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Chile's Annual Report, part II (Jumbo squid)

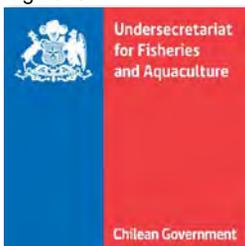


CHILE ANNUAL REPORT

SPRFMO-SCIENTIFIC COMMITTEE

Jumbo squid fishery

August, 2018.



1 DESCRIPTION OF THE FISHERY

1.1 Composition of the Fleet.

The jumbo squid fishery includes the participation of small-scale¹ and industrial² fleets, with distribution percentages of the national catch quota of 80% and 20%, respectively.

Small-scale Fleet

The small-scale fleet that operated in 2017 was composed of 2,102 vessels equal or smaller than 18 meters in length. More than 94% (94.32%) of 2017 operations were conducted by vessels smaller than 12 meters in length.

It is important to mention that more than 98% of landings conducted corresponded to vessels using hand jiggers as fishing gear; the other percentage corresponded to purse-seine fishing gear.

Table 1- Small-scale fleet operating between 2005 and 2017, It is composed by vessels smaller than 18 meters in length and distributed throughout Chile. They are authorized to catch jumbo squid (*Dosidicus gigas*). Source: SERNAPESCA.

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
N° Boats (>18m)	926	788	688	708	613	706	1,880	2,180	1,540	1,747	1,419	1,657	2,102
Landing (t)	283,420	243,307	83,299	135,444	51,140	66,049	138,708	114,955	97,224	125,396	104,242	141,576	115,351

Industrial Fleet

Industrial landings were mainly conducted by vessels with mid-water trawls (more than 84%). Historically, industrial landings were carried out mainly by purse seiners until 2010. During the last years, participation of bottom trawlers has been decreasing, with no participation in 2017.

Table 2 shows industrial vessels with activity registered and landings over three tonnes per trip and capture during the 2005–2017 period. The last two years correspond to the lowest number of

¹ Vessels smaller than 18 m in length operating mainly with hand jigger.

² Vessels larger than 18 m in length operating mainly with mid-water trawling.

industrial vessels that landing over 3 tonnes of *Dosidicus gigas*. This number includes both operations targeting jumbo squid and those operations declaring it as accompanying fauna.

Table 2- Industrial fleet operating between 2005 and 2017 with registered landings higher than 3 tonnes per trip. Landing includes the total reported by the industrial fleet. Source: SERNAPESCA

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
N° Ships	104	59	60	73	41	83	86	57	32	35	32	18	19
Total Landing (t)	13,155	7,332	40,427	8,557	3,405	134,379	24,787	30,010	9,047	51,206	39,446	39,338	39,130

1.2 Catches, Seasonality of Catches, Fishing Grounds and By-catch.

1.2.1 Catches

The largest landings of jumbo squid over the last years can be seen in 2010, 2014, and 2016 (Figure 1). During 2010, industrial landings surpassed small-scale landings, explaining the high level of total landings registered that year. From 2011, the small-scale fleet has landed over 70% of total landings. Season 2017 was characterized by a reduction of landings carried out by the small-scale fleet over the previous year. The total catches were carried out within the country's Exclusive Economic Zone (EEZ).

