

Stichting DLO Centre for Fishery Research (CVO)

P.O. Box
1970 AB IJMUIDEN
Phone: 0255 564600
Fax: 0255 564765
Visitor address: Haringkade 1, IJmuiden

CVO report

Number: 07.004

Monitoring of incidental catches of cetaceans by Dutch pelagic trawlers in 2006.

A.S. Couperus

Commissioned by: Ministerie van Landbouw, Natuur en Voedselkwaliteit
Directie Visserij
T.a.v. Drs. E.A.J. Meeuwsen
Postbus 20401
2500 EK Den Haag

Project number: 439.12130.03

Approved by: Ing. S.W. Verver
Dpt. Head WOT, Centre for Fishery Research

Signature: _____

Date: 24th May 2007

Number of copies:	15
Number of pages:	17
Number of tables:	4
Number of figures:	2
Number of annexes:	2

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Summary

This report contains the results of the ongoing monitoring programme on the incidental bycatch of cetaceans in Dutch pelagic fisheries under EU Council Regulation 812/2004 for the period January to December 2006. The regulation requires 10% observer coverage in ICES area's VI, VII and VIII in the period 1 December – 31 March. In the Dutch situation the monitoring is integrated with the collection of discards data under the EC Data Collection Regulations 1543/2000 and 1639/2001. In 2006, during 5 fishing trips, lasting 87 days in total, 135 hauls were observed. (In fact 97 days and 141 hauls were covered, but part of one trip was in an area not covered by the EU regulation observer scheme).

The required period and area was covered as follows: from January to March 2 trips of 21 and 5 days, were targeting horse mackerel (*Trachurus trachurus*) and mackerel (*Scomber scombrus*) in the Channel; two trips of 21 and 17 days, were targeting blue whiting (*Micromesistius poutassou*) west of Ireland; in December one trip of 23 days targeted herring (*Clupea harengus*) and horse mackerel west of the British Isles and in the Channel. With a total 685 days for the whole fleet in the area, the coverage was 12.7%.

One bycatch incident in which one specimen of the Atlantic white-sided dolphin (*Lagenorhynchus acutus*) was involved, has been recorded in the horse mackerel - mackerel fishery. The incident occurred in a haul at night, when the trawl was hauled early in the morning while it was still dark. The catch was 70 tons of mackerel (1% horse mackerel).

The number of recorded bycatch incidents is too low to make a reliable estimate of the annual mortality. The observed bycatch rate of 0.01 dolphins per day, is in line with the findings in 2005. The EU Council Regulation itself indicates that a clear season and area of bycatch, apparently across a number of fisheries, is recognized. It is therefore recommended to report in the future under the EU Council Regulation 812/2004 by season, and not by year.

Samenvatting

Dit rapport bevat de resultaten van het doorlopende waarnemerprogramma naar de bijvangst van dolfijnen in de Nederlandse pelagische visserij onder EU Verordening 812/2004 in de periode januari tot en met december 2006. De verordening vereist dat 10% van de vlootinspanning gedekt wordt in de ICES gebieden VI, VII en VIII in de periode van 1 december tot en met 31 maart. In de Nederlandse situatie is het waarnemersprogramma geïntegreerd met het verzamelen van vangst- en discard- gegevens onder EU Verordeningen 1543/2000 en 1639/2001.

In 2006 zijn waarnemingen uitgevoerd van in totaal 135 trekken tijdens 5 visreizen van in totaal 87 dagen (de totale lengte van deze reizen bedroeg 97 dagen en 141 trekken, maar een deel van de reizen viel buiten het in de verordening bepaalde gebied en tijdsbestek). De periode en het gebied werd als volgt gedekt: van januari tot maart twee reizen van 21 en 5 dagen gericht op horsmakreel (*Trachurus trachurus*) en makreel (*Scomber scombrus*) in het Kanaal, de Golf van Biskaje en ten westen van Ierland; twee reizen, van 21 en 17 dagen, waren gericht op blauwe wijting (*Micromesistius poutassou*) bij Porcupine Bank ten westen van Ierland; een reis van 23 dagen was gericht op haring (*Clupea harengus*), horsmakreel en makreel, ten westen van de Britse eilanden en in het Kanaal. De dekking ten opzichte van de hele vloot in het gebied (685 dagen) was 12.7%.

