National report of the European Union to the 2010 SPRFMO Science Working Group.

Ad Corten[1] and Jerzy Janusz[2]

[1]) adcorten@yahoo.co.uk, Consultant to the Dutch Ministry of Agriculture,

[2]) jjanusz@mir.gdynia.pl, Sea Fisheries Institute, Gdynia, Poland

1 Introduction

The pelagic fleet from the European Union (EU) in the Pacific in 2009 consisted of two components: the PFA fleet (Pelagic Freezertrawler Association) and the Polish fleet. The PFA vessels worked under German, Lithuanian and Dutch flag, but they had a similar fishing method and strategy. This fleet has been active in the area since 2005. The Polish fleet returned to the Pacific in 2009 after a long absence. This fleet worked in the area in the 1970s and 1980, but was absent from 1985 onwards.

The PFA fleet and the Polish fleet worked independently from one another, and the research activities were also separated. For this reason, the reports on both fleets are presented as separate sections in this report.

The demersal fishery by EU vessels, which started in 2008, was discontinued in 2009.

2 The pelagic fishery by the PFA fleet

2.1 Description of the fishery

The fishery for jack mackerel by the European Union (EU) started in 2005 by a single vessel working for 3 months in the second half of the year. The next year, the same vessel returned and worked for the whole season (March – October). Following the positive results of this season, the number of vessels increased to eight in 2007. In 2008, this number was kept unchanged, following an agreement by the SPRFMO in 2007 to freeze fishing effort as of 31 December 2007.

year	Number of PFA vessels	EU countries involved and number of vessels
2005	1	Netherlands (1)
2006	1	Netherlands (1)
2007	6	Germany (3), Lithuania (1), Netherlands (2)
2008	6	Germany (3), Lithuania (1), Netherlands (2)
2009	6	Germany (3), Lithuania (1), Netherlands (2)

PFA pelagic trawlers in the Pacific in 2005 – 2009. One of the German vessels in 2009 was temporarily reflagged as Lithuanian.

The vessels involved in this fishery are large pelagic trawlers, operating under the flags of Germany, Netherlands, and Lithuania. The vessels use single boat pelagic trawls that are fished mainly during night-time. They operate exclusively in international waters outside the Chilean EEZ. Fishing operations extend in the open Pacific to about 110°W.

The main fishing season in 2009 was from April to August. Compared to 2008, the fishing season in 2009 was shortened by one month, as can been seen from the monthly catches of PFA vessels in 2008 and 2009:

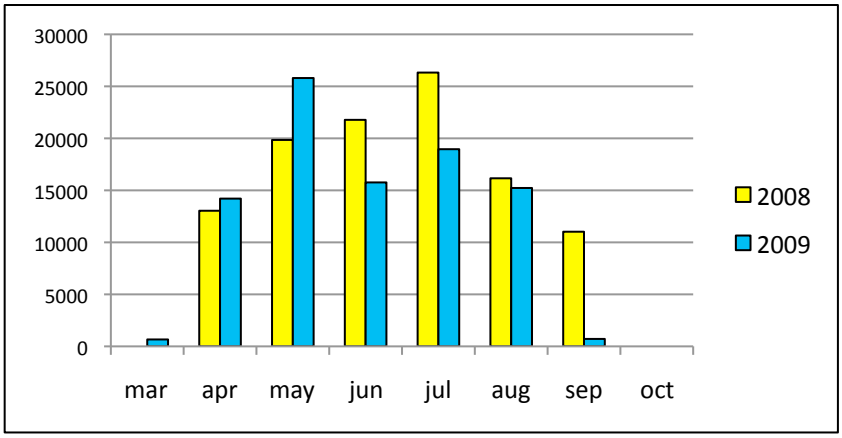

Figure 1. Monthly catches of jack mackerel by PFA vessels in 2009 compared to 2008

2.2 Catch, effort and CPUE in the PFA fleet

Development of catch and effort of jack mackerel in the PFA fleet is presented in the text table below.

year	number of fishing days	catch jack mackerel PFA fleet in tons	catch per day in tons
2005	44	6187	141
2006	109	33766	310
2007	401	123523	308
2008	423	108174	256
2009	436	91336	209

Fishing effort in the PFA fleet in 2009 increased slightly compared to 2008, whereas catches decreased, both in absolute terms and in catch per day.

The CPUE (catch per unit of effort; in this case catch per fishing day) tends to decrease towards the end of the fishing season. A possible explanation for this is given in section 4. Apart from this declining trend throughout the season, the absolute level of CPUE has also been decreasing during the two most recent seasons.

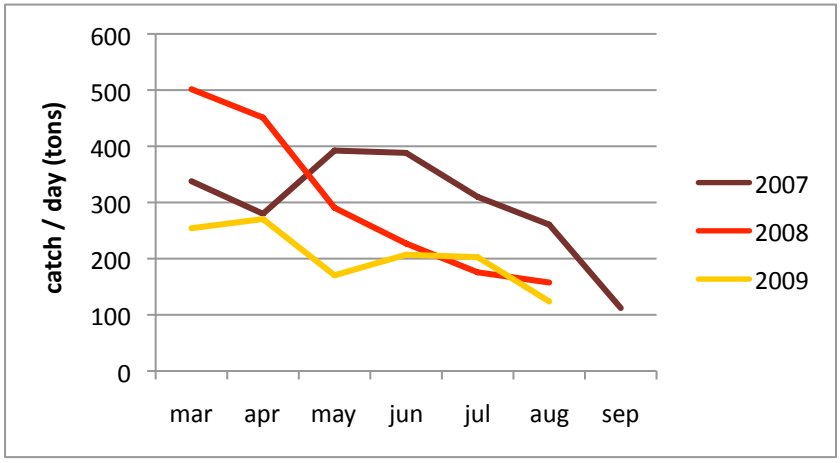

Figure 2. Monthly CPUE of jack mackerel in the PFA fleet in 2009 compared to the two previous years