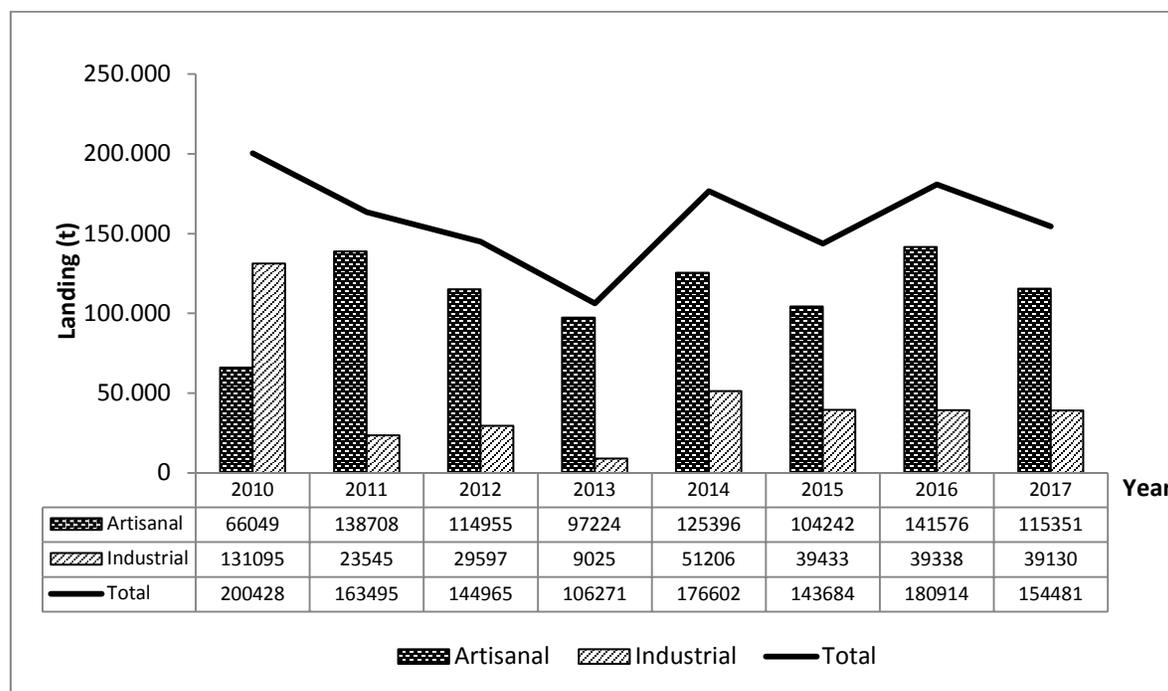


Figure 1- Landings per small-scale and industrial fisheries.

1.2.2 Seasonality of catches during 2011-2017

Catches are mainly concentrated during the first eight months of the year and the extractive activity is reduced from September to October. In this respect, there are irregular monthly seasonal variations explained by operational and economic aspects of the fishery (Figure 2).

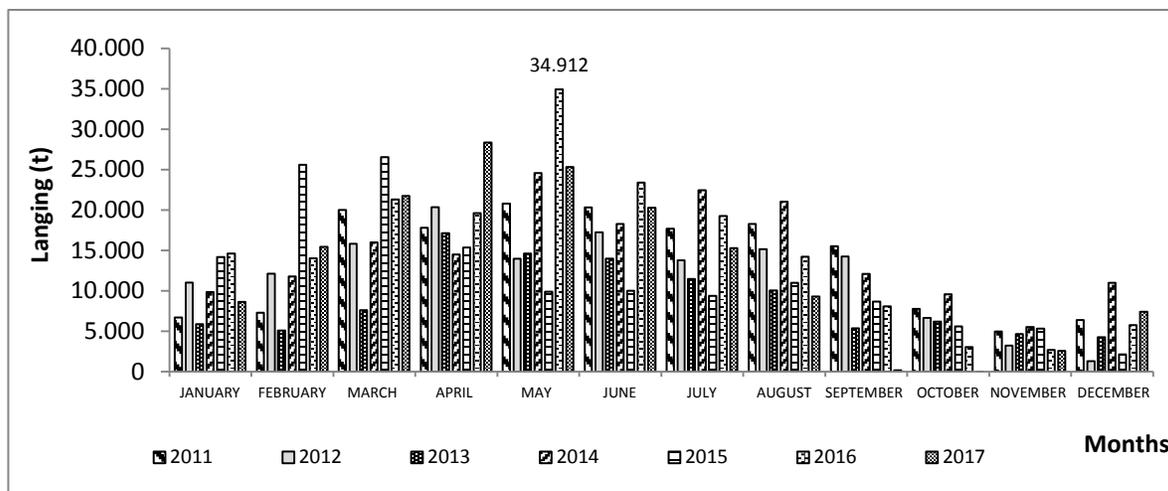


Figure 2- Monthly total landing in tonnes, 2011-2017.

1.2.2 Spatial Distribution of Catches

In 2017, geographic distribution of industrial sets operating on squid as target species with mid-water trawling was located between 35°00' SL and 39°00' SL, between 7.0 and 36.3 miles from the coast. The average was 24.4 nm from the coast. (Figure 3).

