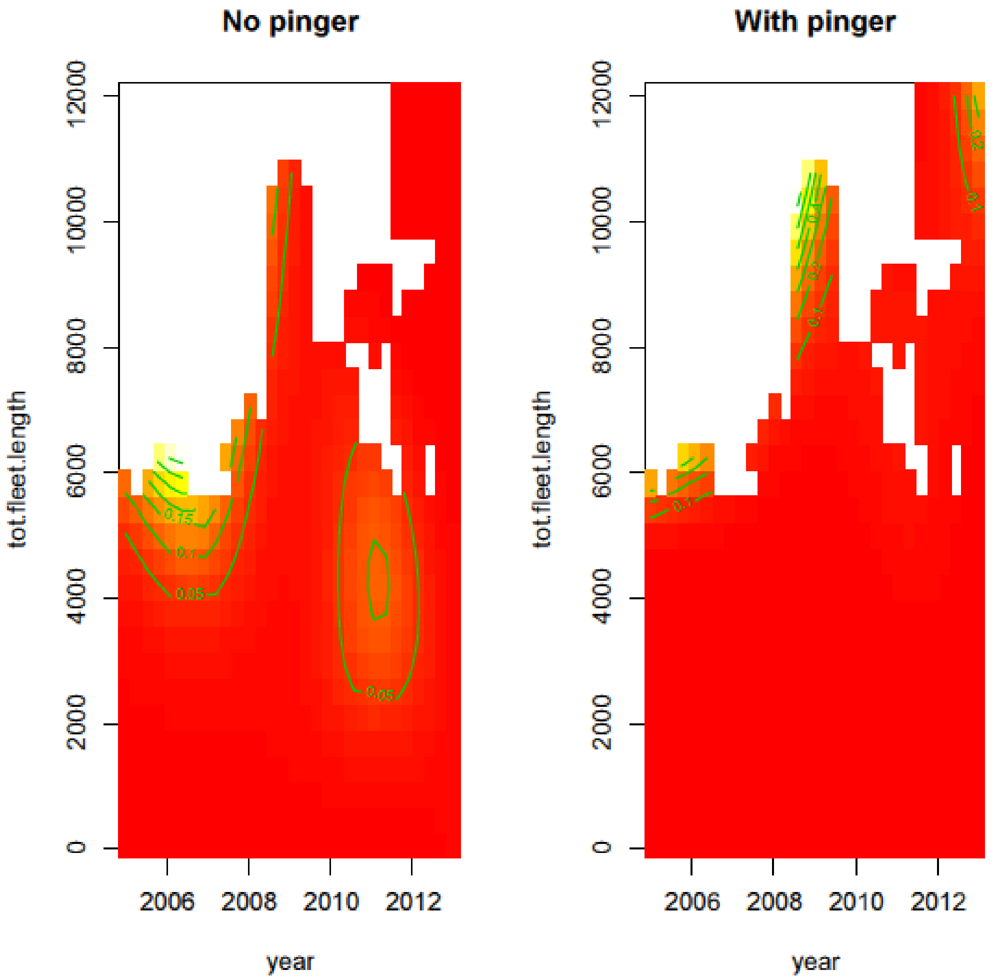
Table A1.2 results of multi-factor GAMs for porpoise bycatch rate

Model	DF	AIC	Δ-AIC
Fleet length.by.syear.pinger.k	19.132	948.4	0.00
Fleet length.by.pinger.smonth.k	16.584	955.3	6.90
Fleet length.by.syear.k	13.862	974.8	26.33
Fleet length.smonth.k	16.079	975.4	26.98
Fleet length.by.pinger.k	9.617	976.8	28.35
Fleet length.by.syear	12.830	977.9	29.52
Fleet length.by.smonth.k	15.912	986.9	38.47
Fleet length.by.smonth.pinger.k	15.324	988.5	40.04
Fleet length.syear.k	15.490	989.0	40.54
Fleet length.by.pinger	4.954	990.7	42.26
Fleet length.smonth	10.182	992.8	44.34
Fleet length.by.smonth	9.484	996.5	48.12
Fleet length.ices.pooled	8.846	1005.9	57.50
Fleet length.by.ices.pooled	15.526	1014.8	66.35
Fleet length.by.metier.pooled	13.255	1015.7	67.28
Fleet length.pinger	3.911	1016.5	68.03
Fleet length	2.900	1022.5	74.07
Fleet length1	2.900	1022.5	74.07
Fleet length.syear	3.907	1023.0	74.61
Fleet length.metier.pooled	7.851	1024.7	76.29
boat.size	4.000	1027.9	79.45
Metier	6.000	1055.6	107.13
Smonth	7.885	1060.1	111.63
ices.division	13.000	1064.4	116.01
big.boat	2.000	1066.4	117.99
ices.pooled	7.000	1076.5	128.03
Year	9.000	1077.9	129.44
Syear	2.001	1078.1	129.64
Pinger	2.000	1081.8	133.43

The best fitting model among these tested is one that included net fleet length (which features in all the best fitting models) and year with different surfaces for pingers being present or absent. Month also features in some of the better fitting models.