2.3 Fisheries data collection and research activities in the PFA fleet

Two independent programmes of data collection were carried out in 2009: (1) the collection of haul-by-haul information directly from the vessels, and (2) an observer programme aimed at obtaining detailed biological information on catches and discards. Both programmes were run by the Dutch consultant agency CMR (Corten Marine Research). Funding was provided on a 50/50 basis by the Dutch ship owners association PFA and the Dutch Ministry of Agriculture, Conservation and Food Quality.

The details of these programmes are briefly presented below.

2.3.1 Collection of haul-by-haul information from the vessels in the PFA fleet

Each trawler was asked to provide detailed information for each individual haul. A simple spreadsheet was used to record the requested information at sea. The information requested in this spreadsheet corresponded to the data demands of the SPRFMO Data and Information Working Group.

The size of the individual catches was estimated by visual inspection of the amount of fish in the net or in the tanks into which the catch was pumped. Normally, the captains tended to under-estimate the amount of catch at first sight. As a result, the sum of all individual catches provided by the captains was lower than the landing data for the entire trip provide by the ship owner. In order to make the tow-by-tow information check with the landing data, the estimates for individual catches were raised by a correction factor.

CMR converted the data into the required SPRFMO format and submitted these (through the European Commission) to the SPRFMO interim secretariat.

The haul-by haul information from individual vessels provided a good picture of the geographical distribution of the fishery. Figure 3 shows the distribution of catches during the 2009 fishing season. Catches in 2009 extended further west than in previous years.

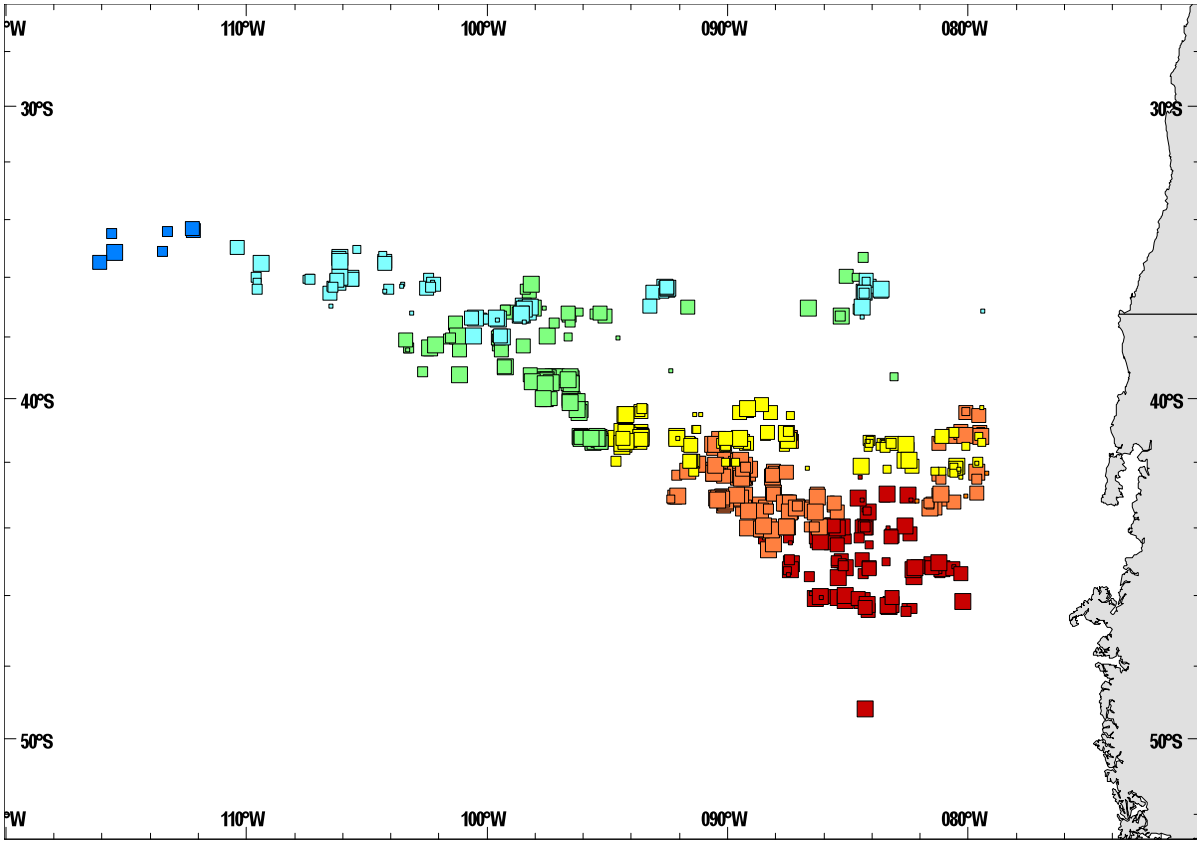

Figure 3. Catch distribution by month of the EU fleet in 2009. Red = April, orange = May, yellow = June, green = July, light blue = August, dark blue = September, purple = October. Size of squares is proportional to catches. Positions may be inaccurate due to errors in data transmission and analysis.

