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Russian Federation Annual report

Russian Federation

Russian Federation Annual report to the 2019 SPRFMO Scientific Committee

1. Description of the fishery

1.1. Fishery in 1972-2019

Practically right after finding of the huge concentrations of jack mackerel in the South Pacific by the Russian researchers in the second half of 1970 – the first half of 1980, this species became the basic object for fishery in the area. Chub mackerel was also one of the main important species for fishery.

The development of fishery stimulated studying of biology and stock conditions of jack mackerel. Till the beginning of 1990 the main researches of oceanic jack mackerel were made by the Russian scientists. From 1955 till 1992 Russia executed 562 expeditions in the South Pacific.

The combined value of the fishery biomass of jack mackerel in the area was estimated in 25-40 mln. t (in 1980), including 16-25 mln. t in the South-East Pacific and 9-15 million t in the South-West Pacific. Considering catch as a whole it is possible to ascertain that the fishery of jack mackerel in the South Pacific in that period did not reach the level exceeding production possibilities of that species to support its abundance at stably high level. The maximum total share of withdrawal by fishery from size of all biomass of the species during 1978-2006 made approximately 6.5-10.5 %.

The information about the number vessels, which fished in the area is shown in Tables 1-2.

Table 1. Number of the fishing vessels during the fishery in the South-East Pacific from 1972 till 2019

Year	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Number of vessels	?	?	0	0	0	0	?	81	75	92
Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Number of vessels	90	92	104	113	91	93	84	113	120	110
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Number of vessels	43	3	4	3	?	0	0	0	0	0
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of vessels	0	3	3	3	0	0	1	6	1	2

Year	2012	2013	2014	2015	2016	2017	2018	2019		
Number of vessels	0	0	0	1	0	1	1	1		

Note: “?” means that the information is absent

Table 2. Number of the fishing vessels during the fishery in the South-West Pacific from 1977 till 2019

Year	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Number of vessels	?	?	?	?	4	13	13	6	4	55
Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Number of vessels	?	1	12	20	42	?	?	?	?	?
Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Number of vessels	?	?	?	0	0	0	0	0	0	0
Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number of vessels	0	0	0	0	0	0	0	0	0	0
Year	2017	2018	2019							
Number of vessels	0	0	0							

Note: “?” means that the information is absent.

The Russian catches of jack mackerel and chub mackerel from 1972 to 2019 in the South-East Pacific and from 1977 to 1999 in the South-West Pacific are presented in the Tables 3-4 and Figures 1-4. There was no Russian fishing activity in the South-West Pacific from 2000 to 2018.

The largest catch of jack mackerel (1 122 297 t) was taken in the South-East Pacific in 1990, and in 1986 (146 200 t of jack mackerel) in the South-West Pacific (Fig. 1, 3). As concerns chub mackerel, the largest catches of this species were taken in 1990 (74 168 t) and in 1991 (828 t) in the South-East and in the South-West Pacific accordingly (Fig. 2, 4).

Table 3. Russian catch of jack mackerel and chub mackerel in the South-East Pacific in tons

Catch, t	Year									
	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Jack mackerel	5500	0	0	0	0	0	49220	532209	544970	771630
Chub mackerel	0	0	0	0	0	0	1773	5800	48300	41500
Catch, t	Year									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Jack mackerel	735898	866500	1056600	837700	785000	818628	938288	1096292	1122297	591800
Chub mackerel	41878	4416	71952	38275	1920	3835	34805	28160	74168	18257
Catch, t	Year									
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Jack mackerel	32000	0	0	0	0	0	0	0	0	0
Chub mackerel	970	0	0	0	0	0	0	0	0	0
Catch, t	Year									
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Jack mackerel	0	7540	62300	7040	0	0	4800	9113	41315	8229
Chub mackerel	0	0	0	0	0	0	387	535		12
Catch, t	Year									
	2012	2013	2014	2015	2016	2017	2018	2019		
Jack mackerel	0	0	0	2561	0	3188	4685	4321		
Chub mackerel	0	0	0	463	0	37	52	44		

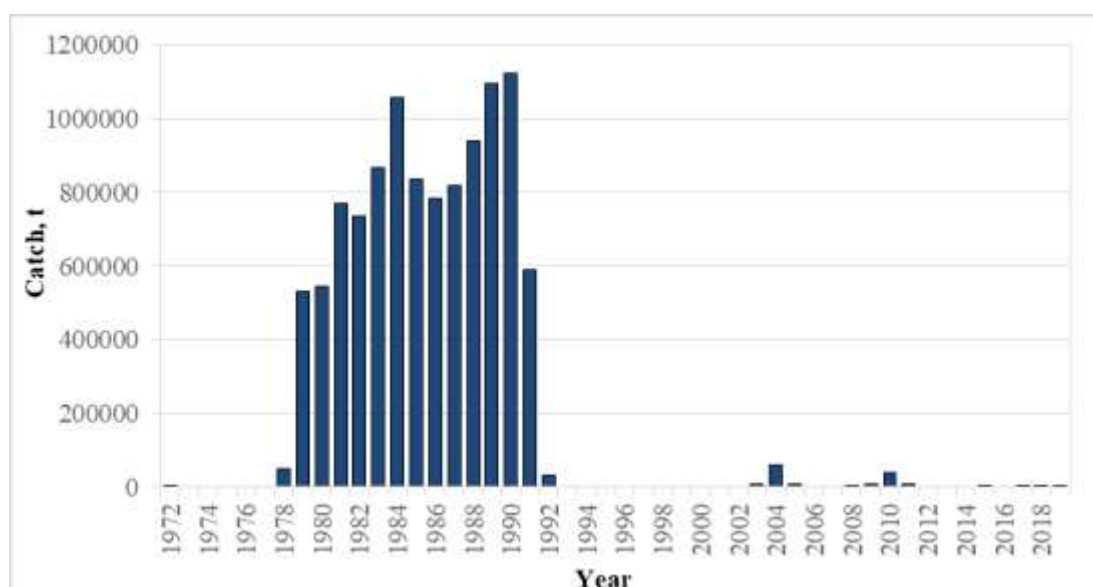


Figure 1. Russian catch of jack mackerel in the South-East Pacific

Table 4. Russian catch of jack mackerel and chub mackerel in the South-West Pacific in tons

Catch, t	Year									
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Jack mackerel	710	254	0	13	0	4953	10651	22300	133350	146200
Chub mackerel	0	0	0	0	0	0	0	0	50	0
Catch, t	Year									
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Jack mackerel	107379	58997	57243	67618	127828	2892	4586	2008	1677	2280
Chub mackerel	50	200	700	100	828	?	326	204	75	0
Catch, t	Year									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Jack mackerel	886	52	223	0	0	0	0	0	0	0
Chub mackerel	0	0	0	0	0	0	0	0	0	0
Catch, t	Year									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Jack mackerel	0	0	0	0	0	0	0	0	0	0
Chub mackerel	0	0	0	0	0	0	0	0	0	0
Catch, t	Year									
	2017	2018	2019							
Jack mackerel	0	0	0							
Chub mackerel	0	0	0							

Note: “?” means that the information is absent.