Interpreting these results is not straightforward, but it appears that net fleet length is a key factor in predicting catch rate, and is more important than the metier, and that within this framework there have been changes in the catch rate by year (which may suggest a change in porpoise distribution, a change in foraging behaviour or subtle changes in gear configurations not revealed by our metier descriptions), and there are differences too depending on whether or not pingers have been used (as one might expect). Plotting the predicted surfaces demonstrates the effect of year and pinger on bycatch rate by net length (Figure A1.1).

Figure A1.1: Model predicted surfaces of porpoise bycatch rate in relation to year and fleet length in pingered and unpingered nets. Note that lighter shades (yellow/orange) represent higher bycatch rates.



In these plots lighter (yellow / orange) areas are those with higher bycatch rates. There appear to have been two episodes of higher bycatch among the unpingered net fleets, one centred around 2007 among net fleets of at least 4 km in length, and a second centred around 2011 involving unpingered net fleets of between 2 km and 6 km in length. Among net fleets with pingers, higher bycatch rates are only associated with longer net fleets – those over 4 km where it is likely pingers were only attached to buoy ropes at either end of the net fleets.

Further work is needed to explore these data in more detail, but for now we can conclude that net fleet length is a key variable, that pingers have a significant effect on bycatch and that there seems to be an effect of year on the bycatch rate when net fleet length is also taken into account.

On this basis we have tried to estimate the bycatch rate of porpoises (and seals and dolphins) for the entire UK gillnet fleet for 2013, based on official logbook records of fishing effort (days at sea), and our interpretation of the likely metier based on: (1) the most valuable of the species landed on a trip by trip basis and (2) any additional information on net type from the logbook data for that trip.

Estimation of fishing effort – number of hauls per day

Our bycatch rates are recorded in terms of the number of animals per haul, so in order to extrapolate to the fishing fleet we must also know the number of net fleet hauls per day at sea for each recorded trip. These data (hauls per day) are not recorded in the logbook or landings data, so we have to estimate them from our observer data. Further modelling of the observer data suggests that a good way to predict the number of hauls per day is to split recorded trips into single and multiday trips. Single day trips are typically made by boats under 12 m in length, while multiday trips usually involve boats of over 12 m in length. Several models were tested including metier, trip type (multi or single day) and ICES Division. The best fitting model predicted the number of hauls per day at sea among observed trips on the basis of the metier and trip type. The predicted number of hauls per day by metier (drift nets pooled) and by vessel category is shown below:

Table A1.3 Predicted Hauls Per Day from Observed Trips

METIER	SINGLE DAY	MULTIDAY
DRIFT	3.4	0.8
GILL	5.9	3.9
GILL HAKE	NA	2.1
GILL LIGHT	5.1	2.1
GILL FLAT	5.1	4.0
TANGTRAM	4.9	2.7

There were no single day trips observed for the hake net metier. Note that the number of hauls per day is generally <u>less</u> for multiday trips compared with single day trips. This is partly because multiday trips may involve more time spent travelling to and from fishing grounds, but probably more importantly because for some of the metiers at least (tangle and hake netting in particular) larger vessels tend to use much longer net fleets. The net fleet length difference is less pronounced for gillnets set for pollack, cod and other whitefish. The implications of these predicted differences in the number of hauls per day at sea in different trip categories are very important, and remain to be fully explored. The uncertainty associated with these estimates of hauls per day should also be quantified and included in bycatch estimation but for now we have treated these as unbiased and precise estimates of the haul per day rate.

Porpoise bycatch estimation

Previous analysis suggested that the observed porpoise bycatch rate is higher in more recent years than in the earlier years of sampling. To avoid under-estimating current porpoise bycatch levels we have therefore used just the most recent four years of data (2010-2013) to estimate porpoise bycatch rates for the six metiers that we have been using to calculate bycatch totals. This results in slightly higher estimates of porpoise bycatch per haul than is the case if we use all nine years' data, but because of the apparent increasing trend these later estimates are likely to be less biased for estimating current total mortalities, though by selecting only the most recent years we lose some precision. Note that since 2010 we have only observed 4 unpingered hauls in the hake fishery, which has had a previously high underlying bycatch rate, so for this metier alone we have used data from the entire nine year time series to estimate unpingered bycatch rates for 2013.