Er werd een bijvangst-incident gerapporteerd in de visserij op horsmakreel en makreel. Hierbij werd een witflankdolfijn (*Lagenorhynchus acutus*) gevangen. Het betrof een nacht-trek, waarbij in de vroege ochtend, terwijl het nog helemaal donker was, werd gehaald. De vangst bestond uit 70 ton makreel (1% horsmakreel).

Het aantal gerapporteerde bijvangst incidenten is te laag om een betrouwbare schatting te maken van de jaarlijkse mortaliteit. De waargenomen bijvangst van 0.01 dolfijn per dag, is van dezelfde orde van grootte als in 2005.

De inhoud van EU Verordening 812/2004 geeft aan dat er sprake is van een bijvangstseizoen van december tot en met maart. Het zou derhalve voor de hand liggen om de rapportage over de voortgang van het waarnemersprogramma, in de toekomst per seizoen te laten plaatsvinden en niet per jaar.

Introduction

Council Regulation No 812/2004¹ is obliging Member States to monitor bycatches of cetaceans in certain fisheries, certain periods of the year and in certain European Waters and to report on the results of the monitoring to the European Commission. In the Netherlands, the monitoring was commissioned by the Ministry of Agriculture, Nature Conservation and Food Quality to IMARES, the former Netherlands Institute for Fisheries Research and started on 1 January 2005.

The aim of this study is to assess the incidental bycatch of cetaceans in the Dutch pelagic fisheries. This report covers the ongoing monitoring of Dutch pelagic fisheries over the period January – December 2006. Under the regulation 10% of the fleet effort in the period of 1 December till 31 March in ICES area VI, VII and VIII has to be covered. In the Dutch situation the monitoring is integrated with the collection of discards data under the EC Data Collection

¹ Council Regulation (EC) No 812/2004 of 26.4.2004 laying down measures concerning incidental catches of cetaceans in fisheries and amending Regulation (EC) No 88/98

Regulations: C.R. 1543/2000² and C.R. 1639/2001³ amended by C.R. 1581/2004⁴ (EC, 2000; EC, 2001).

Earlier studies on the incidental bycatch of cetaceans have been reported by (Couperus, 1995; Couperus, 1997; Couperus, 2006), covering the period 1992-1996 and 2004 - 2005.

Description of the fleet

A description of the Dutch pelagic fleet is given in (Couperus *et al.*, 2004). However, an important feature of the pelagic fishery is that it changes rapidly over time. These changes are caused by developments in the fish market, quota regulations and variation in the stock distribution and migration patterns over time. The number of Dutch freezer trawlers in 2006 was 14 plus two pair-trawlers. Landings from Mauritanian waters decreased from 41% in January 2003 to 29% in 2004. In 2005 the landings were 23% and in 2006 26 %, which seems to indicate stabilisation around 25% (National logbook database). Landings in 2002 were more or less equally divided between horse mackerel, herring and blue whiting and a small part mackerel. In 2004, blue whiting became more important and in 2006 the landings were dominated by blue whiting (Figure 1).

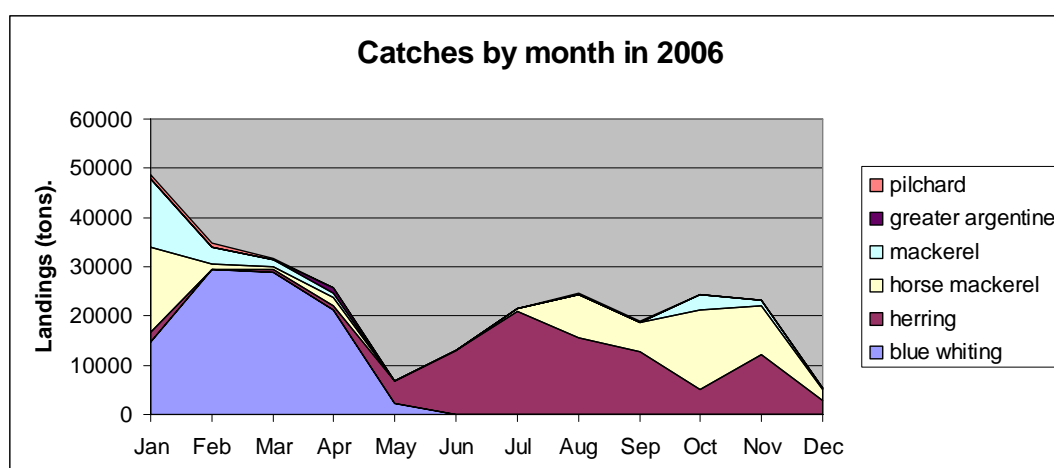


Figure 1. Registered landings from European waters by Dutch freezer trawlers in 2006.