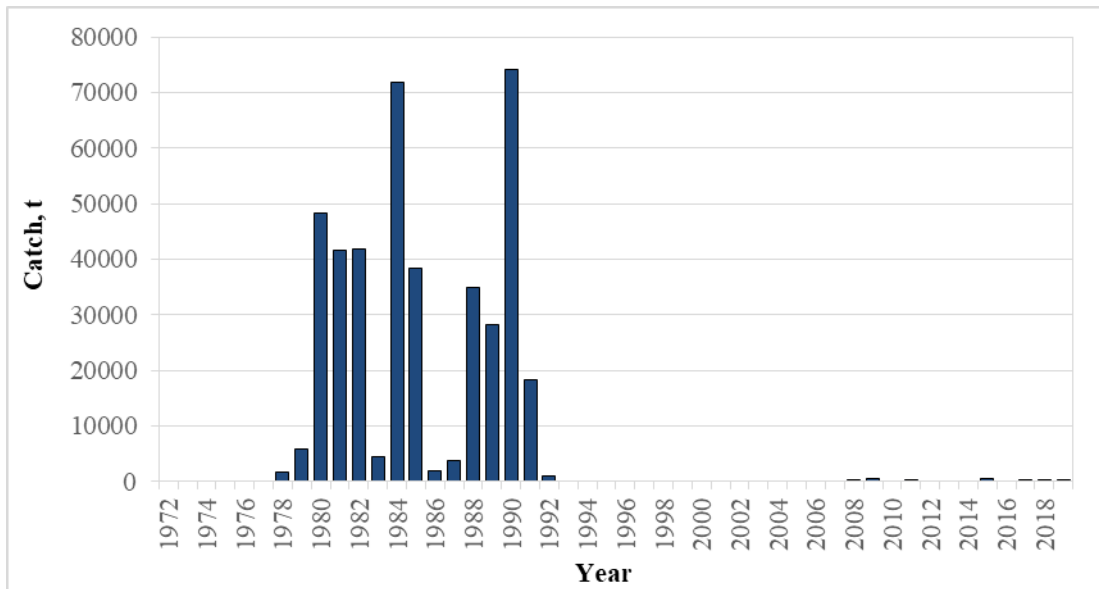


Figure 2. Russian catch of chub mackerel in the South-East Pacific

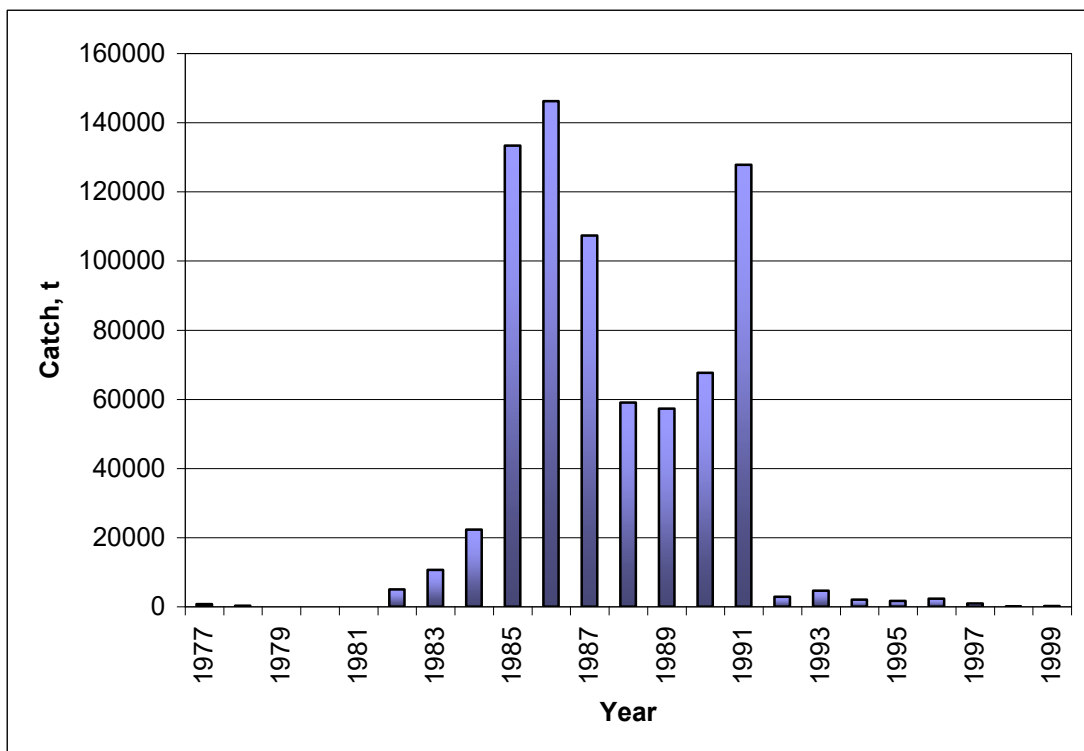


Figure 3. Russian catch of jack mackerel in the South-West Pacific

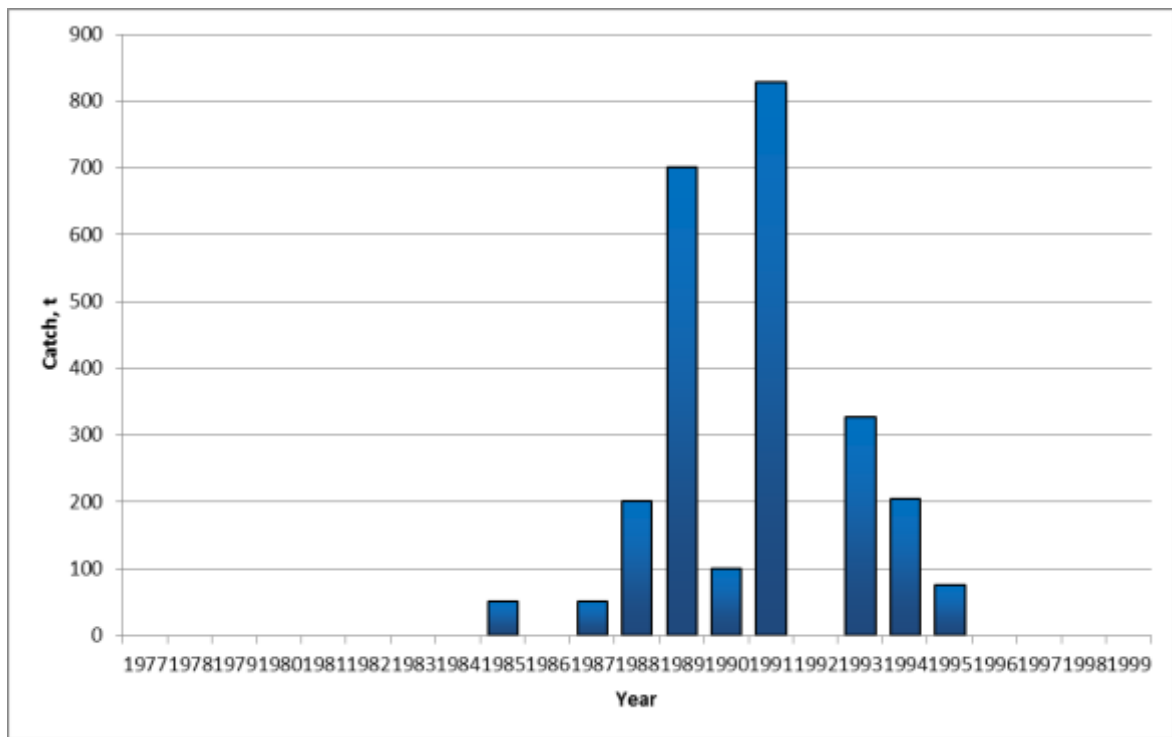


Figure 4. Russian catch of chub mackerel in the South-West Pacific

1.2. Fishery in 2008-2019

In the year 2008, the Russian trawler “Persey” caught jack mackerel and chub mackerel in the high seas of the Southeast Pacific. The total catch was 4800 t for jack mackerel and 386.74 t for chub mackerel in 62 fishing days (Tab. 5, 6, 7).

In 2009 the number of the Russian fishing fleet has increased to 6 vessels. “Germes”, “Ivan Lyudnikov”, “Semiozerno”, “Kapitan Kuznetsov”, “Atlantida” and “Lafayette” (their GT are shown in Table 5) caught jack mackerel and chub mackerel in the high seas of the South-East Pacific.

In 2011 two Russian vessels (“Leader” and “Sheriff”) worked in the high seas of the South-East Pacific (Tab. 5, 6, 7, Fig. 5).

In 2015 the Russian trawler “Alexander Kosarev” worked in the high seas of the South-East Pacific. The total catch was 2561.2 t for jack mackerel and 462.5 t for chub mackerel in 38 fishing days (Tab. 5, 6, 7, Fig. 6).

In 2017 the Russian trawler “Alexander Kosarev” worked in the high seas of the South-East Pacific. The total catch was 3188.4 t for jack mackerel and 37.4 t for chub mackerel in 52 fishing days.

In 2018, the Russian large-capacity trawler “Maironis” began to fish for jack

mackerel in the high seas of the South-East Pacific on 10 April and finished on 29 July. During this period, the vessel caught 4685 t of jack mackerel, 52 t of chub mackerel (Tab. 5, 6, 7, Fig. 8). Positions of the Russian fishing fleet in 2019 show on Fig.9.

Table 5. Russian actively fishing vessels for 2008-2017

Year	Name	GT
2008	Persei	4638
2009	Germes	4629
2009	Ivan Lyudnikov	6144
2009	Semiozerno	6231
2009	Kapitan Kuznetsov	6231
2009	Atlantida	2062
2009	Lafayette	49173
total for 2009		74470
2010	Lafayette	49173
2011	Leader	6144
2011	Sheriff	6232
total for 2011		12376
2012	no	no
2013	no	no
2014	no	no
2015	Alexander Kosarev	7765
2016	no	no
2017	Alexander Kosarev	7765
2018	Maironis	7765
2019	Alexander Kosarev	7765