Table A1.4 provides the observed bycatch rates by metier for the nine year and for the more recent four year time series. Note that bycatch rates are slightly higher in most cases in the later period. Note also that the Standard Errors and Confidence Limits on these estimates are larger for the more recent time series reflecting a decrease in precision because of fewer data points. Porpoise bycatch rates are also presented as bycatch per 100 hauls in column 4 to ease interpretation.

Table A1.4 – Observed bycatch rates for porpoises in 6 gillnet metiers – All UK vessels observed. Two time periods are shown – Most recent four years and nine years since 2005

Metier	Observed Hauls	Porpoises	Porpoises / 100 Hauls	Bycatch Rate	Standard error	95% LCL (2-Sided)	95% UCL (2-Sided)	95% UCL (1-Sided)
2010-2013 Series								
Drift net	126	2	1.587	0.0159	0.0112	0.0019	0.0562	0.0491
Gill	475	5	1.053	0.0105	0.0047	0.0034	0.0244	0.0220
Gill hake	4	0	*0.000* [a]	*0.0000*	*0.0000*	*0.0000*	*0.6024*	*0.5271*
Gill light	250	3	1.200	0.0120	0.0089	0.0025	0.0347	0.0307
Gill flatfish	442	1	0.226	0.0023	0.0023	0.0001	0.0125	0.0107
Tangle / Trammel	1855	45	2.426	0.0243	0.0042	0.0178	0.0323	0.0310
Totals	3152	56						
2005-2013 Series								
Drift net	192	2	1.042	0.0104	0.0073	0.0013	0.0371	0.03243
Gill	1296	14	1.080	0.0108	0.0031	0.0059	0.0181	0.01684
Gill hake	267	13	*4.869* [a]	*0.0487*	*0.0142*	*0.0026*	*0.0818*	*0.07630*
Gill light	604	3	0.497	0.0050	0.0037	0.0010	0.0144	0.01279
Gill flatfish	939	1	0.106	0.0011	0.0011	0.0000	0.0059	0.00504
Tangle / Trammel	3593	64	1.781	0.0178	0.0025	0.0137	0.0227	0.02189
Totals	6891	97						

a) Values for porpoise bycatch rate used in predictions for hake metier are from 2005 onwards.

Bycatch rates appear to have increased in some metiers or regions over the nine year time period, but it is also worth pointing out that sampling rates in some metiers (driftnets and gillnets for flatfish: mainly sole nets) was relatively low in the first 5 years, and in some cases best estimates for bycatch in these metiers was zero. With increased sample sizes we are now able to better estimate bycatch rates in these metiers.

Bycatch totals have then been produced by applying the observed bycatch per haul rates we have estimated (as described above) to the logbook records of days at sea and gear type (stratified by assumed metier based on an assessment of landings records).

Porpoise bycatch mortality estimates for 2013 are presented in Table A1.5 for each of the 6 metiers at a UK level, and for all metiers combined by ICES Division in Table A1.6. Data are too sparse to generate tailored estimates of bycatch by metier and by division using observed metier/division bycatch rates, so we have applied bycatch rates here assuming the overall rates by metier can be used to predict bycatch in each and every division.

We do not ignore the potential effects that the use of pingers may have on estimated bycatch totals. All over 12 m vessels fishing in VIIdefghj are now required to use pingers, and we know that if used correctly (i.e. pingers at either end of net fleets less than 4 km in length or on net fleets over 4 km pingers are positioned so that no part of the net fleet is more than 2 km from an active pinger) bycatch rates should be reduced by around 90%. We cannot say, however, whether all relevant boats are using pingers in the way that has been agreed. We have therefore also estimated bycatch rates and total bycatch numbers for 2013 under two scenarios. Firstly we assumed no pingers are being used properly or at all; this provides a worse case or background scenario (Tables A1.5 and A1.6). Then, based on predicted bycatch rates from observed pingered hauls, where 'pingered' hauls only include those that were net fleets of 4 km or less in length, we estimated bycatch totals assuming all relevant vessels in the over 12 m fishing fleet were using pingers in the agreed way (Tables A1.7 and A1.8). This represents a best case scenario under the current legislation.