2.3.2 Data collection by observers on the PFA fleet

In accordance with the recommendation of the SPRFMO Data and Information Working Group, this programme attempted to obtain at least 10% coverage of all hauls made by the fleet. For this purpose, two observers each made two trips of 7 weeks each on board different vessels. The temporal coverage in 2009 was as follows:

observer	period	days with observations	schip
Co de Klerk	14 mar – 27 apr 2009	33	ROS 171 Maartje Theadora
Tomasz Raczynski	28 apr – 14 jun 2009	48	KW 174 Annelies Ilena
Co de Klerk	6 jul – 2 sep 2009	49	KW 174 Annelies Ilena
Tomasz Raczynski	22 aug – 22 sep 2009	20	KL 749 Margiris

The observers collected data on species composition of catches, length composition, biological characteristics such as sex and maturity stage, food composition, stomach fullness and fat content. In addition they monitored discards and incidental by-catches of large species.

2.4 Biological sampling and length/age composition of catches in the PFA fleet

A total of 15744 jack mackerel was measured in 2009, compared to 28250 fish in 2008. The lower number of fish sampled was related to the lower number of positive hauls in 2009, and the earlier end of the fishing season.

Figure 4 compares the total length composition of catches in 2009 with the results for earlier years. It is seen that fish with a modal length of 35 – 36 cm (fork length) dominated the catches in 2009. The comparison with data for the two previous years indicates that no recruitment to the fished population has occurred since 2007.

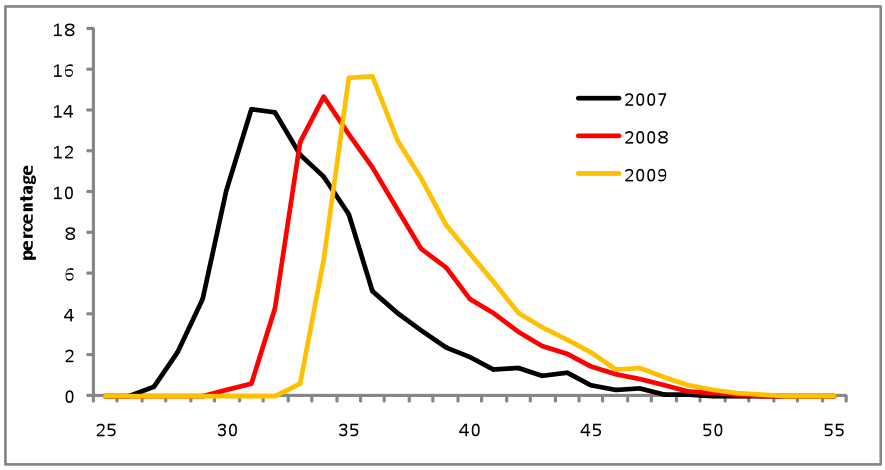

Figure 4. Percentage length composition of jack mackerel in the PFA fleet in 2009 compared to the two previous years

Otoliths for age determination were collected from 713 fish, and the otoliths were read ashore. The results of the age reading showed that the dominant year-class in 2009 was 6 years old. This year-class must have recruited as 4 year-olds in 2007. The absence of new recruitment since 2007 is a good opportunity to follow the growth of a single year-class, and to check existing theories about the growth of the fish.

Data on catch composition showed that 95% of the catch consisted of jack mackerel (*Trachurus murphyi*). The rest consisted of chub mackerel (*Scomber japonicus*) and some Southern rays bream (*Brama australis*).

	Trachurus murphyi	*Scomber japonicus*	*Brama australis*	Total
Catch in tons	91 026	4 077	388	95 490
In percentage	95.3	4.3	0.4	100

Catch compostion of PFA fleet in 2009

3 The pelagic fisheries by Poland in the South Pacific in 2009.

Polish fishing and research activity in the South-east Pacific area, beyond Chilean and Peruvian EEZ started in 1979 and were conducted until 1984. Over 130 th. tons of jack mackerel was caught during this period. The research vessel of the Sea Fisheries Institute in Gdynia (MIR) was engaged in the survey in this area, and the commercial fishing operations were supported by scientists from MIR collecting the fishery and biological information. After joining the European Community, Poland started fishing for Jack mackerel in 2009.

3.1 Description of Polish fishery in 2009

The Polish fishery for jack mackerel (*Trachurus murphyi*) in 2009 started in March in the international waters outside the Chilean EEZ. Fishing operations extended in the open Pacific to about 120°W. In 2009 three Polish vessels (f/v SIRIUS, f/v ALINA and f/v DALMOR II) were involved in the fishery.

All the vessels are large pelagic trawlers and were operating under the flag of Poland. The vessels used mainly the single boat pelagic trawl, but some of hauls were conducted by using pair boat midwater trawl.