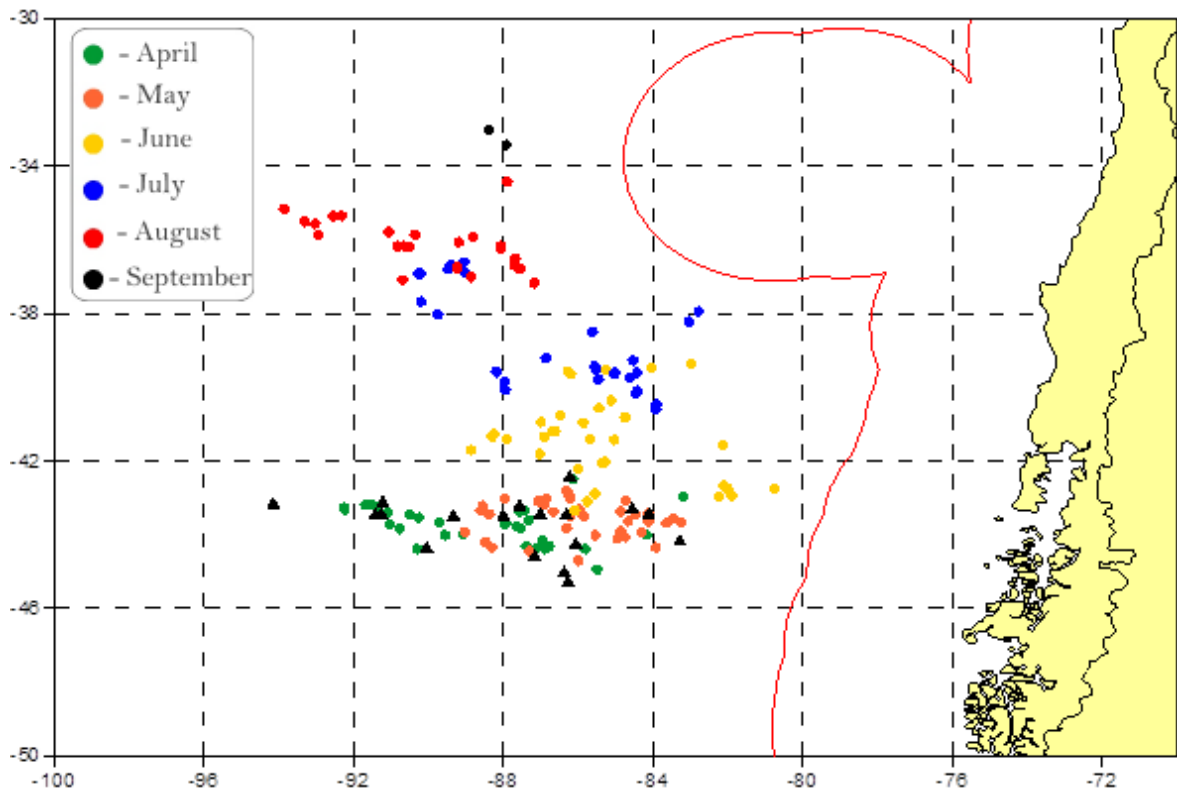


Figure 5. Positions of the Russian Federation fleet by month in 2011

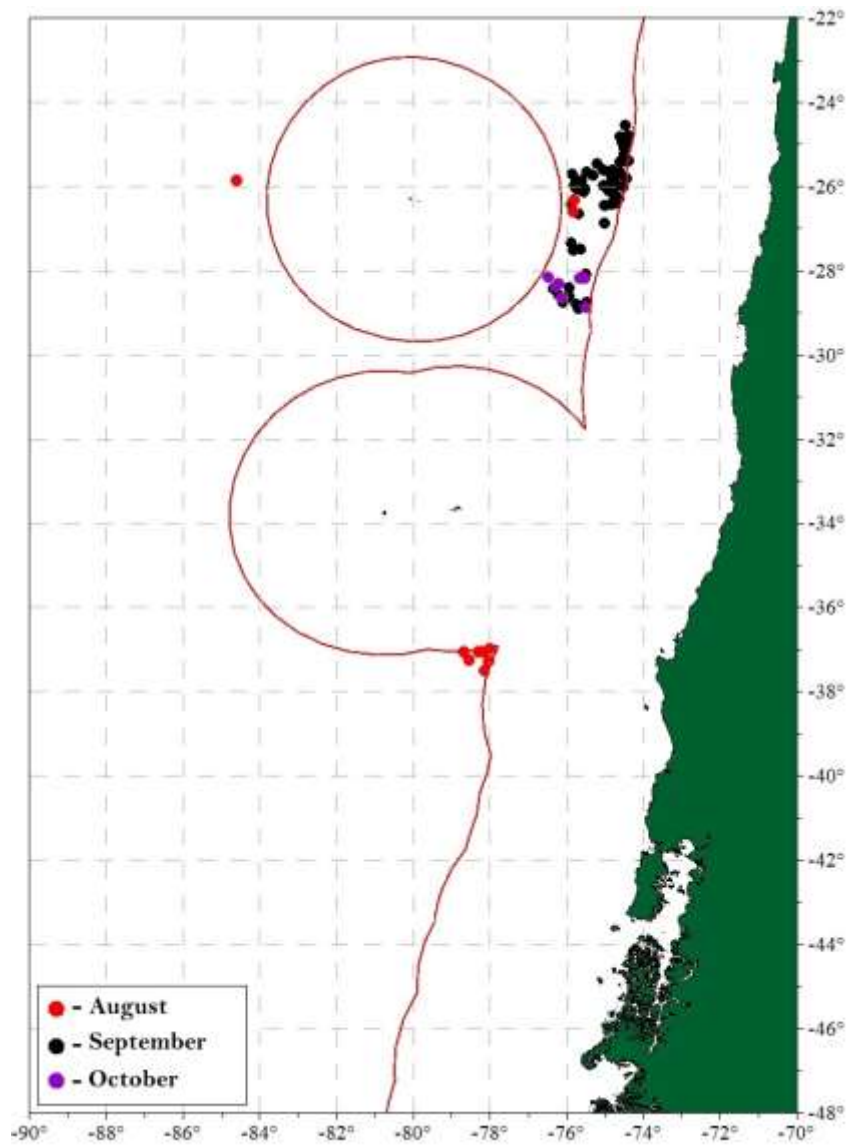


Figure 6. Positions of the Russian Federation fleet by month in 2015

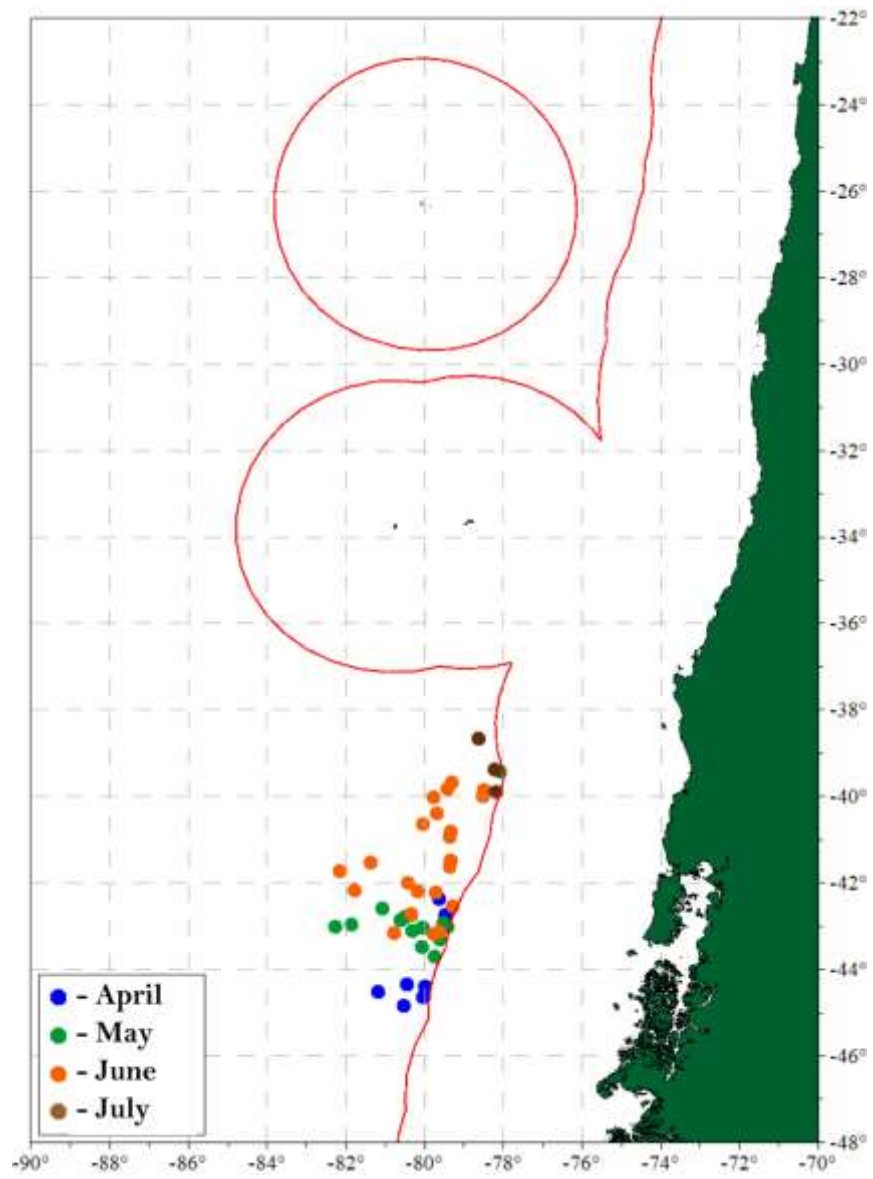


Figure 7. Positions of the Russian Federation fleet by month in 2017

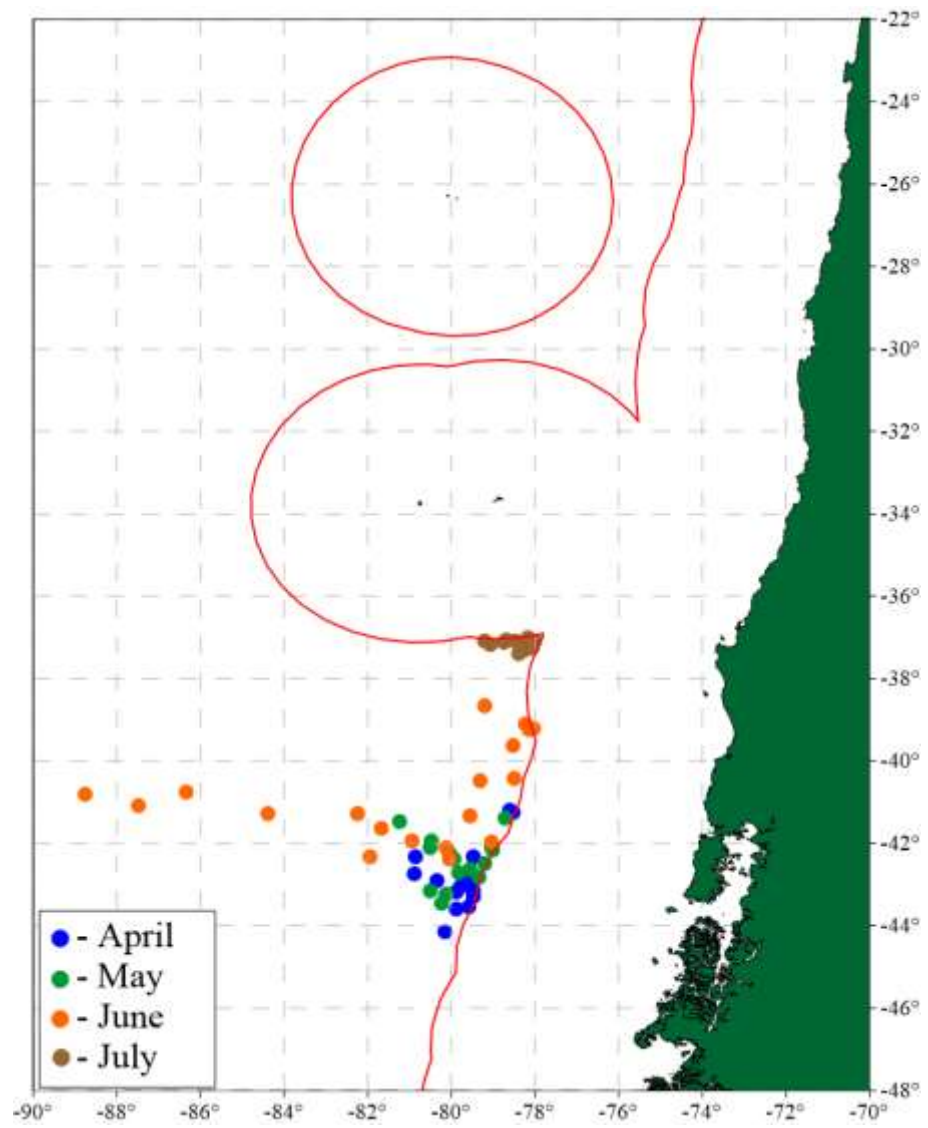


Figure 8. Positions of the Russian trawler “Maironis” in the fishery in 2018

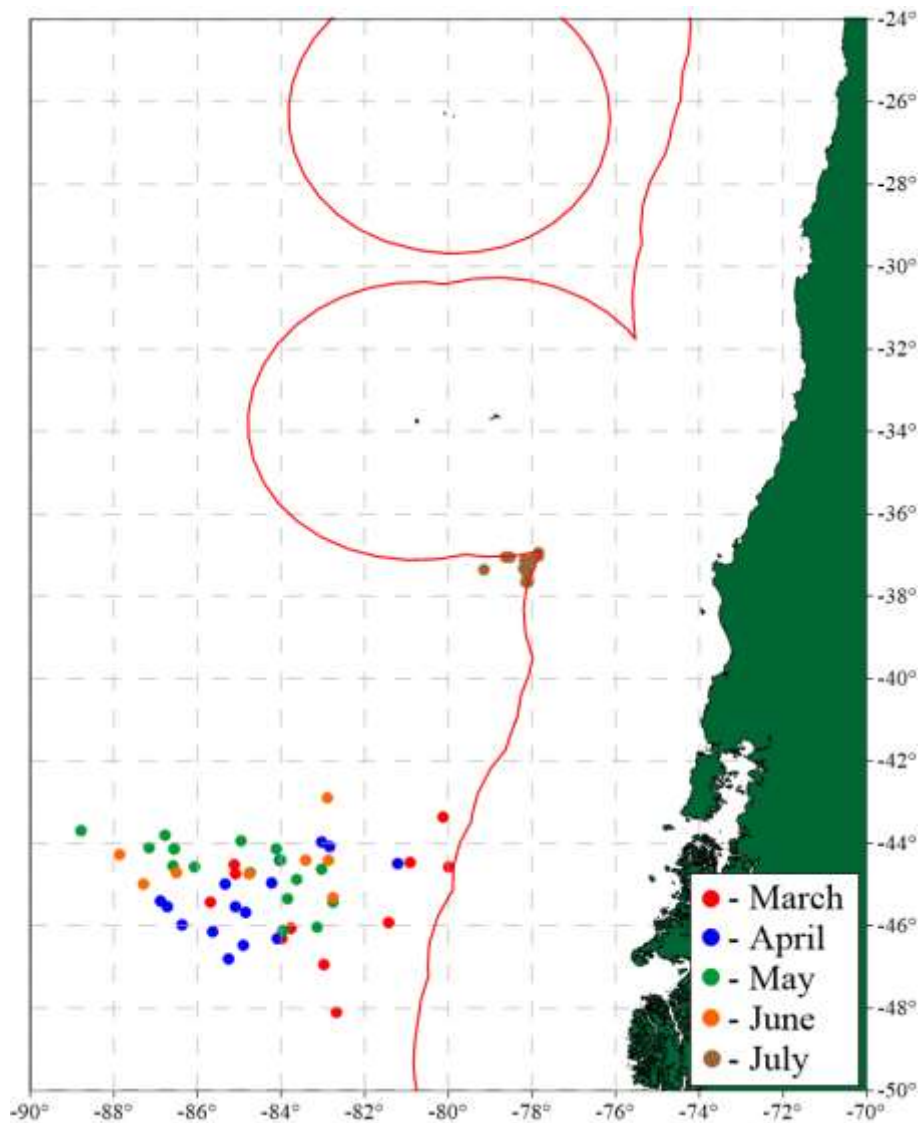


Figure 9. Positions of the Russian trawler “Alexander Kosarev” in the fishery in 2019

The vessels which were involved in this fishery used single midwater trawls. They operated in the area from 31°20 S to 38°52 S and from 85°20 W to 100°38 W in 2008, from 34°39 S to 43°59 S and from 79°03 W to 126°04 W in 2009, from 32°51 S to 45°32 S and from 80°30 W to 94°38 W in 2011, from 24°32 S to 37°31 S and from 74°24 W to 84°38 W in 2015, from 39°18 to 43°12 S and from 78°12 to 82°00 W in 2017. In 2018, the fishery was carried out in the water area between 38°30-44°10 S from 78°10 to 89°40 W. In 2019, the Russian trawler operated in the area from 43-48° S from the zone of Chile to 88°W from March to June, in the area between 37-38°S near the EEZ of Chile in July.

Table 6. The information about fishery in the high seas of the South Pacific in 2008-2019

Year	Number of vessels	Number of tows	Number of fishing days
2008	1	96	62
2009	6	235	153
2010	1		
2011	2	208	182
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	1	89	38
2016	0	0	0
2017	1	76	52
2018	1	134	70
2019	1	118	66

The Russian vessels operated in the area from July till October 2008, from May to September 2009, from March to October 2011, from August to October 2015, from April to July 2017-2018. In 2019, the Russian vessel began fishing in March, while preparing the report, fishing continued. The main catch of jack mackerel and chub mackerel in 2008 was taken in September, the main catch of both species was taken in July 2009, in 2011 the main catch of jack mackerel and chub mackerel was taken in April, in 2015 the main catch of jack mackerel and chub mackerel was taken in September, in 2017 the main catch of jack mackerel and chub mackerel was taken in May as well as in 2018 (Fig. 10, 11).

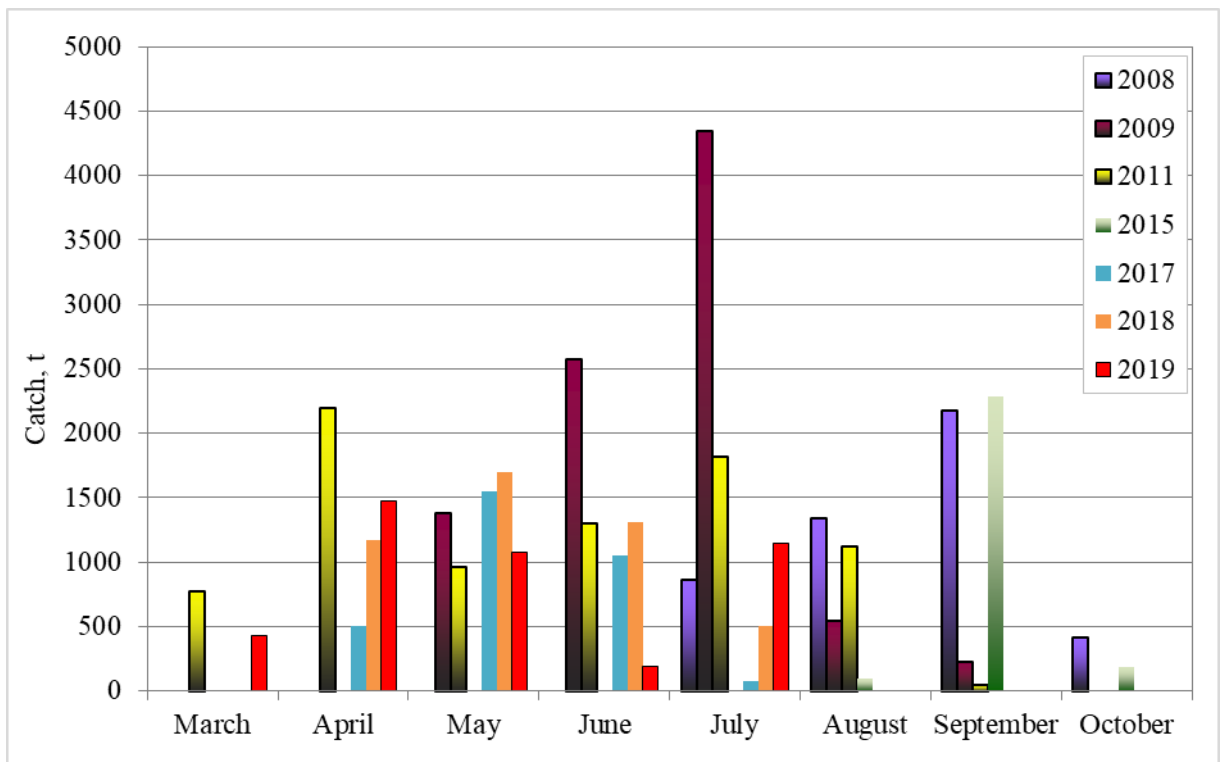


Figure 10. Monthly catches of jack mackerel by the Russian vessels in 2008, 2009, 2011, 2015, 2017, 2018 and 2019