Table A1.5: Estimated total mortality for porpoises in 2013 by Metier – assuming no pingers

Metier	Estimated total 2013	LCL (2-Sided)	UCL (2-Sided)	UCL (1-Sided)
Drift demersal	52	6.4	183.7	160.7
Drift pelagic	40	4.8	141.1	123.4
Gill	266	86.7	617.2	556.8
Gill hake	88	47.2	147.5	137.5
Gill light	529	111.1	1525.6	1352.2
Gill flatfish	130	4.3	714.7	609.3
TangTram	812	598.0	1076.8	1033.1
TOTALS	1917 (CV=0.126)	858.3	4407	3973

Table A1.6: Estimated total mortality for porpoises in 2013 by ICES Division – assuming no pingers. (see text for further explanation)

ICES DIVISION	TOTAL MORTALITY	95% LCL	95% UCL	95% 1-sided UCL	Under 12 m boats	Over 12 m boats	% due to over 12 m boats
IVa	**56**	**41.2**	**75.0**	**72.0**	**0.0**	**56.3**	**100%**
IVb	**31**	**14.4**	**64.9**	**59.2**	**26.7**	**4.7**	**15%**
IVc	**179**	**59.4**	**488.5**	**434.4**	**178.2**	**0.8**	**0%**
VIb	**15**	**10.7**	**19.6**	**18.8**	**0.0**	**14.7**	**100%**
VIIa	34	10.3	89.4	79.8	33.3	0.6	2%
VIId	**487**	**138.3**	**1504.3**	**1324.9**	**487.4**	**0.1**	**0%**
VIIe	543	260.4	1149.1	1044.1	510.0	32.9	6%
VIIf	359	201.1	658.0	606.7	330.6	28.4	8%
VIIg	116	63.4	204.7	189.7	25.6	90.8	78%
VIIh	48	28.7	79.6	74.2	3.4	44.5	93%
VIII	**18**	**11.8**	**26.2**	**24.8**	**0.0**	**17.8**	**100%**
VIIj	30	18.7	47.5	44.6	0.0	30.1	100%
TOTAL	1917	858	4407	3973	1595	322	17%

The effects of pinger use on porpoise bycatch totals – a preliminary analysis

In order to better explore the effects of Regulation 812/2004 on porpoise mortality rates, we have also split our estimates into vessels over and under 12 m (a day trip and multiday trip stratum was also maintained during bycatch estimation but is not displayed). This could help identify the extent of the effectiveness of the policy whereby only over 12 m boats are required to use pingers, and is discussed further below. Table A1.6 shows that the contribution of over 12 m boats to porpoise mortality varies widely by region. In several regions all or most porpoise mortality is due to the over 12 m sector (IVa, VIb, VIIh, VIII, VIIj). But the largest estimated mortality rates are in other areas, dominated by smaller vessels, notably in VIIdefg and IVc.

It must also be stressed that these estimates are derived from non-area specific observations. In other words bycatch rates observed throughout the sampling area have been applied at a metier level in all areas. Some areas, like VIb, have yielded no observations of porpoise bycatch at all, and given the depth of water in this Division, porpoise bycatch may indeed be more unlikely here. The North Sea has not been as well sampled since 2005 as Subarea VII, so estimates for the North Sea (IVabc) may be less reliable. Bycatch observations are also limited so far in VIId, where it is thought that porpoise densities are also lower than in much of the rest of

Subarea VII, casting doubt on the accuracy of the predicted bycatch total for that area. The areas where bycatch totals are likely be most inaccurate are in bold in Table A1.6.

Tables A1.5 and A1.6 provide the first comprehensive estimates of porpoise bycatch in UK waters, on the assumption that no pingers are being used, though the caveats described above should be borne in mind, and these results should be regarded as no more than preliminary indications at present.

Monitoring of the over 12 m sector in Subarea VII in recent years has enabled us to predict the effect of pinger use in this fleet segment. As noted above, we do not know how comprehensively pinger requirements are being implemented in this fleet, but we can estimate what should be the case at present, assuming all over 12 m boats are using DDD pingers on net fleets that are no more than 4 km in length, or on longer net fleets where pingers are no more than 4 km apart.

Because relatively few porpoises (just 2) have been observed bycaught in nets of less than 4 km that were using pingers, we have had to make assumptions about how the bycatch rate in some of the metiers where we have no bycatch observations might have been reduced. A weighted regression approach was used to model bycatch rate by metier with and without pingers and predicted bycatch rates were drawn from the regression model and applied to metiers where zero bycatch was observed.

Bycatch estimates for porpoises by metier were generated assuming all over 12 m boats were using pingers in 2013. In this model we assumed for simplicity that this rule applied equally to all areas, whereas in fact the regulation only applies to Divisions VIIdefghj and Subarea IV, though these areas account for most of the porpoise bycatch by over 12 m boats.

Results are presented in Table A1.7 along with the number of porpoises likely to have been saved under this scenario.