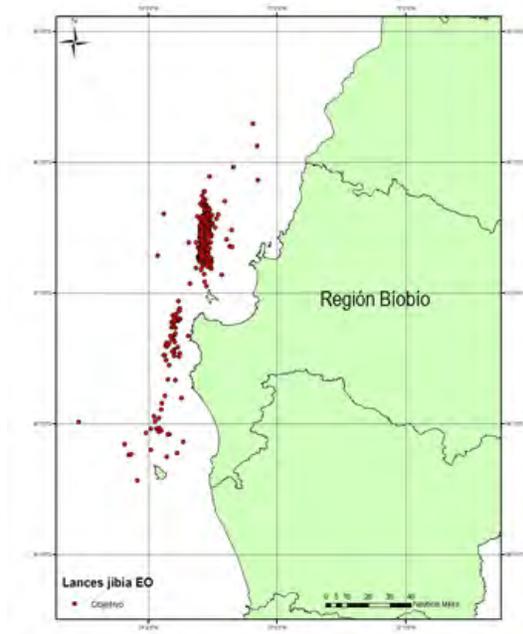


Figure 3 Spatial distribution of industrial sets with squid catches as target species, 2017. Source: IFOP

Small-scale Fisheries concentrates its operation mainly between 32°00' SL and 38°00' SL between the miles 1 and 10, with 90% of the total small-scale landings during 2017 (Figure 4). The Bío Bío Region concentrated over 60% of national landings during 2017.

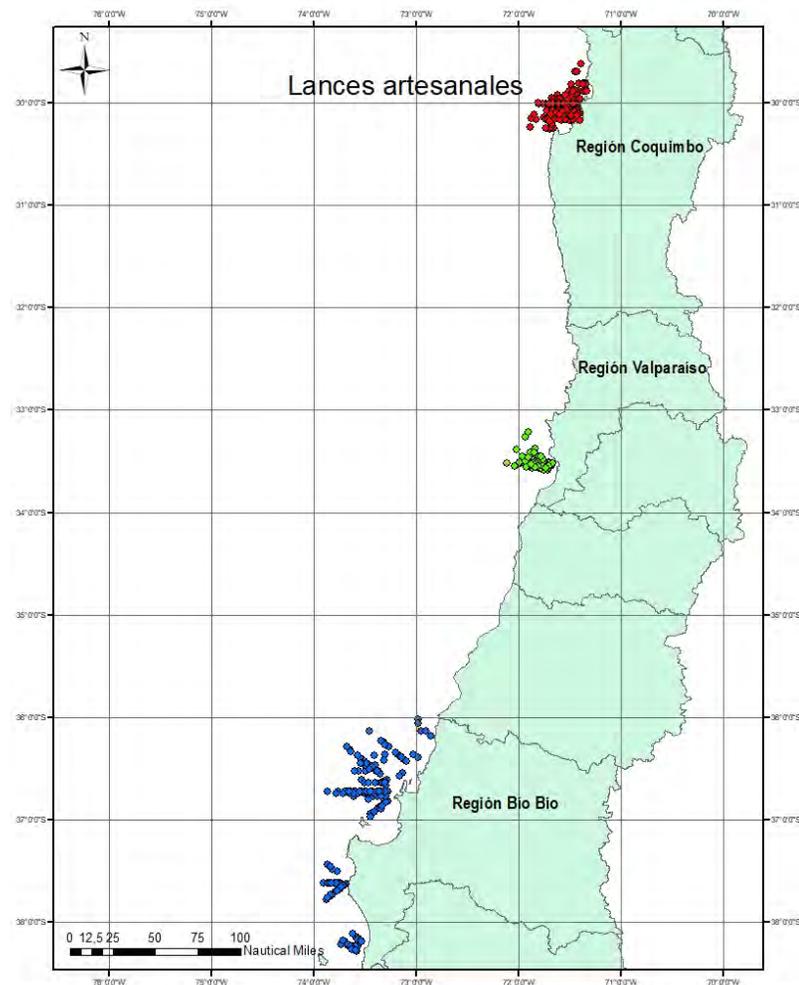


Figure 4.-Geographical distribution of small-scale sets with squid as target species in IV, V, and VIII Regions, season 2017. Source: IFOP.