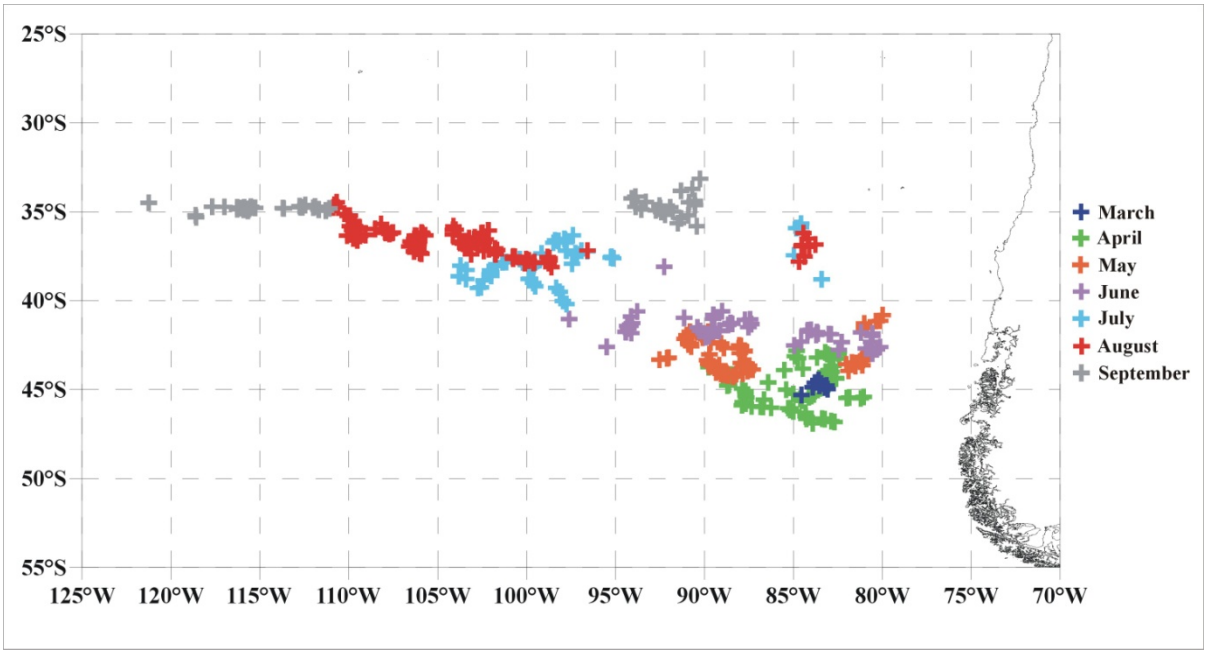

Fig 5. Distribution of hauls by Polish vessels during jack mackerel fishery in 2009 (by months).

3.2 Catch, effort and CPUE in the Polish fleet

In 2009, during 177 fishing days Polish vessels caught total of 21 903 tons fish. Catches were conducted in the subareas 87.3.3 and 87.2.6. during whole season (March – September).

A target species was jack mackerel. Catches of jack mackerel amounted to 20 897 tons (95.4% of total catch). The main bycatch species were chub mackerel (4.2%) and Pacific pomfret (0.3%) (Table 1.).

Table 1. Polish catches in the SPRFMO area in 2009 by FAO subarea, species and months

Species Common name	Alpha- 3 code	Subarea	Total catch (t)	Month III	IV	V	VI	VII	VIII	IX
Jack mackerel	CJM	87.3.3	**12983**	295	3883	4928	3324	552		
Chub mackerel	MAS	87.3.3	**543**	15	193	168	147	20		
Jack mackerel	CJM	87.2.6	**7914**					3080	3649	1185
Chub mackerel	MAS	87.2.6	**378**					174	147	56
Pacific pomfret	BRU	87.2.6	**72**					13	52	7
Others	MZZ	87.2.6	**14**						3	11
Total catch (t)			**21903**	310	4077	5097	3471	3840	3851	1259

The monthly catches of jack mackerel in 2009 by Polish vessels are presented in Figure 6.

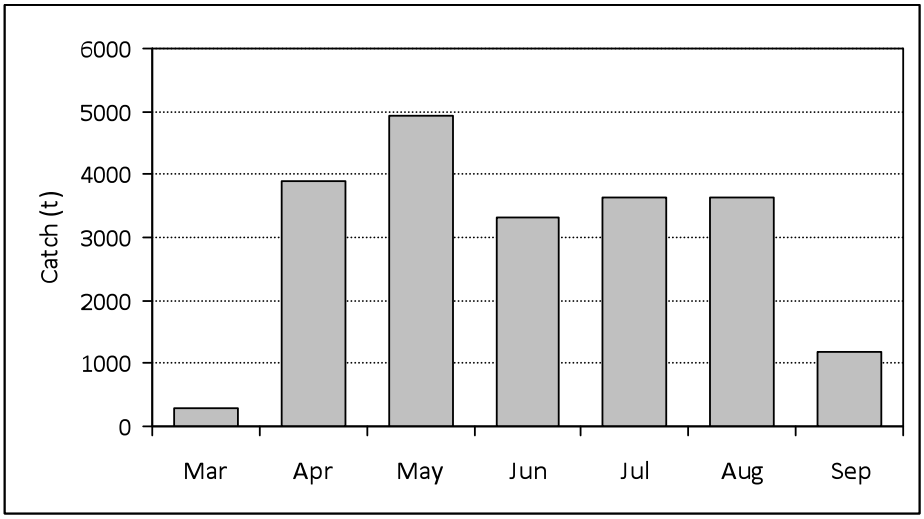

Figure 6. Monthly catches of jack mackerel by the Polish vessels in 2009

The mean CPUE (in tons per day) of jack mackerel was 118 and best CPUE was achieved in May (205 tons/day). During August and September the CPUE dropped significantly (Figure 7).