Table A1.7: Estimates of porpoise bycatch by metier assuming all over 12 m boats are using pingers 'correctly', with difference in terms of reduced bycatch over base scenario (no pingers)

Metier	Mortality estimate	95% LCL	95% UCL	95% UCL (1-sided)	Porpoises 'saved'
Drift demersal	51.92	6.3	183.7	160.7	0
Drift pelagic	39.89	4.85	141.1	123.4	0
Gill	227.98	71.93	579.4	518.2	38
Gill hake	21.49	5.04	208.5	175.6	66
Gill light	519.62	108.7673	1997.1	1759.1	10
Gill flatfish	129.71	4.26	729.2	621.7	0
TangleTrammel	661.08	467.82	1019.9	958.3	151
TOTALS	1652 (CV=0.147)	669	4859	4317	265

Table A1.8: Estimated total mortality for porpoises in 2013 by ICES Division – assuming pingers.

ICES DIV	Estimate	LCL	UCL	UCL-1-sided	Under 12 m	Over 12 m	% due to over 12 m boats
IVa	8.70	0.09	57.10	48.30	0.00	8.70	100%
IVb	27.42	12.90	61.00	55.20	26.70	0.72	3%
IVc	178.36	59.10	487.80	433.70	178.25	0.12	0%
VIb	2.26	0.02	14.90	12.60	0.00	2.27	100%
VIIa	33.44	9.90	89.20	79.60	33.35	0.09	0%
VIId	487.38	138.20	1504.0	1324.80	487.37	0.01	0%
VIIe	519.27	246.20	1343.0	1208.40	509.95	9.32	2%
VIIf	334.94	186.70	920.00	829.30	330.55	4.39	1%
VIIg	40.52	11.60	239.80	204.90	25.65	14.87	37%
VIIh	11.96	4.10	72.20	61.90	3.39	8.57	72%
VIII	2.76	0.01	26.10	22.00	0.00	2.76	100%
VIIj	4.66	0.02	43.30	36.30	0.00	4.66	100%
Totals	1651.67	668.84	4858.4		1595.21	56.46	3%

Overall, our present model suggests that up to about 265 fewer porpoises may have been killed in 2013 as a result of pinger use, assuming complete compliance. This is about 14% of the total number of mortalities that was predicted under the base scenario.

However, it is likely that these figures do not provide a particularly accurate assessment of underlying porpoise mortality rates because (1) we have not yet fully assessed the underlying spatial differences in bycatch rates and more importantly because (2) our extrapolations have assumed that the bycatch rate per haul is vessel size and metier dependent, and not net fleet length dependent. Thus under 12 m vessels making day trips were assumed to catch the same number of porpoises per haul as over 12 m vessels making multi-day trips, despite the fact that we have estimated smaller vessels (day trippers) to haul more than twice as many net fleets per day as the multi-day trip sector.

Our initial attempts to address this concern have yet to bear fruit, and we will need to investigate the observed fishing fleet and haul data in much more detail before we can fully address this concern and properly allocate fishing effort per day at sea to the unobserved fleet. It is clear however that we have almost certainly *over-estimated* the impact of the under 12 m sector in terms of the numbers of porpoises being killed, and as a consequence will have underestimated the impact of pingers in terms of the proportion of animals that may currently be being 'saved' from bycatch.

Dolphin and Seals Bycatch Estimates

We have also estimated bycatch rates and 2013 bycatch totals for seals and common dolphins. We found no evidence (yet) for any annual trend in bycatch for either of these species so we have used the entire data set covering the nine years from 2005 to 2013, but excluding pingered hauls. We do not know yet if pingers have affected bycatch rates for these species (decreased or increased) so consider it prudent to filter out any observations made when pingers were used, and to predict bycatch totals assuming pingers have no effect.
In the following tables we have not separated out grey and common seals. We assume the vast majority, if not all seals caught in Subarea VII are grey seals, but those in IV and VI may be either species, and we do not have sufficiently detailed observations to confidently speciate the results for those areas.

We have not considered bycatch rates for other species (bottlenose dolphin, Risso's dolphin, striped dolphin, white-beaked dolphin, white-sided dolphin, pilot whale or minke whale) as observed bycatch rates appear to be too low to say anything more useful at this time than that these species are relatively rarely caught.