2 EFFORT AND CPUE FOR *Dosidicus gigas* FISHERY

Effort

The total monthly effort of vessels larger than 18m in length [trawling time (tt)] considering the squid fishery as target species during the 2017 season showed an increase in respect of the 2016 season. From April 2017, the effort conducted by the indicated fleet overpassed 250 tt, reaching the highest value during August (369 tt). The main difference in the effort is seen during April and May between 2016 and 2017, with values near 100 tt. during 2016 and around 250 tt. This may

indicate some difficulty of the fleet to reach the catches requested by processing plants, which may indicate a lower availability of the resource in fishing grounds (Figures 5 and 6).

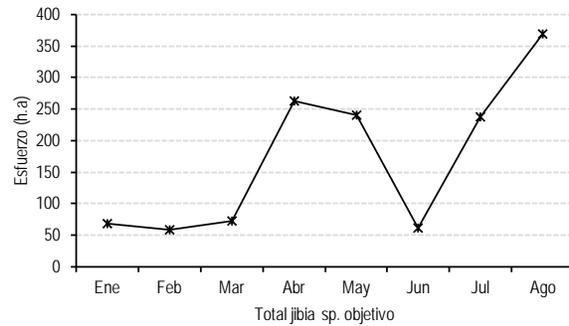


Figure 5.- Monthly effort (trawling time) of squid as target species (upper figure) of the industrial fleet, fishing season 2017. Source: IFOP.

When analyzing the effort historical series of vessels larger than 18m in length on the resource, high periods corresponding to Autumn-Winter during 2013-2014 were observed. During 2015, only fishing effort in the first quarter was registered as a result of the early depletion of the quota (Figure 6).

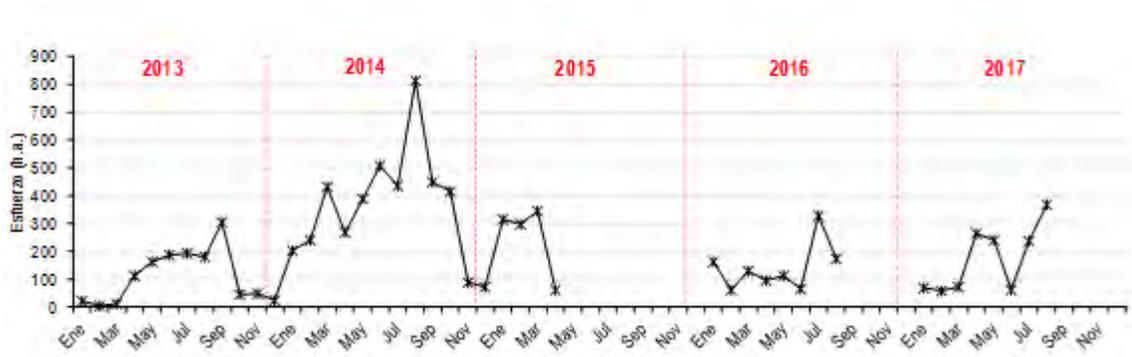


Figure 6.-Monthly effort (trawling time) with squid catches as target species in the area between 35°30' - 38°39' S, of the industrial fleet, seasons 2013 - 2017. Source: IFOP-SERNAPESCA.



Industrial CPUE

For the calculation of the CPUE, only those trips in which squid represented at least 80% of the total catch were considered. These data cover 99% of the total catch of squid. With this, the mid-water trawling CPUE (landings/fishing trips) showed an increasing trend until 2015, stabilizing in the two last years, possibly due to the reduction of the fleet and the monthly fractioning of the quota.

It is important to keep in mind that the largest operation was conducted with “mid-water trawling” fishing gear. Purse seine CPUE is not described since landings with this gear have shown a constant negative trend in the last years (Figure 7).