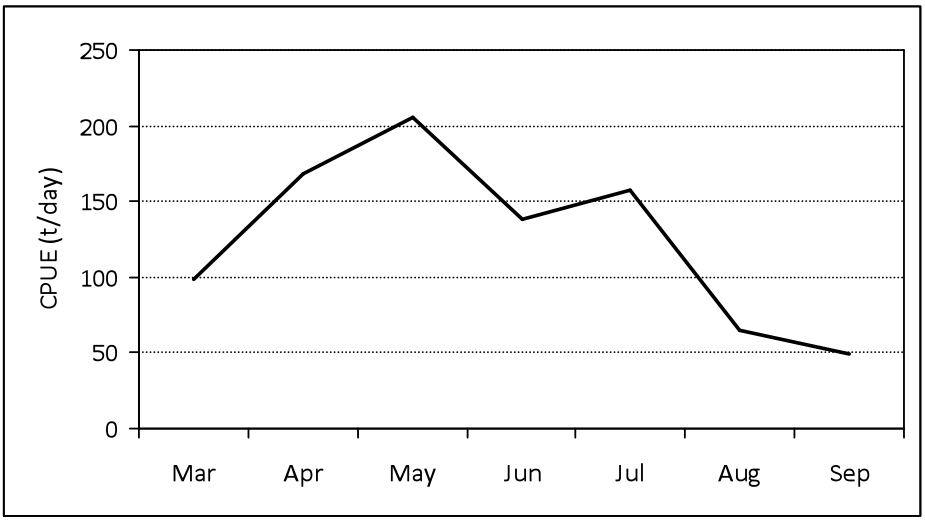

Figure 7. Monthly CPUE of jack mackerel by Polish vessels in 2009

3.3 Fisheries data collection and research activities in the Polish fleet

One scientist from the Sea Fisheries Institute in Gdynia was placed on board of f/v ALINA for collecting the fishery and biological data according to the Polish National Programme for Collecting of Fisheries Data. The observations were carried out during two trips (total 35 fishing days) from August 9 to September 12, 2009 in the FAO statistical area 87.2.6. All the fishery data were recorded from the logbook and biological samples were collected. During the observations 55 hauls were performed, of which 45 by using single boat pelagic trawl and 10 by using pair boat midwater trawl.

3.3.1 Collection of haul-by-haul information from the captains

All detailed information for each individual haul conducted by each vessel were sent by the captain to the Polish Fisheries Monitoring Center. The data were processed into a spreadsheet according to the requirement of the SPRFMO Data and Information Working Group and provided to EC by Polish Ministry of Agriculture and Rural Development.

3.3.2 Data collection by observers at sea

The basic data collected by observer on board of Polish vessel were sent to EC in the form required by SPRFMO (Observertemplate-Trawl-Poland_2009) at the beginning of June 2010.

The size of catch in the individual tow was estimated by visual inspection of the net hauled in on the deck and then compared with the products quantity. Observer collected also data on species composition of catches, length composition, biological characteristics such as sex and maturity stage, and stomach fullness. During the presence of scientific observer on board of fishing vessel (Aug 9 – Sep 12, 2009) the vessel caught total of 2 082 tons of fish. Data on catch composition showed that 95% of the catch consisted of jack mackerel (*Trachurus murphyi*) (1979.2 tons). Pacific mackerel (*Scomber japonicus*) and Pacific pomfret (*Brama japonica*) composed a main bycatch species. The occurrence of other species was rather scarce. No marine mammals or turtles were recorded by the observer. The species composition of catches during the sampling is presented in Table 2.

During the period from August 9 to September 12, 2009 the location of catches followed jack mackerel aggregations which moved westward as far as to the 120°W. When comparing the distribution of catches during the same months of the years 1979-1984 it can be seen that the pattern of catches distribution was quite different.

Table 2. Species composition of Polish catches collected by scientific observer during the catches of jack mackerel (August 9 – September 12, 2009).

Scientific name	Common name	Catch (kg)	(%)
Trachurus murphyi	Pacific jack mackerel	1 979 220.0	95.05
Scomber japonicus	Pacific mackerel	72 720.0	3.49
Brama japonica	Pacific pomfret	26 860.0	1.29
Thyrsites atun	Snoeck	1 253.4	0.06
Katsuwonus pelamis	Skipjack tuna	734.5	0.04
Thunnus alalunga	Albacore	687.0	0.03
Ommastrephes bartramii	Red flying squid	620.4	0.03
	Mezopelagic fishes	230.0	0.01
Centrolophus niger	Rudderfish	24.5	
Mola mola	Ocean sunfish	23.0	
Lamna nasus	Porbeagle	12.0	
Tetragonurus cuvieri	Smalleye squaretail	7.4	
Taractes asper	Rough pomfret	3.0	

Other fishes		1.0
	Σ =	**2 082 396.2**

3.4 Biological sampling and length/age composition of jack mackerel in the Polish fleet

The result of scientific collection of length data (all measurements in fork length) of jack mackerel on board of Polish vessel during 2009 is presented in Figure 8. A total of 4729 fish were measured. The dominating length classes were 35 and 36 cm which represented over 53% of total fish measured. The smaller size categories were almost absent, but it may be the result of the fact that samples were collected between 100° and 120° West longitude where it is assumed that bigger size fish are living.