Fishing effort in 2006

² Council Regulation (EC) No 1543/2000 of 29 June 2000 establishing a Community framework for the collection and management of the data needed to conduct the common fisheries policy

³ Commission Regulation (EC) No 1639/2001 of 25 July 2001 establishing the minimum and extended Community programmes for the collection of data in the fisheries sector and laying down detailed rules for the application of Council Regulation (EC) No 1543/2000

⁴ Commission Regulation (EC) No 1581/2004 of 27 August 2004 amending Regulation (EC) No 1639/2001 establishing the minimum and extended Community programmes for the collection of data in the fisheries sector and laying down detailed rules for the application of Council Regulation (EC) No 1543/2000

The changes in target species mentioned above, caused changes in distribution of effort. Compared to 2004 the fishing effort in 2005 and 2006 was more concentrated off the west of Ireland compared to the preceding years. The overall effort in 2006 (278.000 tons landed, 2174 fishing dayss) was somewhat lower than in 2005 (313.000 tons, 2401 fishing days). Annex 1 shows the "fish calendar" of 2006.

Methods

Observer effort

The monitoring is integrated with the collection of discards data under EC Data Collection Regulations 1543/2000 and 1639/2001 (EC, 2000, 2001), In this programme the observer effort is spread quasi random over the year. Internally the observer trips are scheduled equally over the year and observers join the first trawler that comes in. However, the choice of area and target species are often last minute decisions of the owner of the vessel and may even alter during the trip itself. Therefore it is impossible to foresee or plan the exact effort in the area that has to be monitored under EC Regulation No 812/2004.

In total, 5 trips have (partly) covered the study area and period. Table 2 provides the period and target species covered in this observer programme.

*Table 1. Period, target species and ICES areas covered during the trips conducted in this observer programme. *Number of days of the observed fishing trip; **number of days within the period and area to be covered under EC regulation No 812/2004: 1 December till 31 March, area VI, VII and VIII.*

Trip no	period	trip days*	observer days**	target species	bycatch and/or second target	ICES areas
1	2/1 to 22/1/2006	21	21	horse mackerel	mackerel	VIIb,h, j VIIIa, d
2	30/1 to 19/2/2006	21	21	blue whiting	mackerel/ horse mackerel	VIIb,c,j
3	18/2 to 7/3/2006	17	17	blue whiting	mackerel/ horse mackerel	VIb VIIc,j
4	27/3 to 8/4/2006	13	5	mackerel horse mackerel	none	VIIIa
5	29/11 to 23/12/2006	25	23	herring horse mackerel	mackerel	VIa, VIIb,d,j

According to the national logbook database, the number of fleet days in area VI, VII and VIII during season 2006 was 685. With 87 observer days the coverage was 12.7%. The overall coverage during the period was still 11.6%, showing that most vessels have been operating in area VI, VII and VIII (table 3).

Table 2. Observer coverage by area and by total fleet effort.

	coverage by area	coverage by fleet	observer days	fleetdays total	fleet days VI VII VIII
2006	12.7%	11.6%	87	752	685

Table 3 provides information on the vessels on which the observations were made. These vessels are assumed to be representative for the fleet. The vessel during trip no. 4 was one of two pair trawlers.

Table 3. Information on the vessels.

tripnr	built in	length (m)	power (kW)	comment
1	1988	114	13000	
2	1993	120	12200	
3	1990	111	12200	
4	2002	56	3900	pair
5	1989	115	13400	

Registration of bycatch

For each tow, the observer was present on the bridge during shooting and hauling. Position and time were noted at the beginning of each haul. The time was noted again when hauling started. The rear window of the bridge gives a good view on the rear deck, so that possible bycatch of cetaceans can be recorded from there. Of any bycatch, length and sex were recorded. If the crew agreed, the animals were labeled and frozen for further examination at the institute.