Table A1.9: Common dolphin bycatch rates in non pingered hauls 2005 – 2013 by metier

Metier	Observed Hauls	Dolphins	Dolphins / 100 Hauls	Bycatch Rate	Standard error	95% LCL (2-Sided)	95% UCL (2-Sided)
Drift	192	0	0	0	0	0.01903	0.015482
Gill	1296	3	0.002351	0.001335	0.0004776	0.00675	0.005972
Gill hake	267	6	0.022472	0.009087	0.0082904	0.048268	0.043869
Gill light	604	0	0	0	0	0.006089	0.004948
Gill light flat	939	0	0	0	0	0.003921	0.003185
TangleTrammel	3593	24	0.00668	0.001757	0.0042843	0.009923	0.009381
Totals	6891	33					

Table A1.10: Estimates of common dolphin bycatch in gillnets by metier 2013 UK gillnet fleet

Metier	Estimated total bycatch	LCL (2-Sided)	UCL (2-Sided)	UCL (1-Sided)
Drift demersal	0	0	62.24	50.64
Drift pelagic	0	0	47.82	38.9
Gill	58.57	12.09	170.8	151.11
Gill hake	40.5	14.94	87	79.07
Gill light	0	0	267.6	217.44
Gill flatfish	0	0	223.15	181.29
Tangle Trammel	223.41	144.73	329.93	312.14
Totals	322 (CV=0.095)	172	1189	1031

Table A1.11 Estimates of common dolphin bycatch in gillnets by Division 2013 UK gillnet fleet

ICES DIVISION	Estimate	LCL	UCL	UCL-1-sided
IVa	15.506	9.95	23.03	21.77
IVb	6.733	2.83	18.63	16.5
IVc	18.97	9.62	133.69	112.5
VIb	4.04	2.59	6	5.67
VIIa	1.96	1.16	17.9	14.94
VIId	38.677	19.41	383.74	319.61
VIIe	94.04	52	293.03	256.95
VIIf	74.11	41.9	172.64	155.09
VIIg	38.79	16.53	85.3	77.25
VIIh	14.38	8.07	26.3	24.252
VIII	5.89	3.05	10.58	9.789
VIIj	9.36	4.63	17.66	16.247
TOTAL	322	172	1189	1031

Table A1.12 Seal bycatch estimates by metier and by ICES Division

STRATUM:	**Estimate**	**LCL**	**UCL**	**UCL-1-sided**
BY METIER				
Drift demersal	0	0	62.24	50.64
Drift pelagic	0	0	47.82	38.9
Gill	19.52	0.4943	108.59	92.49
Gill hake	0	0	24.73	20.11
Gill light	0	0	267.6	217.44
Gill flatfish	60.61	1.5345	336.88	286.96
Tangle Trammel	388.82	283.3756	521.45	499.5
BY ICES DIVISION				
IVa	29.489	22.037	38.86	37.312
IVb	6.855	4.104	17.843	15.866
IVc	30.448	16.318	149.747	127.855
VIb	6.9	4.96	9.343	8.939
VIIa	3.282	2.151	19.547	16.532
VIId	95.5	33.537	479.526	409.475
VIIe	138.555	91.55	343.232	306.239
VIIf	107.94	74.935	208.143	190.291
VIIg	21.65	16.49	53.731	47.872
VIIh	13.879	9.2	24.528	22.665
VIII	5.629	4.01	9.315	8.669
VIIj	8.828	6.094	15.502	14.329
TOTALS	469 (CV=0.117)	285	1369	1206

As with estimates provided for porpoises, further work is needed to address differences in spatial bycatch probabilities (especially for common dolphins for which distribution is skewed heavily towards the south and west of the UK) and to refine estimates of fishing effort by day at sea across the observed and extrapolated segments of the fishing fleet. Clearly further work is also required to break down the seal bycatch estimates by species. It is not yet clear how or if pingers are affecting common dolphin bycatch rates and this is another area for further work.

Annex 2: Other dedicated and non-dedicated sampling.

Other dedicated sampling of gear types not required under 812/2004 or 92/43/EEC

Table A2.1: Dedicated monitoring effort not required under 812/2004 or 92/43/EEC.

Category	Nantes type	Metier group	Target group	ICES Division	Vessels	Trips	Days at sea	Hauls	Season	Bycatch
< 15 m	FPO	Pots	Shellfish	VIIf	1	4	2	5	Apr-May	0

Five strings of lobster pots were monitored opportunistically when a vessel hauled pots during the course of a predominately netting trip. Observers are instructed to record data in such instances even though pots are not a gear type of direct interest to the bycatch monitoring programme at this time.

Non-dedicated sampling.

730 non-dedicated monitoring days were conducted during 2013 on a variety of demersal trawl gear types under the English and Northern Irish discard sampling programmes (Table A2.2). These data are not incorporated into our annual marine mammal bycatch estimates because we cannot be sure that all bycatches would have been seen or recorded by discard officers as they have different work patterns and commitments while on deck compared with dedicated bycatch observers. Nevertheless these data are summarised and included in the report because they provide an initial insight into the potential for cetacean bycatch to occur in gear types not routinely covered by dedicated monitoring under 812/2004 and the Habitats Directive.