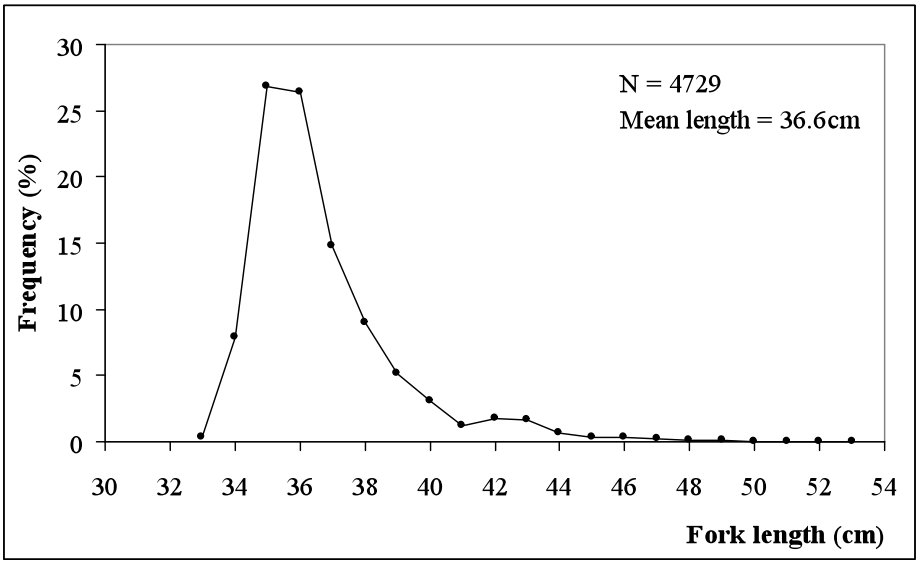

Figure 8. Length distribution of jack mackerel caught during August and September 2009

Age composition of catches was determined on the basis of 166 otoliths collected during the sampling according to the methodology used to determine the jack mackerel age in Chile (Ojeda and all – Chilean Jack Mackerel Workshop (CHJMWS pap#8), Waldorn and Kersten 2001[1] and experience of readers of the Sea Fisheries Institute in Gdynia.

Jack mackerel at age 6 and 7 dominated in the catches conducted during August and September 2009 in the observed area (Figure 9). These results of age composition of catches are slightly different than presented in the Polish draft report sent to EC in Autumn 2009. Otoliths were verified by two readers.

[1] Waldron M.E. and Kersten M. 2001. Age validation in horse mackerel (*Trachurus trachurus*) otoliths. ICES Journal of Marine Science, 58: 806-813

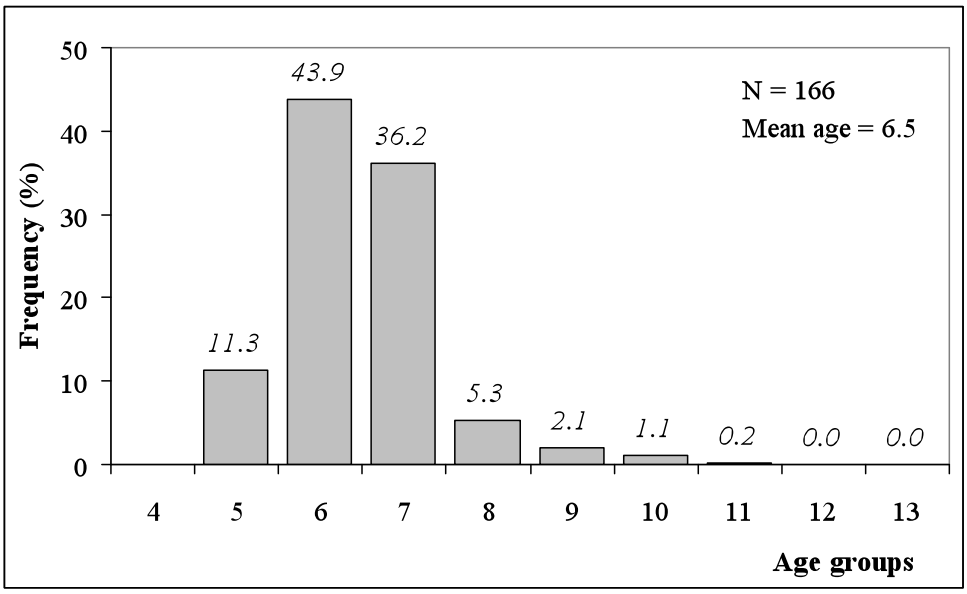

Figure 9. Age composition of jack mackerel caught during August and September 2009

During the Polish sampling, the weight of jack mackerel for commercial uses was in the range from 370g to 1435g with the mean weight of 527g. (Table 3).

Table3. Mean weight of jack mackerel in length classes during Polish catches in August and September 2009

Length classes (fork length) (cm)	N	Frequency (%)	Mean weight (g)
33	17	0.02	402
34	373	0.36	439
35	1270	7.89	461
36	1250	26.85	500
37	700	26.43	529
38	425	14.80	573
39	242	8.99	628
40	144	5.12	665
41	56	3.04	705
42	84	1.18	742
43	79	1.78	795
44	33	1.67	874
45	17	0.70	932
46	15	0.36	986
47	11	0.32	1023
48	5	0.23	1097
49	3	0.11	1227
50	1	0.06	1080
51	1	0.02	1295
52	2	0.02	1273
53	1	0.04	1435
Σ	4729	100.00	
Mean weight (g)			527

3.5 Biological sampling of other species in the Polish fleet

3.5.1 Chub mackerel (*Scomber japonicus*)

Chub mackerel was observed in most of the hauls. To determine the length frequency 1785 fish were measured. The length composition of adult stock shows that fish size ranged between 24 to 44 cm (total length) (figure 10). Only in one haul smaller fish (19-26 cm) were noticed.