Results

Haul information and bycatches

In total 141 hauls have been observed during the 5 observer trips. Figure 2 shows the plotted positions of all these hauls.

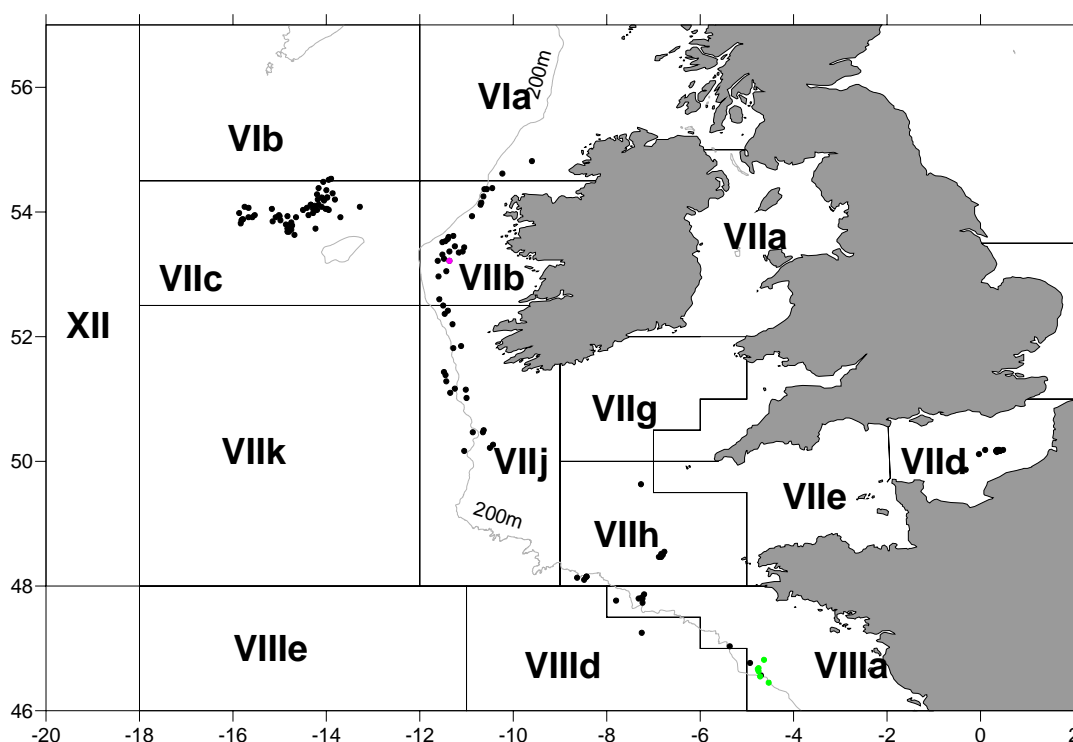


Figure 2. Map with plotted position of the observed trawl hauls during the 5 trips dealt with in this report. The black dots refer to hauls within the period-area which falls under EU council regulation No 812/2004. The pink dot refers to the only bycatch incident within the period-area. The green dots refer to hauls outside the period-area of the council regulation.

Of these hauls, 135 were from 1 December till 31 March in area VI, VII and VIII. In the hauls that fell outside the area and period dealt with here, no bycatch incidents were observed.

One incidental catch was observed, during trip 2 on 15 February (haul no. 34). In this incident one Atlantic white-sided dolphin (*Lagenorhynchus acutus*) has been caught. Thus, the bycatch rate by haul in the area and period covered here is approximately 0.7 dolphins per 100 hauls. Table 4 provides data on length en sex of the specimen.

The bycatch occurred in a trawl haul which was carried out in darkness. The gear had been hauled up at 6.45 o'clock (Dutch time), when it was still dark. The animal was discovered when the entrance of the fish pump was disconnected from the codend after the catch had been pumped on board. The animal was dead.

The catch consisted of 70 tons mackerel with some horse mackerel (1%). The animal was collected for further examination at the Institute, funded by another project.

Table 4. Catch data of the only bycaught dolphin (Lagenorhynchus actus).

bycatch no.	trip no.	haul no.	date	latitude	longitude	sex	length (cm)
1	2	34	15-2-2006	53°13N	11°22W	M	253

Discussion

The number of reported bycatches was too small to necessitate further analysis. The overall bycatch rate is similar to rates from an earlier project in the 90ies. (Couperus, 2006) evaluated bycatch rates more extensively in the light of developments in the fishery from the nineties till 2005.