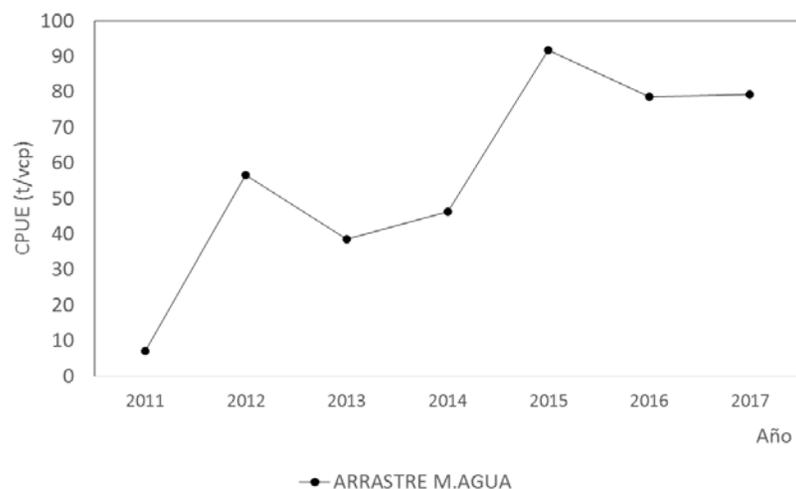


Figure 7.-Industrial yields [CPUE (t/vcp)] of squid with “mid-water trawling” gear (filter trips with proportion of squid in total catch \geq 80%). (Source IFOP)

Small-scale CPUE

The nominal yield (landing/number of trips with fishing) of squid in boats of the small-scale fleet (with records of line and jigging) increased during 2017 in respect of 2016, suggesting an increasing trend from its lowest value registered in 2012. This increase in the CPUE was obtained with a significant reduction of the number of fishing trips in 2017 that was close to the half of the effort applied in 2016. This decrease of the effort was registered between the last four months of the year, when fishermen mentioned that the squid was lost or far from the coast (Figure 8).

It is important to mention that the boat operation corresponds to more than 90% of the squid landings during 2017.

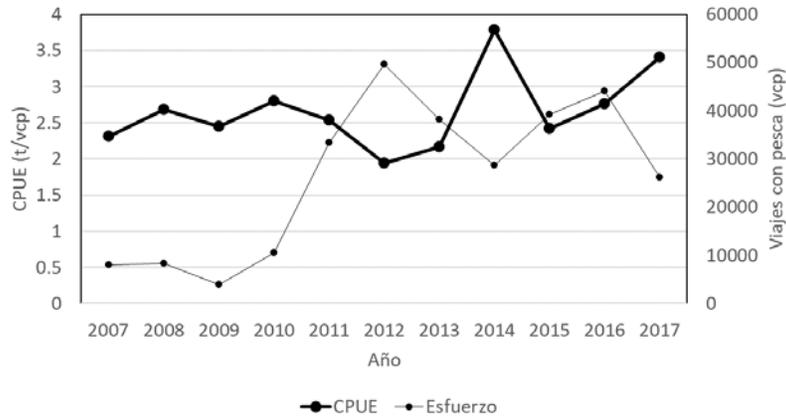


Figure 8.-Fishing yields of squid in boats, 2007-2017. (Source IFOP)

Industrial fleet accompanying fauna

Accompanying fauna identified during the 2017 fishing season in industrial fleet landings operating on this resource with mid-water trawling only represents 0.13 % (Table 3).

Table 3.- Percentage of accompanying fauna in sets with catch of squid as target species, 2017. Source: IFOP.

Especie	Porcentaje (%)
Jibia	99,8700
Merluza de cola	0,1137
Merluza común	0,0091
Jurel	0,0013
Medusas	0,0010
Reineta	0,0005
Tollo pajarito	0,0001

3 RESEARCH PROGRAMS

The 2017 research program is mainly composed of projects developed by annual agreements with the Fisheries Research Institute (IFOP). It is complemented by other projects requested by the fisheries authority to support the decision-making process.



Projects developed annually by IFOP are as follows:

- **Squid fisheries monitoring (*Dosidicus gigas*)**

This study allows to collect information in real time on the evolution of the main biological and fisheries indicators associated to squid fisheries and its accompanying fauna. The follow-up was focused on the main fishing regions of the country with the IV, V and VIII Regions where the small-scale fleet operates and the VIII Region where the industrial fleet operates.

- **Status assessment and exploitation possibilities**

This Project is aimed at providing the Technical Scientific Committee (CCT) the technical advice, data, background and information necessary for the analysis of exploitation possibilities and the determination of the Allowable Biological Catch (ABC) levels for the next annual extractive season (2019) in squid fishery.