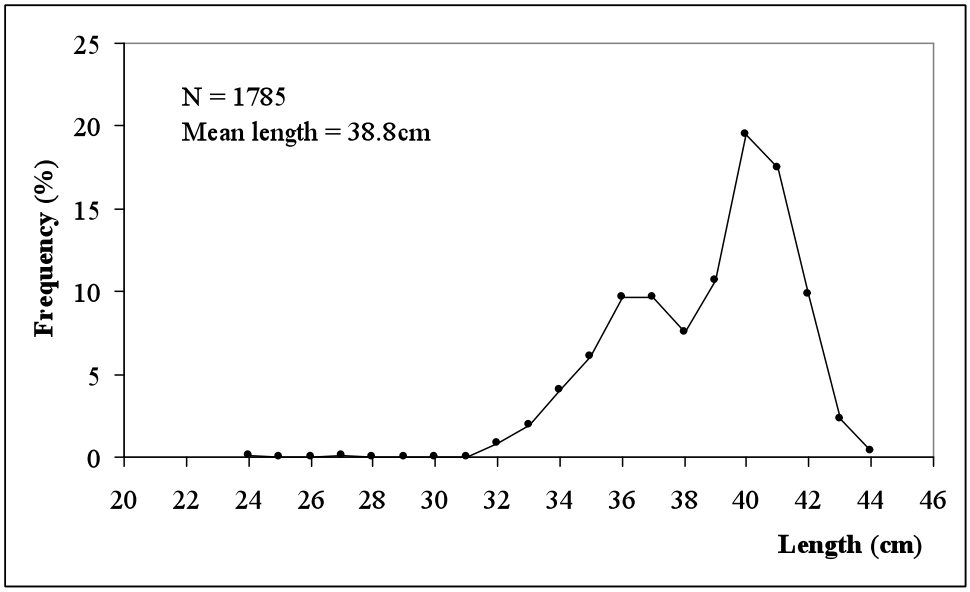

Fig. 10. Length distribution of chub mackerel caught during August and September 2009

Age composition of chub mackerel was determined on the basis of 154 otoliths collected during the sampling (Figure 11).

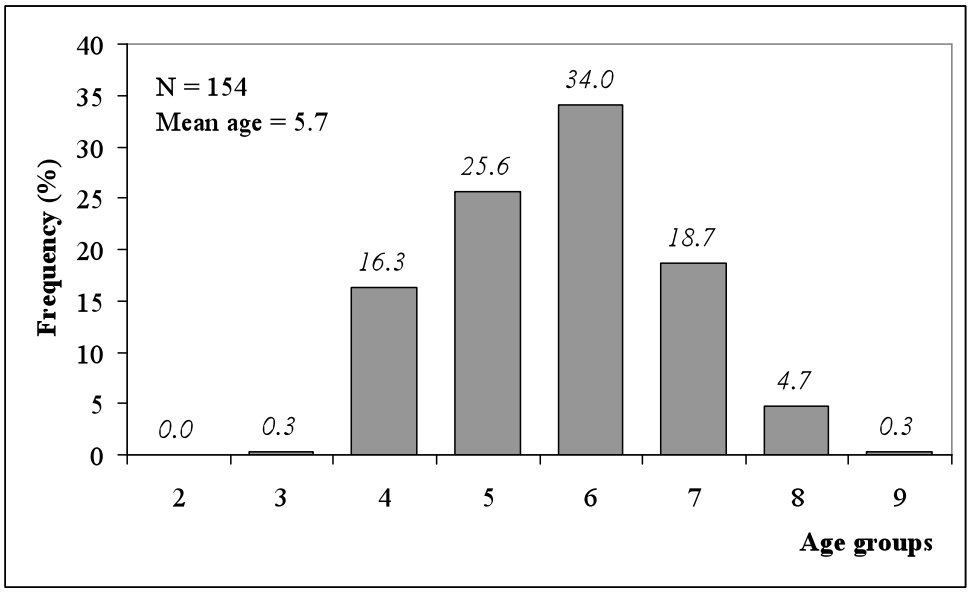

Figure 11. Age composition of chub mackerel caught during August and September 2009

During the sampling the weight of chub mackerel for commercial uses was in the range from 106g to 650g, with the mean weight 583g. (Table 4).

Table 4. Mean weight of chub mackerel in length classes during Polish catches in August and September 2009

Length classes (cm)	N	Frequency (%)	Mean weight (g)
24	1	0.06	106
27	1	0.06	136
32	15	0.84	293
33	34	1.90	325
34	73	4.09	344
35	109	6.11	396
36	172	9.64	430
37	172	9.64	485
38	134	7.51	512
39	191	10.70	588
40	348	19.50	650
41	311	17.42	705
42	176	9.86	770
43	41	2.30	807
44	7	0.39	815
Σ	1785	100.00	
Mean weight			583

3.5.2 Pacific pomfret (*Brama japonica*)

Pacific pomfret was observed in about 70% of the hauls. To determine the length frequency 807 fish were measured. The length composition of adult stock shows that fish size were in the range between 32 and 61 cm (total length) (figure 12). Only in one haul smaller fish (19-26 cm) were noticed.