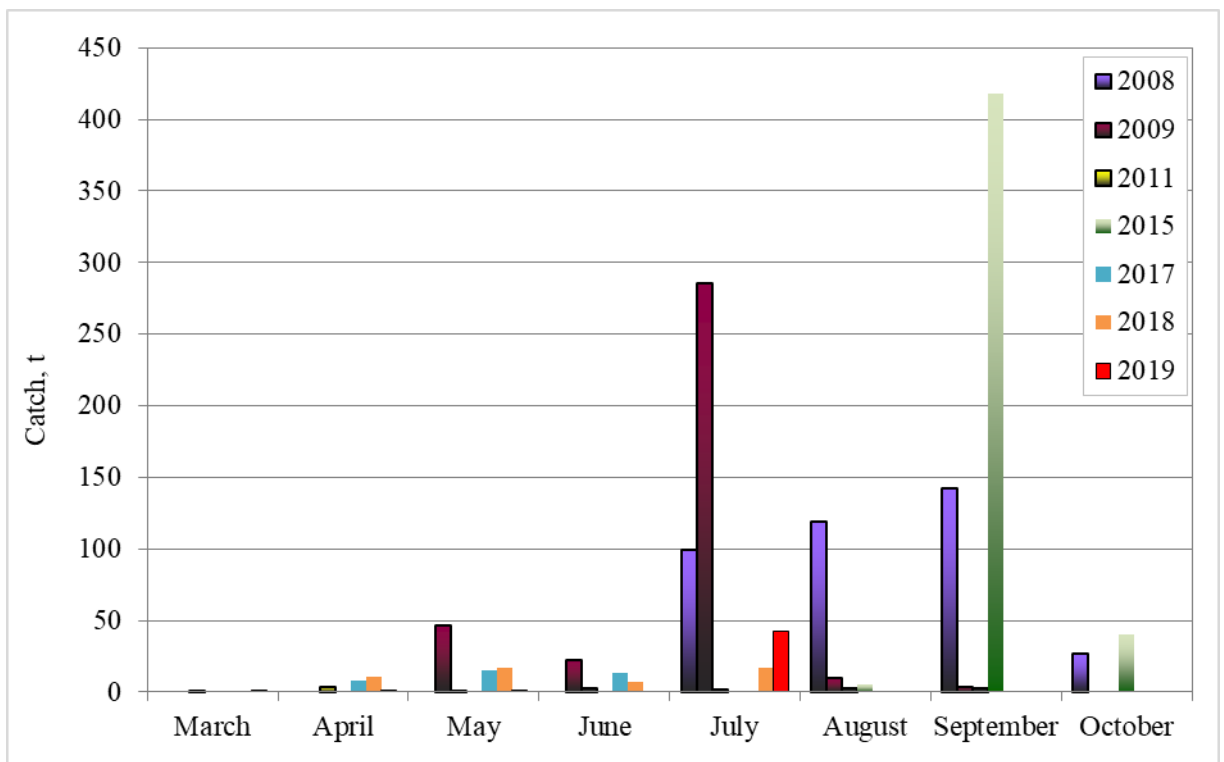


Figure 11. Monthly catch of chub mackerel by the Russian vessels in 2008, 2009, 2011, 2015, 2017, 2018 and 2019

In 2015 the Russian large-capacity freezing trawler “Alexander Kosarev” (vessel length - 120 m, gross tonnage – 7 765 t, fishing gear - midwater trawl) started fishing in the Convention area of the SPRFMO to the south of the Juan Fernandez Islands (Chile) in August where 8 vessels from other countries had already been operating. The vessels were fishing for jack mackerel in the area between 37-38°S and 78-79°W. Fishing conditions were very poor, catches obtained by the trawler “Alexander Kosarev” ranged from 1 to 20 t per tow, daily catches did not exceed 20-30 t per fishing day. In the third decade of August fishing conditions even more deteriorated, and all the vessels went to search. The Russian trawler “Alexander Kosarev” doubled westward the area of the Juan Fernandez Islands and got to the underwater mountain of the Salas y Gómez Ridge. At the seamount with the coordinates 25°51 S, 84°38 W in the pelagic layer of 150-200 m above 400 m depth a control hourly trawling was performed. The catch made up 30 t of spawning redbait (*Emmelichthys nitidus*) with the length of 20-30 cm, modal length class of 24 cm, and with average weight of 154 g. On 31 August - 1 September the Russian trawler got to the area between the island zones and the continental EEZ of Chile, where jack mackerel concentrations were found and all fishing vessels centered. The fishing conditions were unsustainable there but much better than in the area south of the Juan Fernandez Islands zone. Vessels were operating in the waters between 24.5-29°S and 74.4-76°W performing trawlings in the surface layer within 24 hours. Catches of the trawler “Alexander Kosarev” ranged from 2 to 100 t per trawling, daily performance in September averaged approximately 100 t per fishing day. Catches consisted of jack mackerel, chub mackerel often occurred in by-catch. In early October, the fishing conditions got worse, on 7 October the Russian fishing vessel finished fishing operations.

In 2017 the Russian trawler "Alexander Kosarev" began fishing on April 23. Until the end of the month, fishing activity took place in the area between 42°00`-45°00` S, with a slight distance from the Chilean EEZ. In May-June, the Russian trawler, together with the vessels of other countries, gradually shifted to the north and worked in the area between 39°30`-43°20` S and 78°20'- 82°00 W. Trawling was carried out mainly in the near-surface layer 0-50 m. The catches widely fluctuated from 5-15 to 80-120 t per trawling. The average CPUE of the Russian trawler "Alexander Kosarev"

in April was about 65 t, in May - 87 t, in June – 48 t for fishing day. In the beginning of July chub mackerel stocks were dispersed, the catches did not exceed 20 tons per trawl, on July 4 the Russian trawler stop fishing in the Convention Area.

The beginning of the fishing by the Russian large-capacity trawler “Maironis” in 2018 took place in the Convention Area of the SPRFMO Commission on 10 April. Until the third decade of June, the Russian vessel, together with the Lithuanian trawler and two Chinese trawlers, operated within the water area $39^{\circ}10-44^{\circ}10$ S, $78^{\circ}05-82^{\circ}15$ W gradually shifting in the northern direction. The fishing conditions were unstable, jack mackerel concentrations were of a local nature and very active. Usually, vessels carried out fishing for jack mackerel in the nighttime, performing trawling in the 5-80 m surface layer. The catches varied widely, with deterioration in the conditions they ranged from 10 to 30 t per trawling, during improvement periods they reached 60-100 t per trawling. In daytime jack mackerel schools dropped to depths of more than 100 m and dispersed, fishing for them was inefficient, the catches did not exceed 1 to 5 t per trawling. In the third decade of June, concentrations of large jack mackerel with a modal class of 47 cm in length were found, which rapidly moved westward in the zone between $41^{\circ}05-41^{\circ}25$ S from 84 to 90° W. The results of fishing for these concentrations were approximately the same as in the eastern positions. At the end of June, the Russian trawler temporarily stopped fishing because of the need of repair and crew change. In the second half of July, the vessel continued fishing but due to poor fishing conditions it was completed on 29 July.

The average CPUE of the trawler “Maironis” in April was 66.1 t, in May - 93.3 t, in June - 70.5 t, in July – 43.6 t per fishing day.

During the period from 10 April to 29 July, the Russian vessel caught 4685 t of jack mackerel and 52 t of chub mackerel.

In 2019, the Russian trawler “Alexander Kosarev” carried out the fishery for jack mackerel together with 3-4 large-capacity vessels from the European Union, China and the Republic of Korea. From March to June, the fleet controlled the water area between $43-48^{\circ}$ S from the zone of Chile and 88° W. Fishing conditions were unsustainable. The fishery was based on catching large jack mackerel concentrations with prevailing length of 43-46 cm and with average mass of 800-1000 g. This fish was characterized by high

activity. The best catches were recorded in the night time when jack mackerel was going to layers 30-60 m, the density of schools was on the increase. In day time jack mackerel schools moved at a high rate of speed, dropped to depths of 80-100 m and lower, they were poorly caught. The highest CPUE of the trawler “Alexander Kosarev” was recorded in April - 99.3 t per fishing day, it decreased to 62.6 t per fishing day in May and it was especially low in June – 29.4 t per fishing day which was largely due to a significant deterioration in weather conditions.

In mid-July, after landing fish products and repairing vessel mechanisms, the trawler “Alexander Kosarev” renewed fishing at the junction of the Juan Fernandez Islands zone and the mainland of Chile between 37-38°S. Concentrations of smaller jack mackerel with a dominant length of 31-36 cm and the average weight of 540 g were found here. These concentrations were more constant than large fish concentrations, the catches of the Russian trawler increased, the average catch was 80.1 t per fishing day for July.

During the period from 19 March to 31 July, the Russian trawler “Alexander Kosarev” caught 4321 t of jack mackerel and 44 t of chub mackerel in total.

Catch, effort and CPUE summaries

Development of catches and efforts in fishing of jack mackerel and chub mackerel by the Russian vessels is presented in the Tables 7, 8.

Table 7. Catches and CPUE for jack mackerel and chub mackerel fishery in the SPRFMO area by year

Year	Catch per day, t	Catch, t		Catch per hour, t	
	jack mackerel	jack mackerel	chub mackerel	jack mackerel	chub mackerel
2008	77.419	4800	386.74	10.06	0.84
2009	59.563	9113.2	534.93	7.94	0.57
2010		41315			
2011	45.213	8228.8	12.41	5.45	0.05

2015	69.222	2561.2	462.5	5.88	1.13
2017	61.315	3188.4	37.4	6.6	0.2
2018	67.905	4685.5	52.4	5.7	0.1
2019	65.463	4320.5	43.9	6.2	0.06

Table 8. The average monthly catch and CPUE of jack mackerel and chub mackerel by the Russian vessels in the Southeast Pacific in 2008-2019

Month	Catch, t		Catch per hour, t	
	jack mackerel	chub mackerel	jack mackerel	chub mackerel
2008				
July	866.12	99.66	19.13	2.22
August	1344.21	118.65	9.81	0.86
September	2173.45	142.09	10.66	0.75
October	416.21	26.34	2.87	0.18
2009				
May	1377.11	46.86	8.18	0.28
June	2575.17	22.33	7.82	0.64
July	4347.26	285.39	8.52	0.84
August	543.44	9.84	5.21	0.11
September	220.90	3.08	6.33	0.07
2011				
March	772.12	1.20	5.43	0.04
April	2197.31	3.41	5.15	0.20
May	964.66	0.52	2.91	0.01
June	1302.56	3.00	3.60	0.03
July	1822.08	1.80	10.63	0.03
August	1122.68	2.30	7.51	0.03
September	47.42	2.89	0.18	0.03
2015				
August	91.62	4.88	1.99	0.20
September	2279.80	417.64	6.53	1.21
October	189.80	39.98	4.69	0.99
2017				
April	508.5	8.2	7.9	0.2
May	1551.4	15.5	7.6	0.2
June	1051.7	13.1	5.6	0.1
July	76.8	0.6	2.6	0.1

2018				
April	1173.1	11.0	6.6	0.1
May	1697.7	17.1	6.8	0.1
June	1308.7	7.0	5.9	0.03
July	506.0	17.3	3.5	0.15
2019				
March	431.8	0.6	3.7	0.01
April	1477.6	0.3	9.6	
May	1075.0	0.2	5.6	
June	192.7		3.3	
July	1143.4	42.8	6.4	0.24

The CPUE of jack mackerel and chub mackerel in July-October 2008, May-September 2009, March-August 2011, August-October 2015, April-July 2017, April-July 2018 and March-July 2019 are shown in the Figures 12 and 13.