Table 5 shows the bycatch rates from observer trips in the 90ies and the seasons 2004/2005 and 2005/2006. The catch rate, for example of dolphins per day, is highly variable due to the low number of incidents. From the number of days in the area (685 in 2006) one may carefully conclude from these figures that the number of bycaught animals is in the range of tens per year, in the same order of magnitude as in 2005.

In the Dutch fishery, bycatches of dolphins occur mainly in the fishery for horse mackerel and mackerel west of Ireland in February and March (Couperus, 1997). The relatively low bycatch rates in 2005 and 2006 compared to the rates in the nineties are probably related to the increased observer and fishery effort in the blue whiting fishery (Couperus, 2006) and the extension of the season with the month December since 2004.

*Table 5. Bycatch rates by haul and day between 1 January and 31 March in 1993-1996 and between 1 December and 31 March in the seasons 2004/2005 and 2005/2006 in ICES area's VI, VII and VIII. Data from the period 1993-1996 are from 6 observer trips reported in (Couperus, 1994; Couperus, 1995; Couperus, 1997). Dolphin species involved were Atlantic white-sided dolphin (*Lagenorhynchus acutus*; n=7), short beaked common dolphin (*Delphinus delphis*; n=6) and long-finned pilotwhale (*Globicephala melas*; n=1).*

	hauls	days	Incidents	dolphins	inc/ haul	dolphins/ haul	inc/day	dolphins/day
1993	75	25	0	0	0.00	0.00	0.00	0.00
1994	105	48	5	6	0.05	0.06	0.10	0.13
1995	37	13	1	3	0.03	0.08	0.08	0.23
1996	47	26	4	5	0.09	0.11	0.15	0.19
04/05	143	63	2	3	0.01	0.02	0.03	0.05
05/06	135	66	1	1	0.01	0.01	0.02	0.02

It is not possible to estimate the bycatch rate with any accuracy with the current observer effort, due to the high number of hauls without bycatches. The total mortality caused by Dutch pelagic freezer trawlers in the 2005-2006 season is in the order of magnitude of several tens. However, data from the 90ies suggest that the bycatch rate may vary, partly induced by changes in the quota's of pelagic target species.

As noted already by Couperus (2006), there is a clear season and area during which the probability of bycatch is increased, apparently across a number of fisheries. It is therefore recommended to report in the future under the EU council regulation 812/2004 by season, and not by year.

Also, as noted by Couperus (2006), catch rates are usually expressed as dolphins or incidents per haul (i.e. in the ICES Working Group for Marine Mammal Ecology - WGMME) which enables comparisons between observed rates in different fisheries. However, direct extrapolation to the national fleet(s) is difficult because the official records of the fishery effort and landings, is

expressed as days at sea and not as number of hauls per day or hours of hauling. It should be emphasized that, in the pelagic fishery, the search of fish concentrations is also part of the effort.

Acknowledgements

I would like to thank the skippers and crew of the sampled vessels for their co-operation with the project. I would also like to thank the observers Ronald Bol, Mario Stoker, Martien Warmerdam, and Thomas Pasterkamp for their hard work on board of the vessels.

This project is funded under EU Regulation 812/2004; collection of fisheries data under the Common Fisheries Policy.

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Annexes

1. Fishing days 2006
2. Trawlist

Annex 1

Fishing days by ICES area in 2006. her=herring; hor=horse mackerel; bw=blue whiting; mac=mackerel; arg=greater argentine; hke=hake. Codes between brackets refer to much less important target species. Cells with bold borders indicate the area and period of this monitoring programme. Data from the VIRIS database.