207 non-dedicated monitoring days were conducted during 2013 in a variety of static net fisheries under the English and Northern Irish discard sampling programmes (Table A2.2). It is worth noting that no cetacean bycatches were recorded despite the fact that many of the fisheries sampled are the same as those sampled by dedicated observers under the bycatch programme and from which we have several records of cetacean bycatch occurring in 2013 (26 in 2013). A similar pattern was evident in 2011 and 2012.

Although a relatively crude comparison which isn't stratified by specific net type and area, it is worth highlighting the fact that between 2011 and 2013, 80 cetacean bycatches were recorded from 3220 monitored static net hauls under the dedicated bycatch programme. Over the same period only 1 cetacean bycatch was recorded from 1422 sampled static net hauls under the discard sampling programmes. Based on these figures the overall bycatch rate calculated from dedicated monitoring (.025 per haul) is thirty-six times higher than the rate calculated using non-dedicated observations (.0007). This finding emphasises the importance of designing and optimising monitoring programmes specifically for purpose, in this case for protected species bycatch monitoring.

Table A2.2: Non-dedicated sampling conducted by collaborating institutions under DCF and other programmes.

Gear Group	Gear Type	Area	Target	Days	Hauls	Dolphins	Porpoise	Contractor
Demersal Trawl	Beam	IVC	Shrimp	12	51	0	0	Cefas
Demersal Trawl	Beam	VIID	Dover sole	4	16	0	0	Cefas
Demersal Trawl	Beam	VIIE	Anglerfish	6	28	0	0	Cefas
Demersal Trawl	Beam	VIIE	Cuttlefish	23	200	0	0	Cefas
Demersal Trawl	Beam	VIIE	Dover sole	31	240	0	0	Cefas
Demersal Trawl	Beam	VIIE	Megrim	24	126	0	0	Cefas
Demersal Trawl	Beam	VIIF	Anglerfish	9	36	0	0	Cefas
Demersal Trawl	Beam	VIIF	Dover sole	9	90	0	0	Cefas
Demersal Trawl	Beam	VIIF	Megrim	7	38	0	0	Cefas
Demersal Trawl	Beam	VIIG	Anglerfish	17	75	0	0	Cefas
Demersal Trawl	Beam	VIIG	Megrim	7	38	0	0	Cefas
Demersal Trawl	Beam	VIIH	Anglerfish	11	43	0	0	Cefas
Demersal Trawl	Beam	VIIH	Cuttlefish	5	21	0	0	Cefas
Demersal Trawl	Beam	VIIH	Megrim	17	88	0	0	Cefas
Demersal Trawl	Dredge	VIIA	Scallop	12	110	0	0	AFBINI
Demersal Trawl	Dredge	VIIE	Scallop	7	49	0	0	Cefas
Demersal Seine	Fly Seine	VIIA	Whitefish	6	28	0	0	AFBINI
Demersal Trawl	Midwater Demersal	VIIA	Whitefish	33	58	0	0	AFBINI
Demersal Trawl	Otter	IVB	Cod	1	2	0	0	Cefas
Demersal Trawl	Otter	IVB	Whiting	3	7	0	0	Cefas
Demersal Trawl	Otter	IVC	Bass	1	5	0	0	Cefas
Demersal Trawl	Otter	IVC	Cod	4	6	0	0	Cefas
Demersal Trawl	Otter	IVC	Dover sole	1	4	0	0	Cefas
Demersal Trawl	Otter	VIIA	Queen Scallop	10	43	0	0	AFBINI
Demersal Trawl	Otter	VIIA	Plaice	2	6	0	0	Cefas
Demersal Trawl	Otter	VIID	Lemon sole	2	5	0	0	Cefas
Demersal Trawl	Otter	VIID	Plaice	1	1	0	0	Cefas
Demersal Trawl	Otter	VIIE	Bass	2	3	0	0	Cefas
Demersal Trawl	Otter	VIIE	Brill	2	2	0	0	Cefas
Demersal Trawl	Otter	VIIE	Cuttlefish	2	6	0	0	Cefas
Demersal Trawl	Otter	VIIE	Haddock	1	2	0	0	Cefas
Demersal Trawl	Otter	VIIE	John Dory	1	2	0	0	Cefas
Demersal Trawl	Otter	VIIE	Lemon sole	9	25	0	0	Cefas
Demersal Trawl	Otter	VIIE	Megrim	1	2	0	0	Cefas
Demersal Trawl	Otter	VIIE	Ray	2	10	0	0	Cefas
Demersal Trawl	Otter	VIIE	Squid	1	3	0	0	Cefas
Demersal Trawl	Otter	VIIF	Ray	4	10	0	0	Cefas
Demersal Trawl	Otter	VIIG	Ray	4	10	0	0	Cefas
Demersal Seine	Seine	VIIA	Nephrops	4	27	0	0	AFBINI
Demersal Trawl	Single Nephrops	IVB	Nephrops	10	12	0	0	Cefas
Demersal Trawl	Single Nephrops	VIA	Nephrops	4	13	0	0	AFBINI
Demersal Trawl	Single Nephrops	VIIA	Nephrops	90	399	0	0	AFBINI & Cefas
Demersal Trawl	Twin Nephrops	IVB	Nephrops	1	2	0	0	Cefas
Demersal Trawl	Twin Nephrops	VIA	Nephrops	43	85	0	0	AFBINI
Demersal Trawl	Twin Nephrops	VIIA	Nephrops	242	817	0	0	AFBINI
Demersal Trawl	Triple Nephrops	VIIA	Nephrops	1	2	0	0	AFBINI
Demersal Trawl	Twin Otter	IVB	Nephrops	2	5	0	0	Cefas
Demersal Trawl	Twin Otter	IVC	Dover sole	2	9	0	0	Cefas
Demersal Trawl	Twin Otter	VIIE	Alfonsino	1	2	0	0	Cefas
Demersal Trawl	Twin Otter	VIIE	Cuttlefish	3	8	0	0	Cefas
Demersal Trawl	Twin Otter	VIIE	Haddock	7	22	0	0	Cefas
Demersal Trawl	Twin Otter	VIIE	Lemon sole	3	7	0	0	Cefas
Demersal Trawl	Twin Otter	VIIE	Megrim	4	10	0	0	Cefas
Demersal Trawl	Twin Otter	VIIE	Plaice	1	2	0	0	Cefas
Demersal Trawl	Twin Otter	VIIE	Squid	1	2	0	0	Cefas