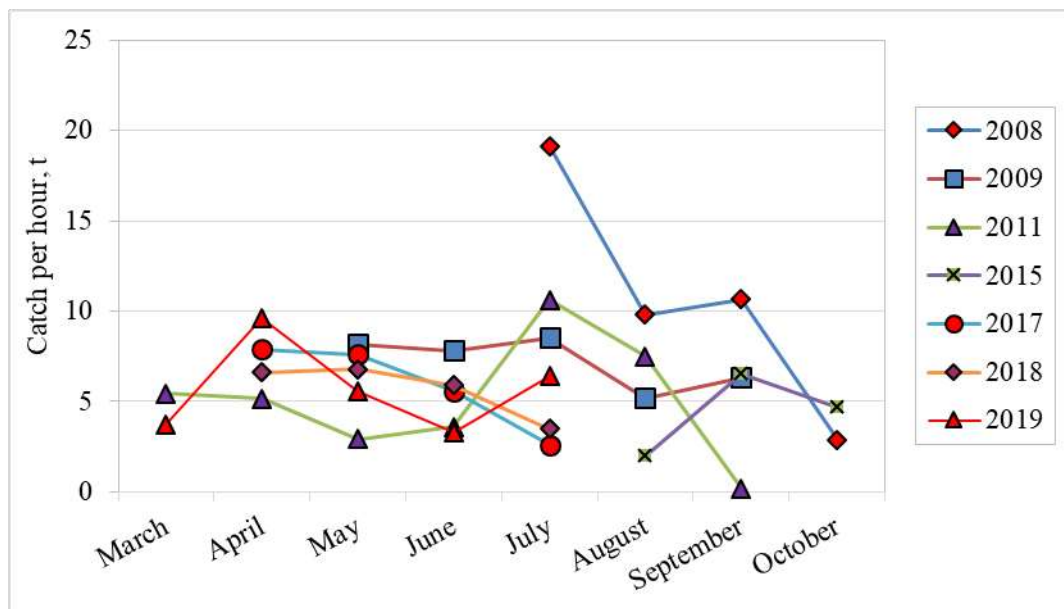


Figure 12. CPUE of jack mackerel in 2008, 2009, 2011, 2015, 2017, 2018 and 2019

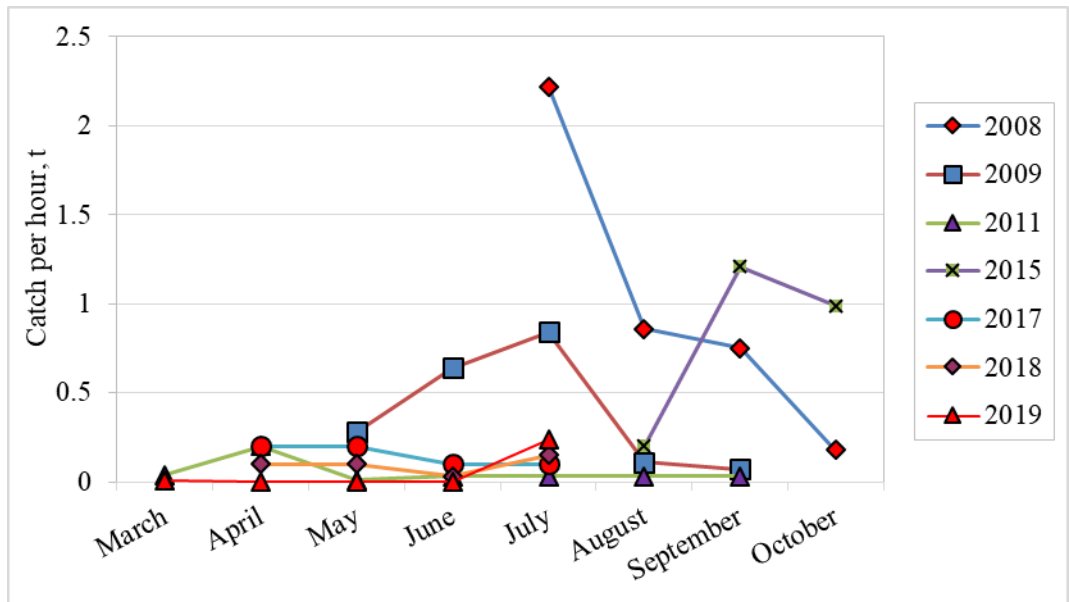


Figure 13. CPUE of chub mackerel in 2008, 2009, 2011, 2015, 2017, 2018 and 2019

3. Fisheries data collection and research activities

3.1. Collection of haul-by-haul information from the captains

Each trawler provided the detailed information for each individual haul. That information contained data about the vessel and the trawl; tow start and end date and time; tow start and end position; height and width net opening; gear and bottom depth; intended target species and the catch data.

The size of the individual catches was estimated.

3.2. Data collection by observers at sea

In accordance with the SPRFMO recommendation on Data and Information Working Group, this program attempted to obtain at least 10% coverage of all hauls made by the fleet. For this purpose, observers were onboard of the Russian vessel during the fishing in 2008.

In 2009 the observers were onboard of fishing vessel “Germes” and onboard of R/V “Atlantida”. 30.64% of hauls were observed.

In 2011 the observer worked onboard of the vessel “Leader”. 33.17% of hauls were observed.

The data on vessel, fisheries and biological information were recorded onboard of commercial vessel of distant-water fisheries.

The Russian scientific observer was onboard the trawler “Alexander Kosarev” during the whole period of activities in 2015. Observations covered 80 hauls of 89 (89.9%).

The Russian scientific observer was onboard the trawler “Alexander Kosarev” during the whole period of activities in 2017. Observations covered 62 hauls of 76 (81.6%).

In April-July 2018, the Russian scientific observer was constantly onboard the trawler “Maironis”. Observations covered 85 hauls of 134 (63.4%).

In March-June 2019, the scientific observer was also constantly onboard the trawler “Alexander Kosarev”. Observations covered all 118 completed hauls (100 %).

4. Biological sampling and length/age composition of catches

Biological sampling for mid-water trawl catch has been carried out to obtain the

length data on jack mackerel and chub mackerel. The Figures 12-13 present the length composition for 2008, 2009 and 2011.

A total of 2400 specimens of jack mackerel and 2400 specimens of chub mackerel were measured in 2008, compared to 5766 and 576 in 2009 and 11131 and 266 in 2011, respectively.

Jack mackerel of 34-37 cm, 34-36 and 18-20 cm, 32-35 and 40-43 cm dominated in catches in 2008, 2009 and 2011 respectively (Fig. 14).

Chub mackerel of 35-38 cm dominated in catches in 2008, specimens of 27, 30 and 34-35 cm dominated in 2009 and fish of 32-37 cm dominated in 2011 (Fig. 15).

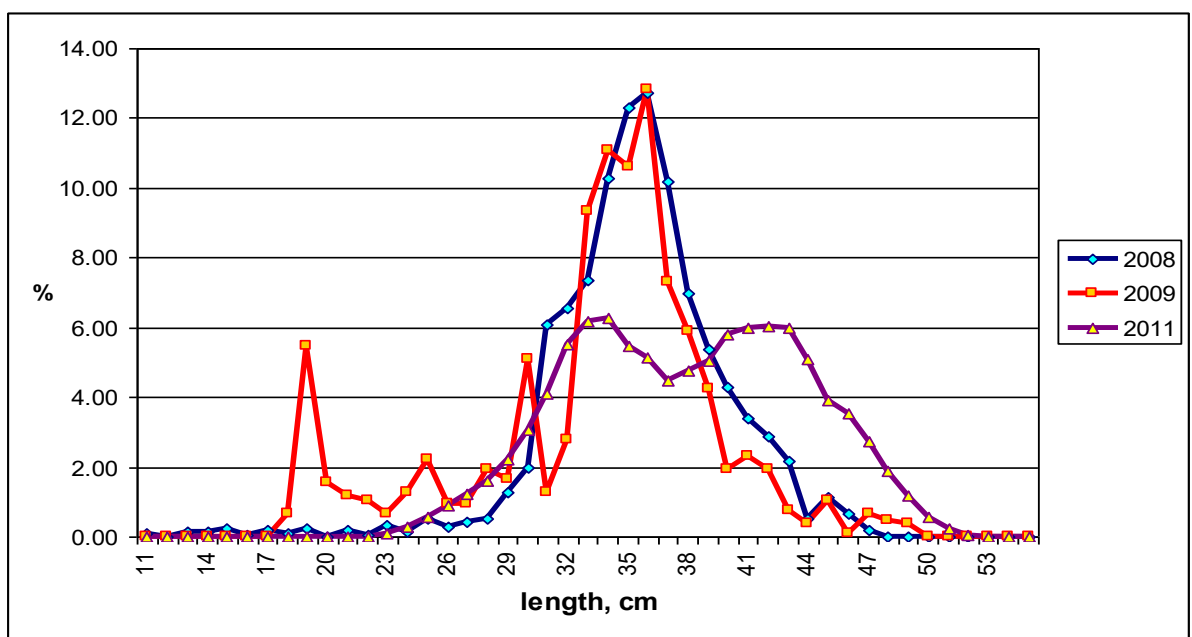


Figure 14. Length composition of jack mackerel in spring-autumn 2008, 2009 and 2011

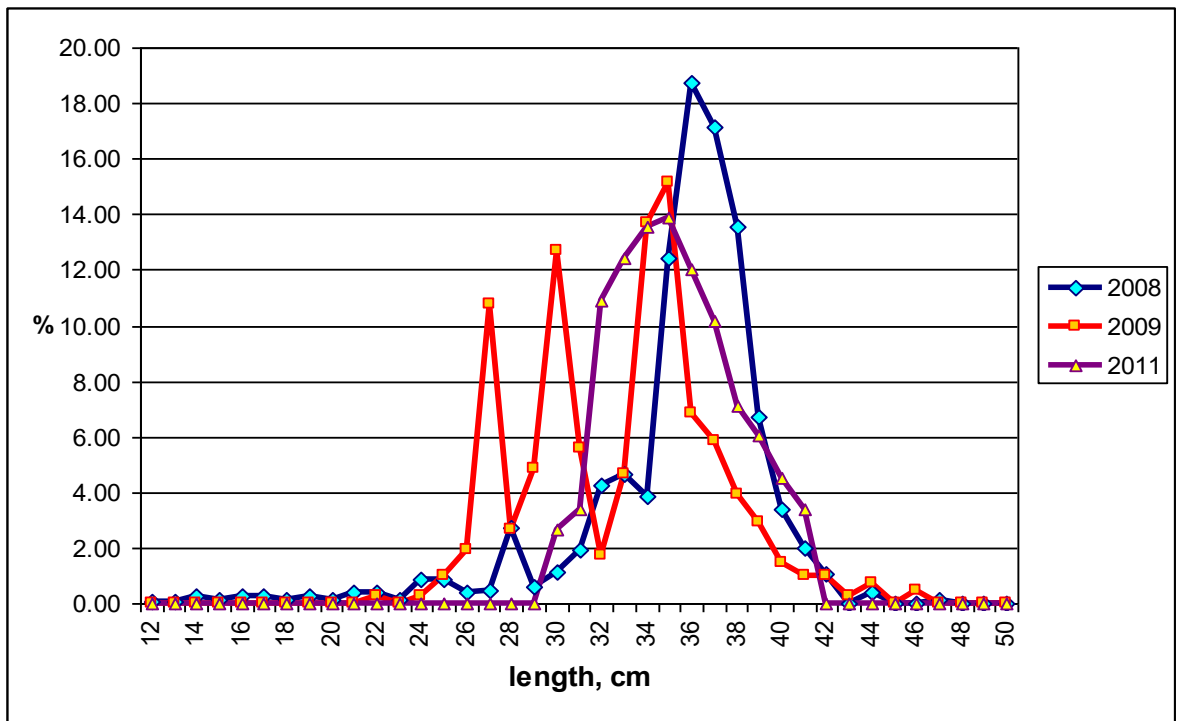


Figure 15. Length composition of chub mackerel in summer-autumn 2008, 2009 and 2011

The average length of jack mackerel and chub mackerel by ten-day period in 2008, 2009 and 2011 are shown in Figures 16-17.