fishing days 2006

ICES area	January	February	March	April	May	June	July	August	September	October	November	December	total
IIA				bw 10	bw 6			her/(bw) 20	her/(bw) 43				79
IIIB									her 3				3
IVA	mac/hor 20			her/(bw) 11	her 36	her 90	her 124	her 48		mac/hor 17	her/mac 4		350
IVB	hor 2			? 1	her 15	her 13	her 3	her 41	her/(hor) 31	her 13	hor 2	her 1	122
IVC	hor/(her) 29	hor 10	her 1	hor 3			hor 1	hor 19	hor 14	hor/her 21	hor/(her) 12	hor 4	114
VB				bw 12	her/bw 2								14
VIA	mac/(hor) 48	bw 5	bw 155	bw/(arg) 191	bw/(arg) 20		her 24	her/(hor) 8		hor/(her)/mac 17	? 1	hor 2	471
VIB		bw 10	bw 5										15
VIIIB	hor/mac/(her) 50						hor 7	hor 6		hor/(mac) 27	hor/(mac) 31	hor 5	126
VIIIC	bw 63	bw 106	bw 4										173
VIIID	her/pil/hor 36	pil/her 8	her/pil 3					hor 2	hor 54	hor/her 44	her/(hor) 79	her/(hor) 19	245
VIIIE	pil 2						hor 2	hor/(pil) 98	hor 41	hor 24		hor 4	171
VIIIG												her 1	1
VIIIH	mac/(pil) 21	mac 2								hor 38	hor/(pil) 23	hor 1	85
VIIIA	hor/(mac) 11	mac 1	mac/hor 11	mac/hor 12						hor 21	hor/mac 5	mac/hor 2	63
VIIIB				hor 5									5
VIIID	hor 1									hor 1			2
VIIJ	mac/hor/(her) 59	mac/(hor) 31	mac/hor 12	hor/(mac) 17			hor 1				hor 8	hor 6	134
VIIK	bw 1												1
total	343	173	191	262	79	103	162	242	186	223	165	45	2174



Annex 2

Trawl hauls during the 5 trips dealt with in this report. The shaded records refer to hauls which do not fall under EU council regulation No 812/2004 period-area.

trip no.	haul no.	day	month	time (NL)	haul duration (min.)	lat	lon	main catch	cetacean bycatch
1	1	4	1	16:30	105	48°09N	008°26W	h. mackerel	
1	2	4	1	20:45	165	48°09N	008°26W	h. mackerel	
1	3	5	1	1:10	230	48°06N	008°29W	h. mackerel	
1	4	5	1	16:45	180	48°09N	008°26W	h. mackerel	
1	5	6	1	16:00	270	50°16N	010°26W	h. mackerel	
1	6	7	1	14:00	180	50°13N	010°30W	h. mackerel	
1	7	8	1	7:00	300	52°30N	011°30W	h. mackerel	
1	8	8	1	13:10	300	52°36N	011°35W	h. mackerel	
1	9	9	1	10:15	330	52°22N	011°28W	h. mackerel	
1	10	9	1	18:30	345	52°25N	011°24W	h. mackerel	
1	11	10	1	3:30	105	52°58N	011°36W	mackerel	
1	12	10	1	20:30	150	52°12N	011°18W	h. mackerel	
1	13	11	1	10:15	195	51°49N	011°17W	h. mackerel	
1	14	11	1	15:15	195	51°51N	011°07W	h. mackerel	
1	15	12	1	13:45	360	48°08N	008°38W	h. mackerel	
1	16	13	1	3:20	40	47°46N	007°48W	h. mackerel	
1	17	13	1	5:50	120	47°15N	007°15W	h. mackerel	
1	18	13	1	10:00	60	47°48N	007°19W	h. mackerel	
1	19	13	1	15:00	210	47°49N	007°15W	h. mackerel	
1	20	14	1	4:30	210	47°48N	007°14W	h. mackerel	
1	21	14	1	11:00	120	47°44N	007°14W	h. mackerel	
1	22	15	1	16:45	120	47°52N	007°12W	h. mackerel	
1	23	15	1	5:00	180	48°30N	006°48W	h. mackerel	
1	24	15	1	13:00	150	48°28N	006°50W	h. mackerel	
1	25	15	1	18:00	60	48°31N	006°50W	mackerel	
1	26	16	1	0:00	120	48°33N	006°46W	h. mackerel	
1	27	16	1	6:45	45	49°38N	007°16W	h. mackerel	
1	28	16	1	13:30	150	48°28N	006°53W	h. mackerel	
1	29	17	1	0:00	265	53°31N	011°31W	mackerel	
1	30	18	1	9:45	30	53°34N	011°24W	mackerel	
1	31	18	1	12:30	120	53°32N	011°27W	h. mackerel	
1	32	18	1	18:00	180	53°36N	011°23W	mackerel	
1	33	19	1	13:15	150	53°37N	011°17W	mackerel	
2	1	1	2	22:00	225	51°10N	011°15W	mackerel	
2	2	2	2	9:40	60	51°06N	011°21W	h. mackerel	
2	3	3	2	21:20	185	53°52N	014°59W	b. whiting	
2	4	4	2	4:45	215	53°47N	014°44W	b. whiting	
2	5	4	2	12:10	260	53°50N	014°45W	b. whiting	
2	6	4	2	20:50	240	53°55N	014°39W	b. whiting	
2	7	5	2	9:30	620	53°41N	014°50W	b. whiting	
2	8	5	2	19:50	130	53°43N	014°45W	b. whiting	