Demersal Trawl	Twin Otter	VIIF	Ray	3	10	0	0	Cefas
Demersal Trawl	Twin Otter	VIIH	Haddock	7	22	0	0	Cefas
Demersal Trawl	Triple Otter	IVC	Dover sole	6	20	0	0	Cefas
Drift Net	Drift	VIIA	Bass	5	6	0	0	Cefas
Drift Net	Drift	VIID	Bass	2	1	0	0	Cefas
Static Net	Gill	IVB	Turbot	5	5	0	0	Cefas
Static Net	Gill	IVC	Cod	3	8	0	0	Cefas
Static Net	Gill	IVC	Dover sole	2	7	0	0	Cefas
Static Net	Gill	VIIA	Cod	2	6	0	0	Cefas
Static Net	Gill	VIID	Dover sole	8	25	0	0	Cefas
Static Net	Gill	VIIE	Anglerfish	11	20	0	0	Cefas
Static Net	Gill	VIIE	Dover sole	3	5	0	0	Cefas
Static Net	Gill	VIIE	Ling	6	16	0	0	Cefas
Static Net	Gill	VIIE	Pollack	11	57	0	0	Cefas
Static Net	Gill	VIIF	Anglerfish	1	4	0	0	Cefas
Static Net	Gill	VIIF	Bass	1	3	0	0	Cefas
Static Net	Gill	VIIG	Hake	10	27	0	0	Cefas
Static Net	Gill	VIIG	Pollack	16	77	0	0	Cefas
Static Net	Gill	VIIH	Pollack	6	40	0	0	Cefas
Static Net	Gill	VIIJ	Pollack	8	40	0	0	Cefas
Static Net	Tangle / Trammel	IVB	Cod	2	3	0	0	Cefas
Static Net	Tangle / Trammel	IVB	Turbot	5	5	0	0	Cefas
Static Net	Tangle / Trammel	IVC	Cod	3	8	0	0	Cefas
Static Net	Tangle / Trammel	IVC	Dover sole	3	13	0	0	Cefas
Static Net	Tangle / Trammel	VIIA	Cod	2	6	0	0	Cefas
Static Net	Tangle / Trammel	VIID	Dover sole	28	75	0	0	Cefas
Static Net	Tangle / Trammel	VIIE	Anglerfish	37	54	0	0	Cefas
Static Net	Tangle / Trammel	VIIE	Ling	6	16	0	0	Cefas
Static Net	Tangle / Trammel	VIIE	Spider Crab	1	4	0	0	Cefas
Static Net	Tangle / Trammel	VIIF	Anglerfish	7	7	0	0	Cefas
Static Net	Tangle / Trammel	VIIF	Turbot	3	10	0	0	Cefas
Static Net	Tangle / Trammel	VIIG	Hake	10	27	0	0	Cefas
TOTAL				**937**	**3540**	**0**	**0**	