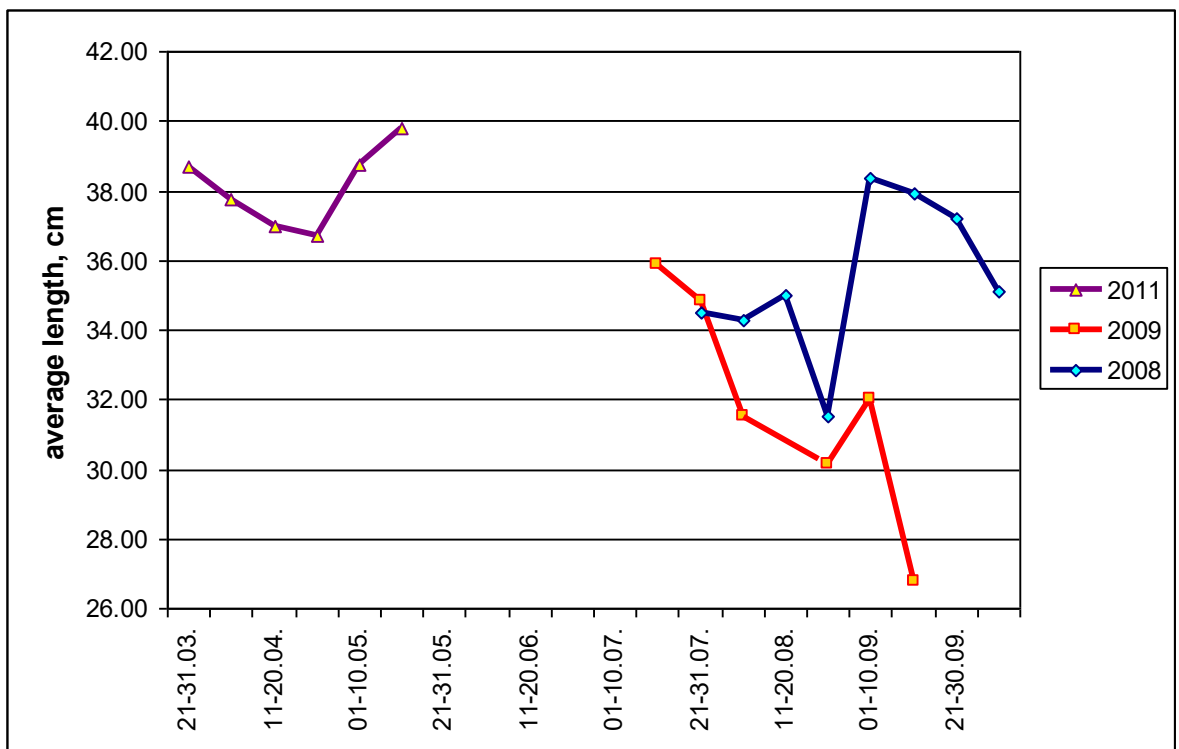


Figure 16. Average length of jack mackerel by ten-day period in 2008, 2009 and 2011

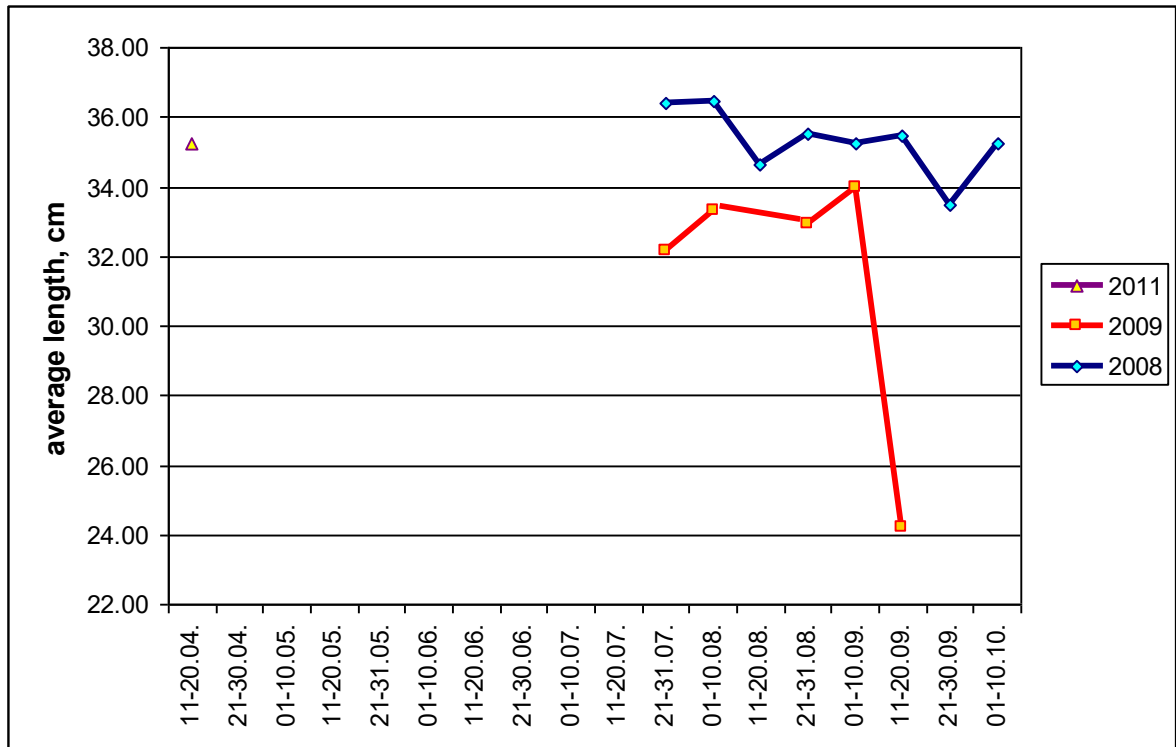


Figure 17. Average length of chub mackerel by ten-day period in 2008, 2009 and 2011

According to our data for 2008-2011 the occurrence of jack mackerel juveniles in the catches increased in advancing from the east to the west, causing a decrease in the average sizes of fish in the catches (Fig. 18).

According to the Russian data in 1979-2002 the average length of jack mackerel, on the contrary, decreased in a direction from the west to the east, that is, off the coast of the South America the smallest jack mackerel was caught. According to the data collected during the cruise of R/V “Atlantida” in 2009, the average length of jack mackerel in catches increased at advancement in the east direction of the water area from 126° W to 74° W.

Thus, since 2008 abundance of jack mackerel juvenile which was found in the coastal waters was essentially reduced in comparison with the period from 1979 to 2002.

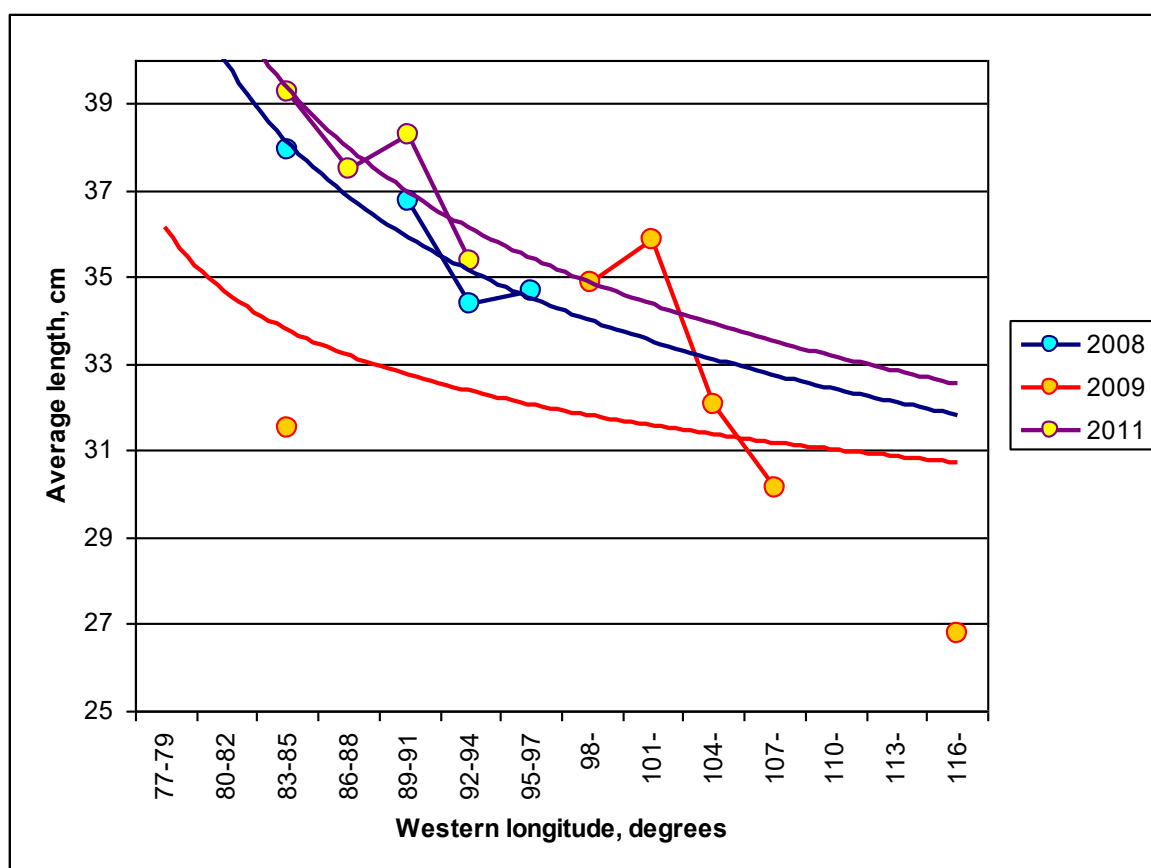


Figure 18. The average length of the jack mackerel in the catches on different meridians in 2008-2011

In 2015, 22942 specimens of jack mackerel and 9090 specimens of chub mackerel were measured. There was a significant difference in size composition of jack mackerel in the southern and northern fishing areas of RTMKS “Alexander Kosarev”. As for the area to the south of the Juan Fernandez Islands zone, catch consisted of different-sized fish with the modal length classes of 28, 35 and 40 cm (Fig. 19). Size composition of jack mackerel in the catches was homogeneous (a dominance of 26 cm length specimens observed) in the northern area between the island zones and the continental area of Chile (Figures 19, 21).

There was few chub mackerel in the southern area, measurements were not made. Chub mackerel of bigger size with a dominating length of 34-35 cm occurred in the northern area (Figures 20, 22).