2	9	6	2	1:00	120	53°48N	014°52W	b. whiting	
2	10	6	2	5:45	205	53°41N	014°48W	b. whiting	
2	11	6	2	12:30	435	53°44N	014°50W	b. whiting	
2	12	6	2	21:55	135	53°38N	014°41W	b. whiting	
2	13	7	2	2:15	210	53°48N	014°46W	b. whiting	
2	14	7	2	13:30	405	53°51N	015°09W	b. whiting	
2	15	8	2	0:30	225	53°57N	015°01W	b. whiting	
2	16	8	2	7:20	190	53°56N	014°50W	b. whiting	
2	17	8	2	20:30	150	53°56N	015°00W	b. whiting	
2	18	9	2	1:45	125	53°55N	015°05W	b. whiting	
2	19	9	2	7:00	120	54°03N	015°10W	b. whiting	
2	20	9	2	20:25	95	53°57N	015°32W	b. whiting	
2	21	10	2	0:30	195	54°04N	015°40W	b. whiting	
2	22	10	2	8:30	180	53°55N	015°35W	b. whiting	
2	23	10	2	13:50	280	54°05N	015°45W	b. whiting	
2	24	10	2	20:15	125	53°55N	015°40W	b. whiting	
2	25	11	2	0:30	100	53°53N	015°47W	b. whiting	
2	26	11	2	7:00	255	53°53N	015°48W	b. whiting	
2	27	11	2	20:30	120	53°52N	015°49W	b. whiting	
2	28	12	2	3:00	90	53°59N	015°52W	b. whiting	
2	29	12	2	7:15	245	53°49N	015°50W	b. whiting	
2	30	12	2	20:30	165	54°02N	014°30W	b. whiting	
2	31	13	2	12:45	365	54°02N	014°12W	b. whiting	
2	32	13	2	22:30	180	54°12N	014°11W	b. whiting	
2	33	14	2	7:00	600	54°11N	014°03W	b. whiting	
2	34	15	2	4:15	150	53°13N	011°22W	mackerel	1 L. acutus
2	35	15	2	21:30	120	51°09N	011°01W	mackerel	
2	36	16	2	1:45	120	51°01N	011°00W	mackerel	
2	37	17	2	5:30	300	50°28N	010°52W	mackerel	
2	38	17	2	15:30	165	50°10N	011°03W	h. mackerel	
3	1	20	2	11:30	155	51°23N	011°27W	mackerel	
3	2	20	2	16:00	285	51°17N	011°26W	mackerel	
3	3	20	2	22:40	235	51°26N	011°29W	mackerel	
3	4	22	2	4:45	180	53°44N	014°14W	b. whiting	
3	5	23	2	2:30	240	53°57N	014°23W	b. whiting	
3	6	23	2	22:10	120	54°03N	014°17W	b. whiting	
3	7	24	2	4:00	120	53°59N	014°17W	b. whiting	
3	8	24	2	8:45	155	54°07N	014°20W	b. whiting	
3	9	24	2	14:15	200	54°07N	014°10W	b. whiting	
3	10	24	2	21:30	180	54°04N	014°25W	b. whiting	
3	11	25	2	2:30	185	54°05N	014°06W	b. whiting	
3	12	25	2	8:35	115	54°06N	014°15W	b. whiting	
3	13	25	2	23:00	150	54°07N	014°20W	b. whiting	
3	14	26	2	4:50	135	54°14N	013°59W	b. whiting	
3	15	26	2	22:35	95	54°14N	014°06W	b. whiting	
3	16	27	2	3:00	135	54°17N	014°12W	b. whiting	
3	17	27	2	17:15	135	54°23N	014°10W	b. whiting	
3	18	27	2	22:55	200	54°14N	013°59W	b. whiting	
3	19	28	2	10:40	145	54°29N	014°04W	b. whiting	
3	20	1	3	2:30	120	54°21N	014°00W	b. whiting	
3	21	1	3	8:15	180	54°31N	013°57W	b. whiting	