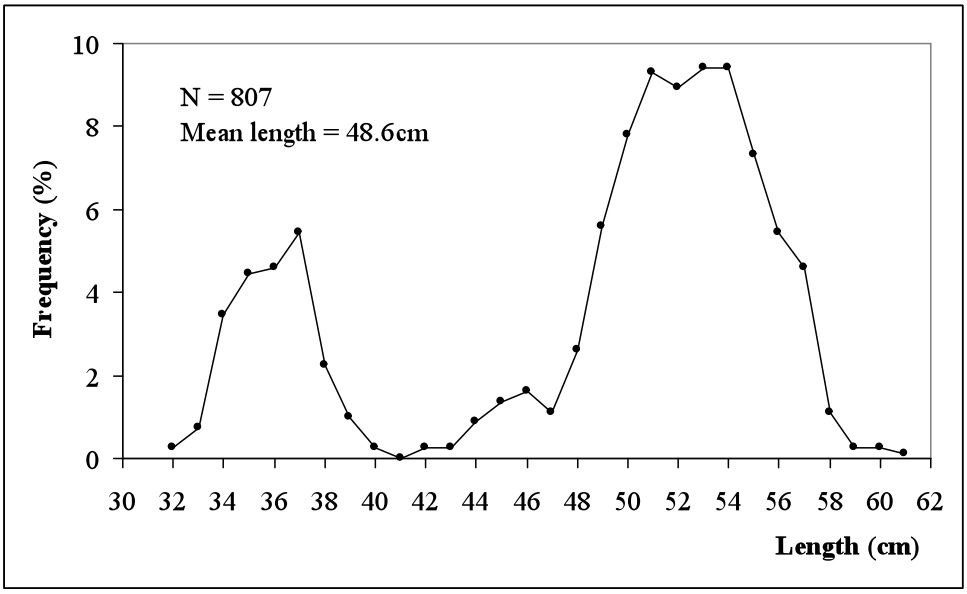

Fig. 12. Length distribution of pomfret caught during August to September 2009

Age composition of chub mackerel was determined on the basis of 217 otoliths collected during the sampling (Figure 13).

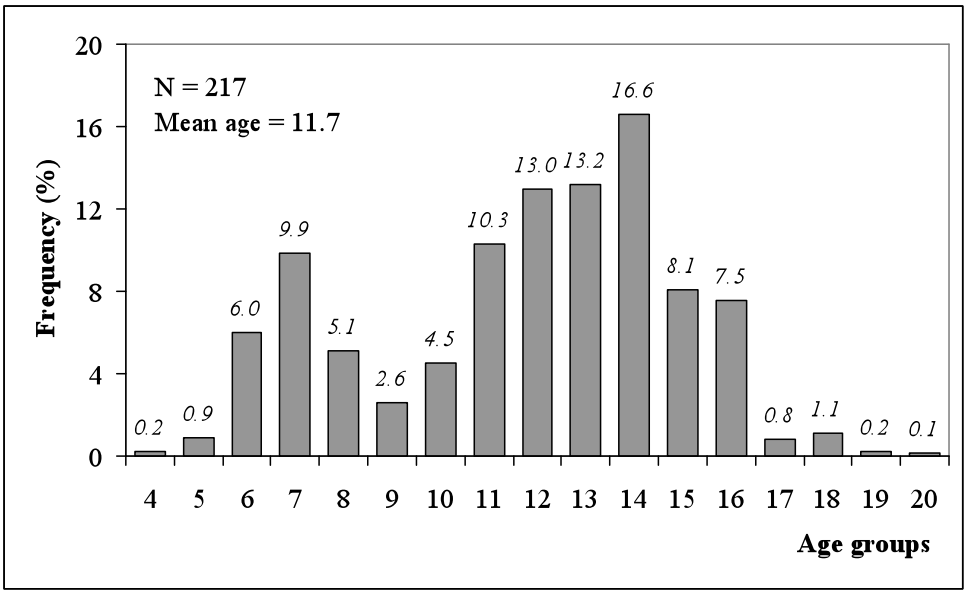

Figure 13. Age composition of pomfret caught during August and September 2009

During the sampling the weight of pomfret for commercial uses was in the range from 330g to 2395g, with the mean weight 1391g. (Table 5).

Table 5. Mean weight of pomfret in length classes during Polish catches in August and September 2009

Length classes (cm)	N	Frequency (%)	Mean weight (g)
32	2	0.25	333
33	6	0.74	340
34	28	3.47	371
35	36	4.46	394
36	37	4.58	427
37	44	5.45	466
38	18	2.23	503
39	8	0.99	505
40	2	0.25	635
41			
42	2	0.25	783
43	2	0.25	862
44	7	0.87	798
45	11	1.36	940
46	13	1.61	1077
47	9	1.12	1159
48	21	2.60	1277
49	45	5.58	1336
50	63	7.81	1491
51	75	9.29	1589
52	72	8.92	1663
53	76	9.42	1762
54	76	9.42	1824
55	59	7.31	1964
56	44	5.45	2039
57	37	4.58	1978

58	9	1.12	2089
59	2	0.25	2158
60	2	0.25	2208
61	1	0.12	2395
Σ	807	100.00	
Mean weight			1391

4 Conclusions

From a comparison between PFA catches, and catches taken by the Polish fleet, it appears that both fleets are exploiting the same population of jack mackerel. The geographical distribution of the catches is nearly identical (figures 3 and 5), and so is the length composition (figures 4 and 8). This also means that the exploited population, although distributed over a wide area, is very homogeneous as regard length and age composition.

The PFA catches in the past three years show that no recruitment to the jack mackerel population has occurred in the last two years. The catches in 2009 were dominated by 35-36 cm fish, which presumably are 6 – 7 years old.

The lack of recruitment in 2008 and 2009 must have caused a decrease in population size (at least in numbers). This may partly explain the drop in CPUE of the PFA fleet during the two most recent years.

Since there has been no recruitment in two years, the average size of the fish is increasing. This may explain the earlier termination of the fishing season in recent years. In earlier years, it was observed that larger fish disappeared from the catches towards the end of the fishing season. Presumably, the larger fish are the first to start spawning. When this happens, the fish apparently change their behaviour and the schools break up in smaller schools or individual fish. The dispersed distribution of the fish then makes them unavailable to the trawlers. An overall increase in age of the population would enhance this process, and result in an earlier termination of the fishing season.