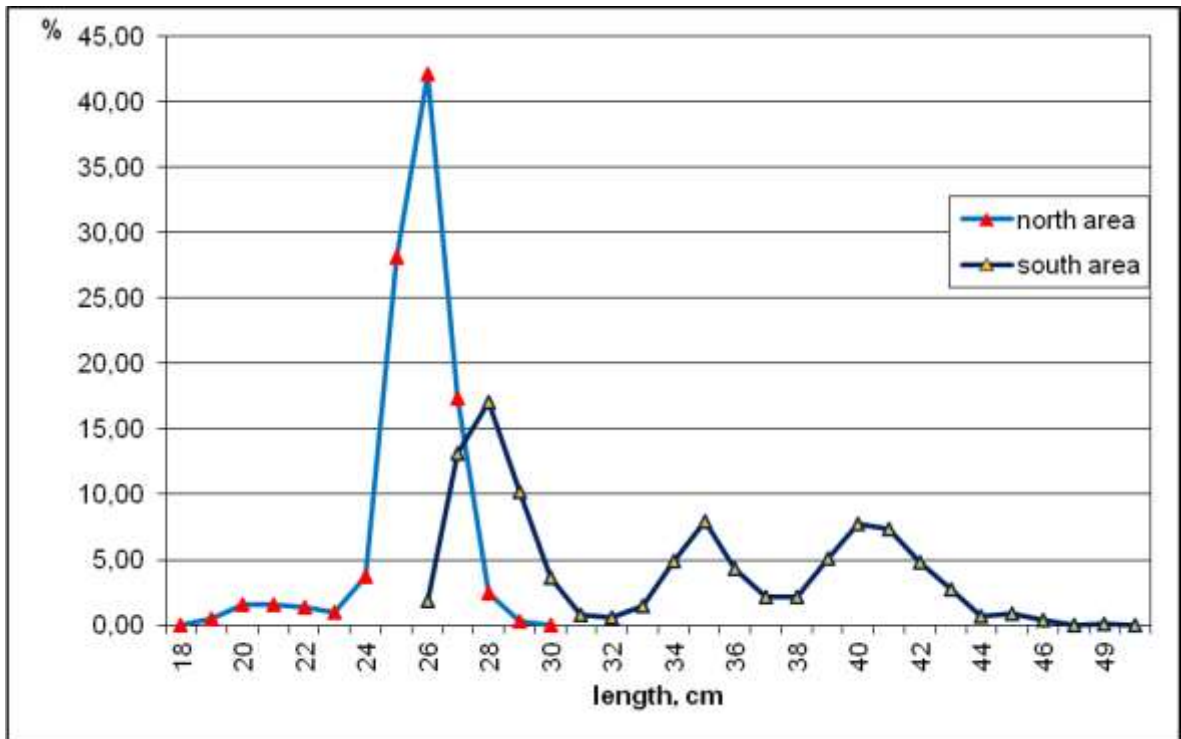


Figure 19. Length composition of jack mackerel in summer-autumn 2015

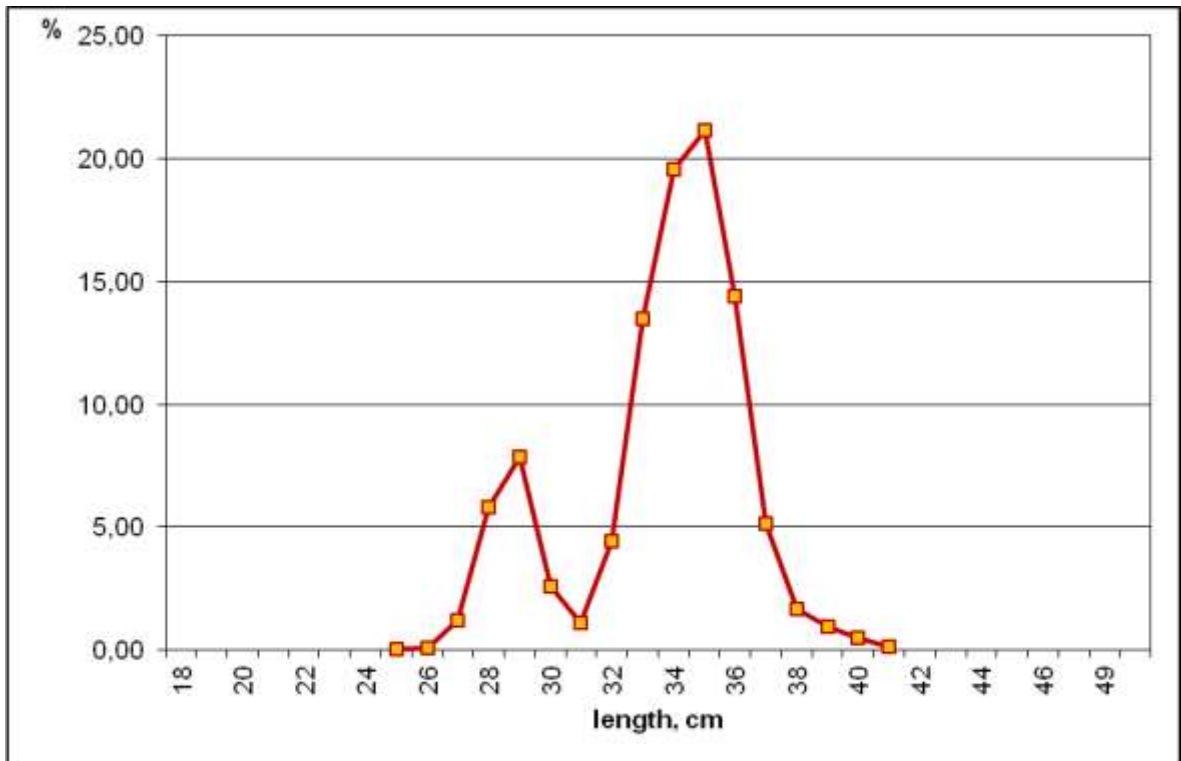


Figure 20. Length composition of chub mackerel in summer-autumn 2015 (north area)

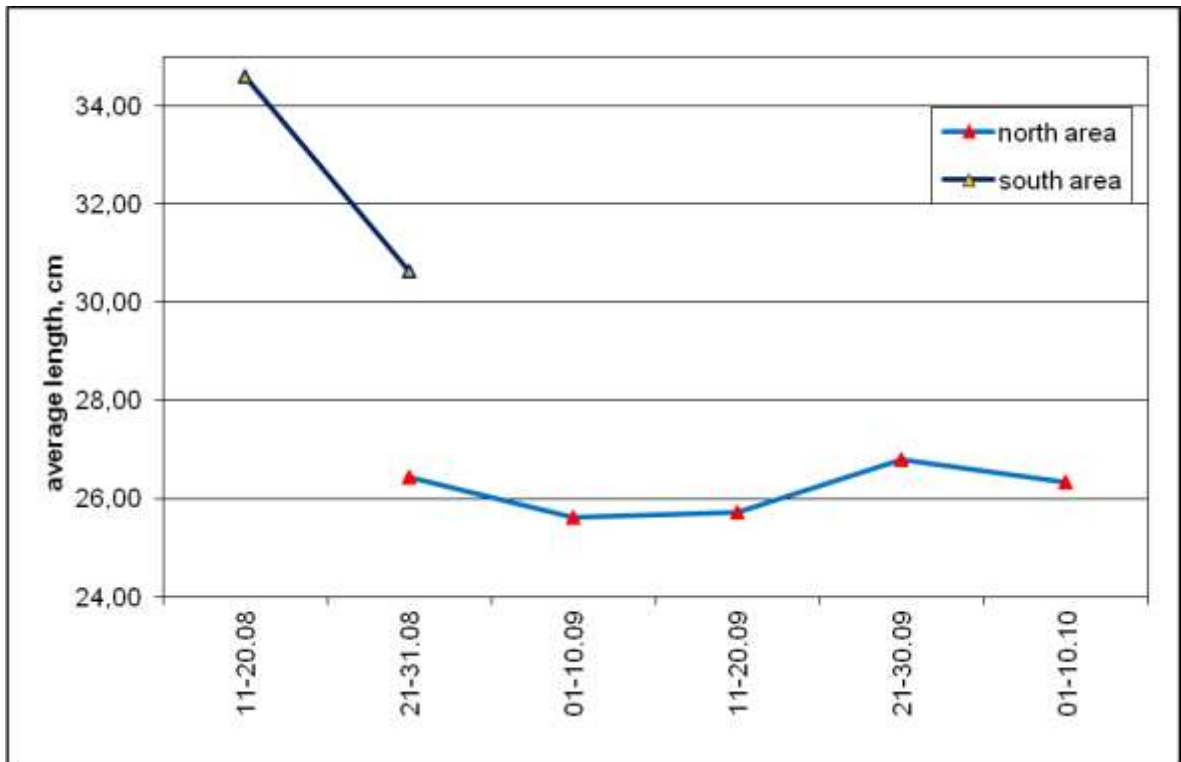


Figure 21. The average length of jack mackerel by ten-day period in 2015

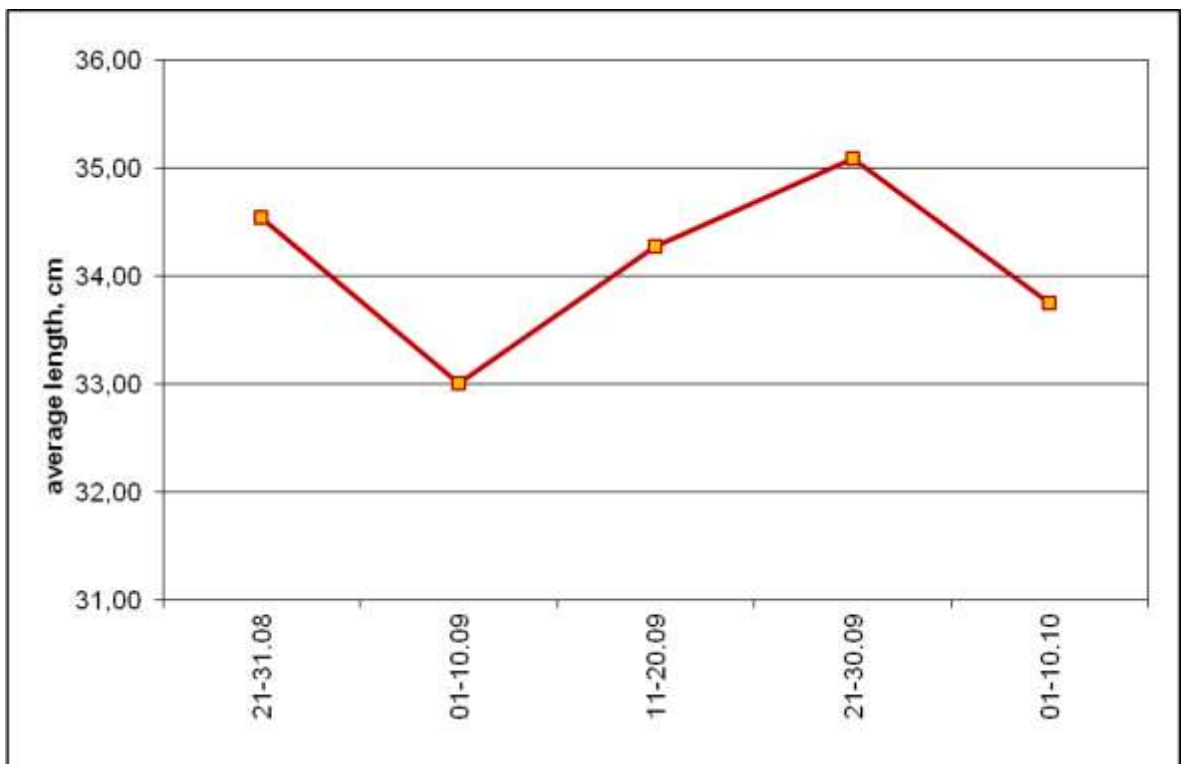


Figure 22. The average length of chub mackerel by ten-day period in 2015 (north area)

In 2017, 14803 specimens of jack mackerel, 1112 specimens of chub mackerel were measured. 2,100 specimens of jack mackerel, 800 specimens of chub mackerel

were fully analyzed, according to CMM's. For 600 specimens of jack mackerel the age samples were taken. 70 bird observations were performed.

The size composition of the fished jack mackerel during the entire period of operations did not change significantly. The individuals 32-38 cm length predominated, the modal length class was constantly equal to 36 cm (Fig. 23).

The amount of chub mackerel in the catches of the Russian trawler "Alexander Kosarev" in 2017 was low (Fig. 24). According to the results of the measurements, the dominance of fish with a length of 37 cm is clearly distinguished.