4 BIOLOGICAL SAMPLING, AND LENGTH AND AGE COMPOSITION OF THE CATCH.

4.1 Biological sampling

For industrial fisheries, biological data at the VIII Region in Talcahuano and San Vicente ports were collected, always through onboard sampling. Small-scale sampling was conducted onboard of the vessels and during landings, when possible. Specific biological samplings were conducted in processing plants or in land at the moment of landing, when possible.

Tables 4 and 5 show the number of individuals sampled (length and biological) for industrial and small-scale fleets, respectively.

Table 4.- Number of sampled trips, sets and individuals in squid industrial fishery. Season 2017. Source IFOP

Año	Tipo de muestreo			
	Longitud		Biológico	
	Viajes	Lances	Viajes	Lances
2014	90	156	96	152
2015	38	63	26	26
2016	111	223	102	130
2017	106	256	75	95

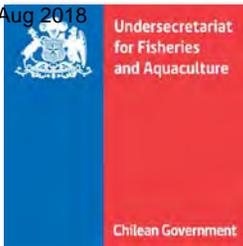


Table 5.-Number of trips, sets and individuals of squid measured by port in length and biological samplings of the small-scale fleet. Season 2017. Source IFOP.

Región	Tipo de muestreo					
	Longitud			Biológico		
	Viajes	Lances	Ejemplares	Viajes	Lances	Ejemplares
Coquimbo	14	14	327	0	0	0
Valparaíso	59	59	1.734	33	33	60
Bío Bío	1	1	58	0	0	0
Total	74	74	2.119	33	33	60

4.2 Length and age composition of catches

When observing the size structure of industrial fleet squid for season 2017, it showed an unimodal distribution, for both sexes, composed of individuals with sizes between 30.5 cm and 94.5 cm ML. During this period, a lower proportion of individuals with sizes over 68.5 cm in mantle length (ML) was observed. On the other hand, 95% of sampled individuals were over the size of sex maturity (Figure 9).

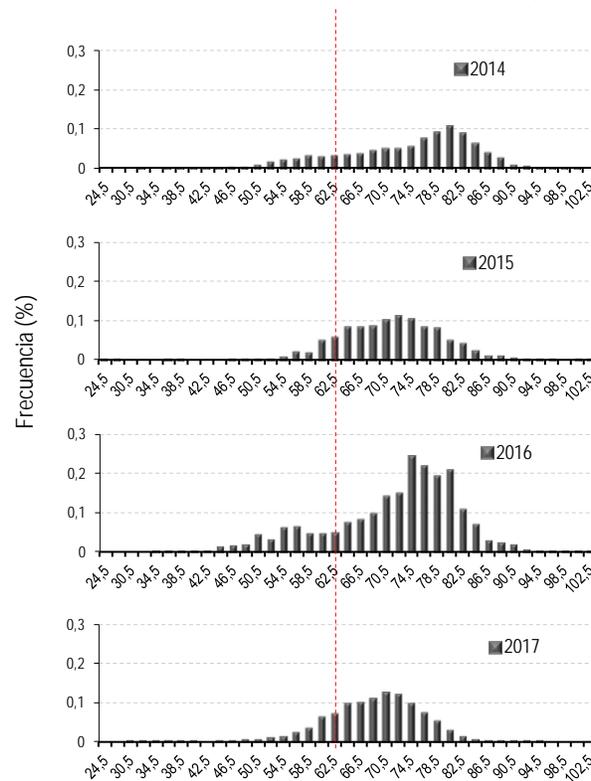


Figure 9-Annual composition of mantle length (cm) in industrial catches of squid (both sexes combined) for the area between 35°30' - 38°39' S. Red vertical line corresponds to the size at sexual maturity of females estimated by Liu *et al.* (2010). Seasons 2014-2017. Source: biological samplings IFOP.

In the case of small-scale Fisheries, season 2017, size composition in the IV Region (both sexes combined) showed a distribution composed of adult individuals (100%) larger than 60cm in ML and its main mode was around 80.5 cm ML. For the V Region, size composition showed a platykurtic distribution with a main mode distributed between 70.5 cm and 74.5 cm ML; while in the case of the VIII Region, size composition recorded bimodal distribution located between 78.5 and 80.5 cm ML (Figure 10).