3	22	1	3	15:00	365	54°32N	013°54W	b. whiting	
3	23	2	3	2:00	210	54°18N	013°52W	b. whiting	
3	24	2	3	18:20	280	54°12N	013°49W	b. whiting	
3	25	3	3	4:00	360	54°03N	014°01W	b. whiting	
3	26	3	3	15:00	195	54°05N	013°17W	b. whiting	
3	27	3	3	21:20	220	53°55N	013°42W	b. whiting	
3	28	4	3	3:20	150	54°02N	013°57W	b. whiting	
3	29	4	3	11:00	345	54°03N	013°59W	b. whiting	
4	1	29	3	9:30	150	47°02N	005°22W	--> pair	
4	2	31	3	9:10	230	46°34N	004°42W	mackerel	
4	3	31	3	15:00	160	46°46N	004°56W	--> pair	
4	4	1	4	8:30	300	46°33N	004°43W	--> pair	
4	5	1	4	14:30	190	46°49N	004°38W	--> pair	
4	6	3	4	0:30	150	46°38N	004°45W	mackerel	
4	7	4	4	0:45	105	46°27N	004°32W	--> pair	
4	8	5	4	7:30	120	46°41N	004°45W	mackerel	
4	9	5	4	16:30	285	46°40N	004°46W	--> pair	
5	1	1	12	14:55	105	54°49N	009°36W	mackerel	
5	2	2	12	9:20	150	54°23N	010°27W	h. mackerel	
5	3	2	12	13:30	155	54°37N	010°14W	h. mackerel	
5	4	4	12	10:15	205	54°22N	010°34W	h. mackerel	
5	5	4	12	15:30	345	54°09N	010°41W	h. mackerel	
5	6	5	12	1:45	260	54°15N	010°383W	h. mackerel	
5	7	5	12	7:15	160	54°22N	010°37W	h. mackerel	
5	8	5	12	13:00	285	54°07N	010°42W	mackerel	
5	9	6	12	11:35	295	53°56N	010°53W	mackerel	
5	10	8	12	9:30	100	53°27N	011°15W	h. mackerel	
5	11	8	12	12:50	210	53°21N	011°10W	h. mackerel	
5	12	8	12	18:10	85	53°22N	011°05W	mackerel	
5	13	9	12	9:10	275	53°22N	011°22W	mackerel	
5	14	9	12	15:15	300	53°13N	011°37W	h. mackerel	
5	15	14	12	9:15	250	53°03N	011°26W	mackerel	
5	16	14	12	16:15	255	53°15N	011°29W	h. mackerel	
5	17	14	12	22:00	240	53°19N	011°31W	h. mackerel	
5	18	15	12	11:15	420	53°26N	011°03W	h. mackerel	
5	19	16	12	9:15	240	50°30N	010°38W	h. mackerel	
5	20	16	12	14:30	180	50°28N	010°39W	h. mackerel	
5	21	17	12	23:50	65	49°52N	000°19W	Herring	
5	22	18	12	4:35	105	50°07N	000°02W	Herring	
5	23	18	12	8:45	65	50°11N	000°06E	Herring	
5	24	18	12	12:10	105	50°10N	000°20E	Herring	
5	25	18	12	20:45	120	50°11N	000°29E	Herring	
5	26	19	12	1:15	185	50°11N	000°23E	Herring	
5	27	19	12	8:55	50	50°11N	000°21E	Herring	
5	28	19	12	21:00	240	50°10N	000°25E	Herring	
5	29	20	12	15:05	185	50°11N	000°23E	Herring	
5	30	20	12	20:45	205	50°10N	000°25E	Herring	
5	31	21	12	10:45	55	50°11N	000°24E	Herring	
5	32	21	12	14:30	365	50°09N	000°21E	Herring	