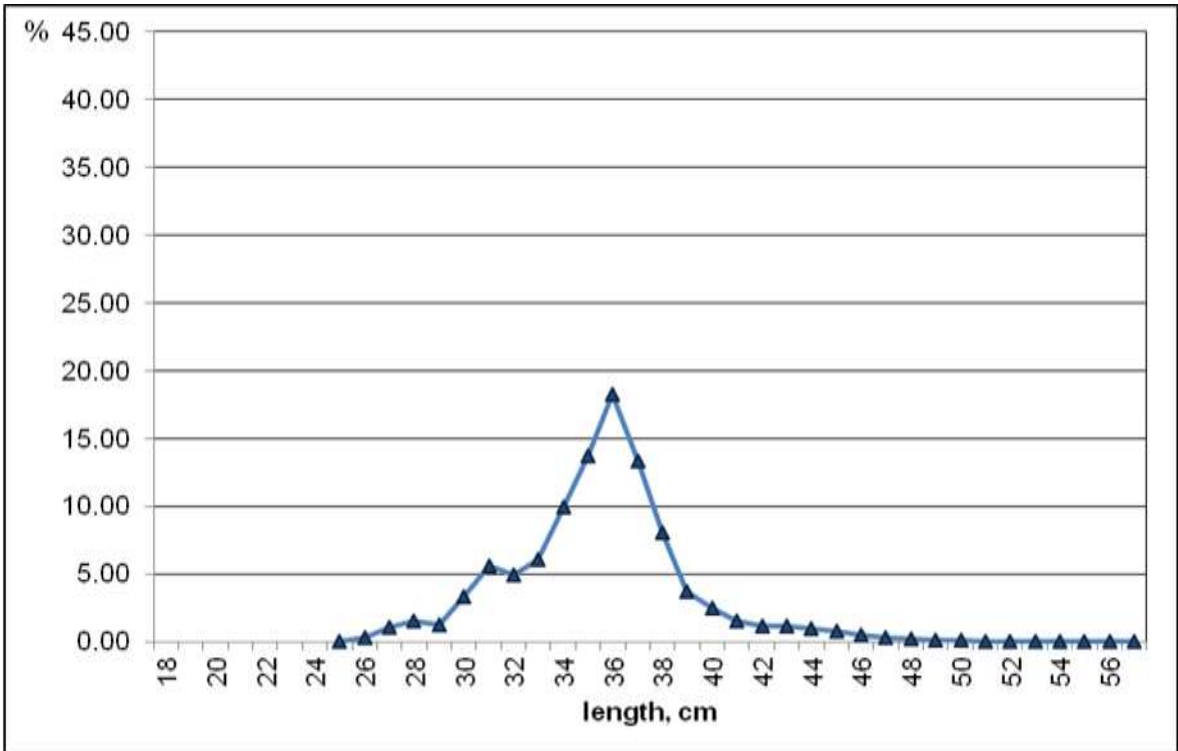


Figure 23. Length composition of jack mackerel in spring-summer 2017

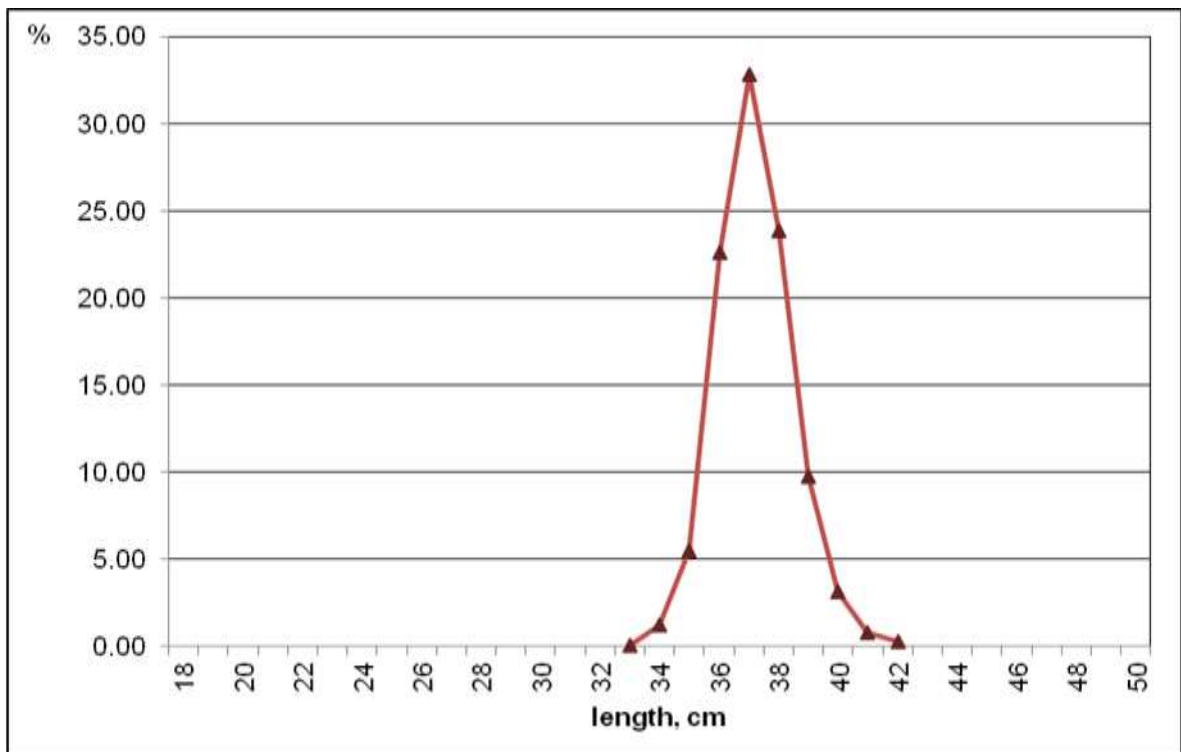


Figure 24. Length composition of chub mackerel in spring-summer 2017

In April-July 2018, 17 921 specimens of jack mackerel, 1492 specimens of chub mackerel were measured. 2 700 specimens of jack mackerel, 500 specimens of chub mackerel were taken for biological analysis. 617 samples of jack mackerel and 260 specimens of chub mackerel were taken for age sampling.

In April-May, length composition of jack mackerel in the catches was relatively stable. The specimens with 34-39 cm length and modal classes of 36 and 37 cm dominated. In June, the length composition of jack mackerel in the catches changed a bit. One part of the catches was formed by fish with a modal grouping of 35 cm, another part was represented by fish with a mode of 40 cm. The largest jack mackerel (36-56 cm length, 47 cm mode, average weight - 1070 g) was caught at the end of June in the western area between 84-90° W (Fig. 25).

The by-catch of chub mackerel was insignificant during the whole period of observations and averaged 0.8% of the jack mackerel catch. Chub mackerel with 32-44 cm length and modal classes of 34-35 cm and 38-39 cm presented in the catches (Fig. 26).

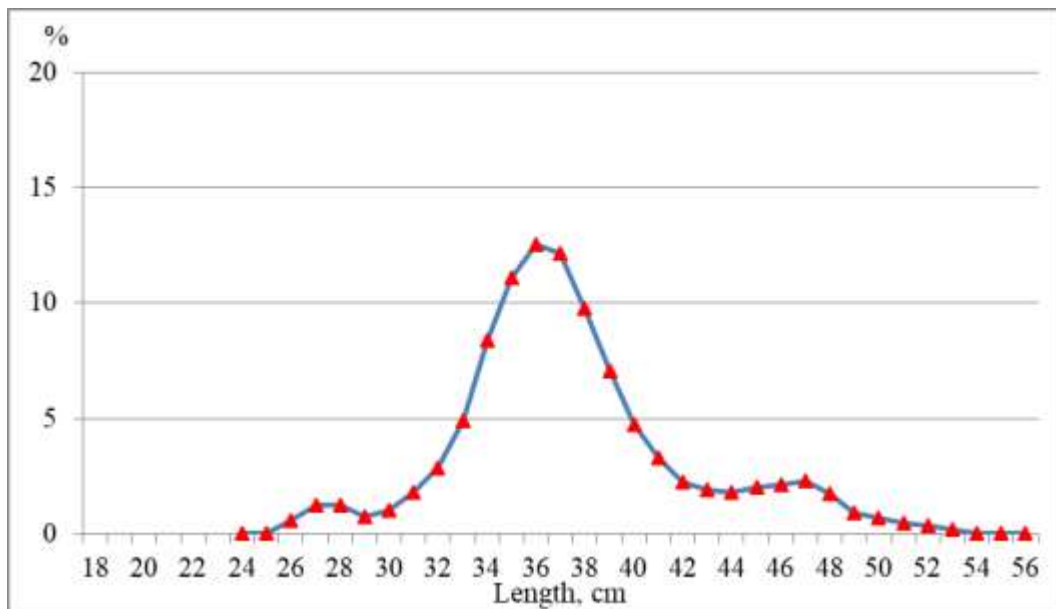


Figure 25. Length composition of jack mackerel in the South Pacific in April-July 2018

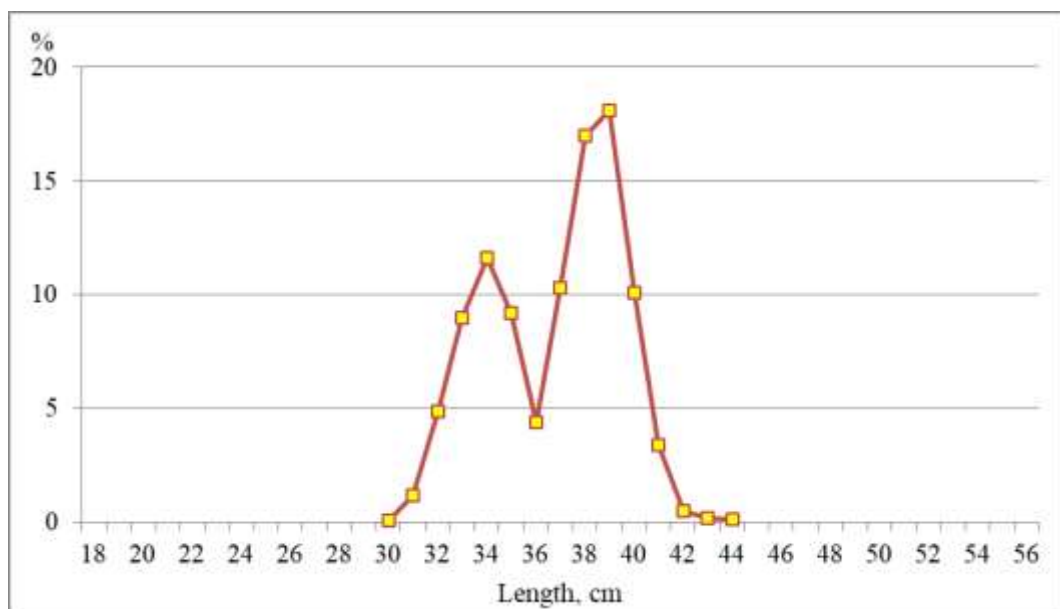


Figure 26. Length composition of chub mackerel in the South Pacific in April-July 2018

For the period from 19 March to 31 July 2019, 16686 specimens of jack mackerel were measured, 3050 specimens were analyzed and 1301 specimens were taken for age sampling by the scientific observer. The by-catch of chub mackerel was very low and therefore, the amount of collected material was limited – 1594 specimens were measured, 252 specimens were analyzed, 37 specimens were taken for age sampling.

Length composition of jack mackerel and chub mackerel in the catches of the Russian trawler “Alexander Kosarev” in 2019 is presented in Figures 27 and 28, respectively.

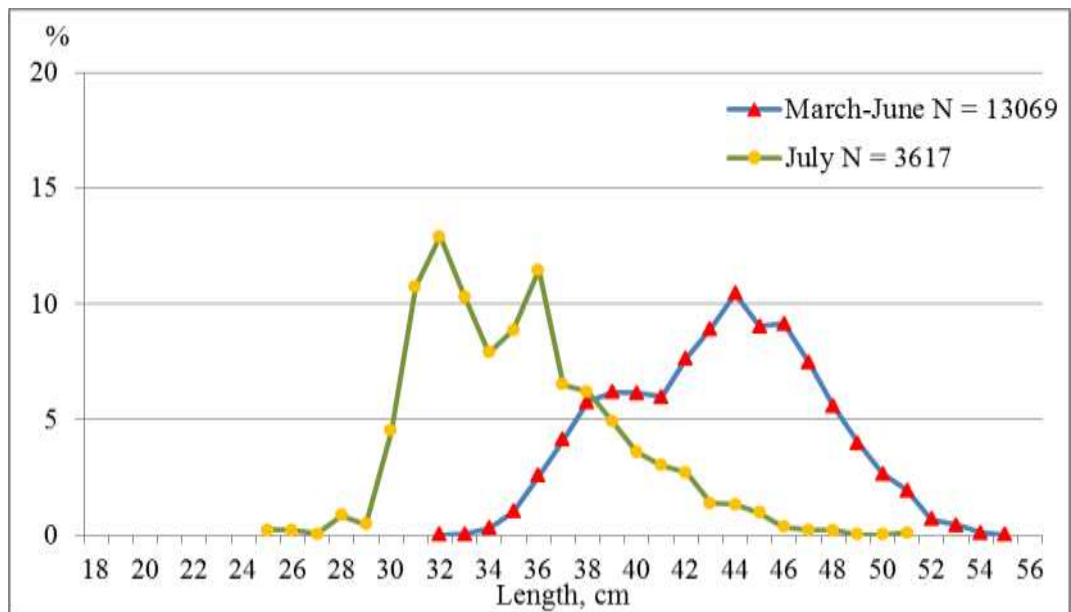


Figure 27. Length composition of jack mackerel in the South Pacific in March-July 2019

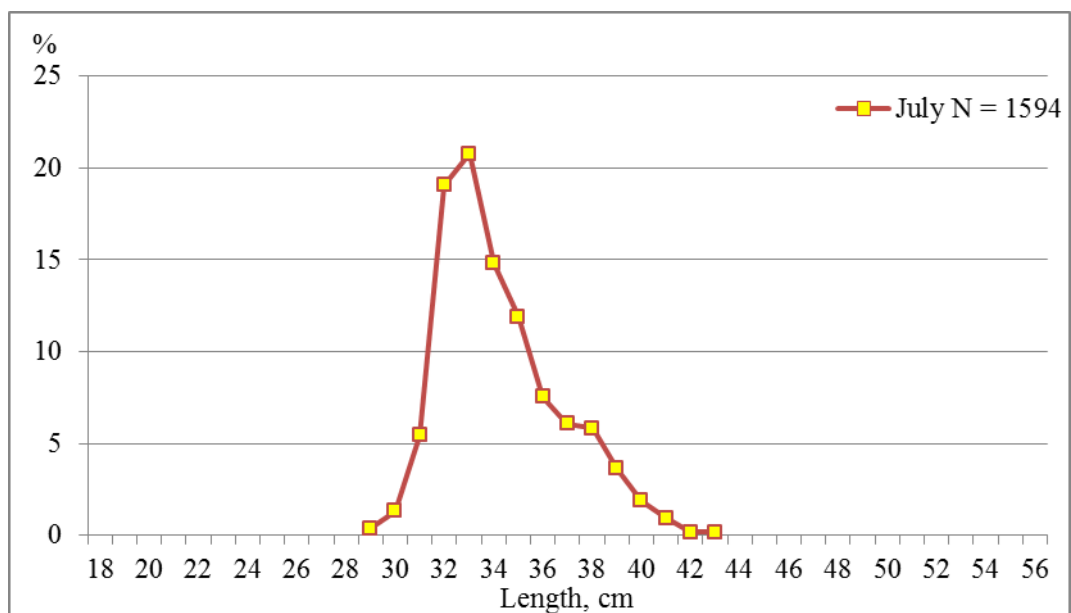


Figure 28. Length composition of chub mackerel in the South Pacific in March-July 2019