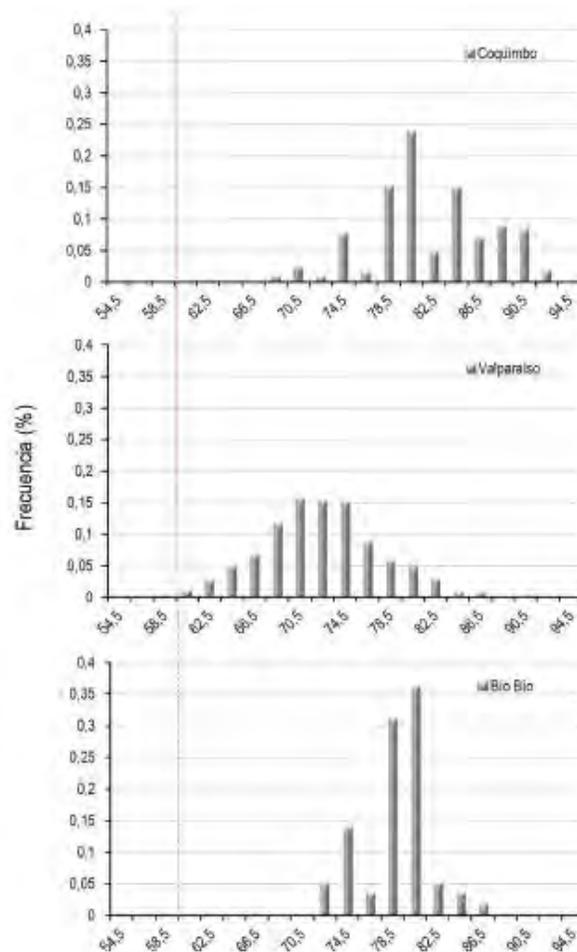


Figure 10.-Composition of mantle length (cm) weighted to the small-scale catches (both sexes combined) per region. Vertical red line corresponds to size at sexual maturity in females estimated by Liu *et al.* (2010), 2017. Source: IFOP

5. AT-SEA AND PORT SAMPLING PROGRAM

Samplings were carried out with the participation of Scientific Observers (SO) onboard and in port and these activities covered industrial and small-scale fisheries sectors. In total, for the industrial fleet, 109 trips and 5 vessels (IFOP logbooks) were registered for trips with squid as target species and 61 trips and 3 trawlers with catch of squid as accompanying fauna of the fishing operations targeting hake and hoki. Also, all the small-scale information collected by the scientific observer's network deployed at the main sampling centers of the center-south area corresponding to the small-scale fleet in IV, V, and VIII Regions.

6. ADMINISTRATIVE MEASURES

Administrative Measures in Force

Administrative measures applied to the squid fishery started in 2012 with the aim at conserving the resource. In that line, the Undersecretariat for Fisheries and Aquaculture declared it in full exploitation status, restricted the access, established global annual quota and prohibited its catch as target species for elaboration of meal as describe in the following table.

Administrative measure	Purpose	Regulation
Access	Suspension of the resource registration in the Small-Scale Fisheries Register (RPA), reception of applications and granting of industrial authorizations between XV and XII Regions, due to its full exploitation status . In force until 2019.	Art. N°50. General Law on Fisheries and Aquaculture (updated text which incorporates amendment Law N°20.657) R. Ex. N° 3421/2014
Annual Global Catch Quota (CGAC)	<p>Squid CGAC for 2018 is 200,000 t, with a fractioning of 80% and 20% for the small-scale and industrial sectors, respectively, as follows:</p> <ul style="list-style-type: none"> - Squid Global Quota 200.000 t <ul style="list-style-type: none"> ✓ Research Quota 1.000 t ✓ Unforseen events Quota 2.000 t - Remaining Quota 197.000 t - Small-Scale Quota 157.600 t <ul style="list-style-type: none"> - Reserve Accompanying Fauna 1.576 t - Small-scale target Quota 156.024 t - Industrial Quota 39.400 t 	EXEMPT DTO. N° 800/2017

Administrative measure	Purpose	Regulation
Other Measures	- Squid species (<i>Dosidicus gigas</i>) is eliminated from the list of aquatic resources to be used as raw material in fish meal production.	SUPREME DTO. N° 98/2012