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Chile's Annual Report to the 2017 SPRFMO Scientific Committee
Part II: Jumbo Squid Fishery

Undersecretariat for Fisheries and Aquaculture

Chilean Government

CHILE ANNUAL REPORT
JUMBO SQUID FISHERY

SPRFMO-SCIENTIFIC COMMITTEE

August, 2017.

1 DESCRIPTION OF THE FISHERY

1.1 Composition of the Fleet.

The jumbo squid fishery includes the participation of small-scale[1] and industrial[2] fleets, with distribution percentages of the national catch quota of 80% and 20%, respectively.

Small-scale Fleet

The small-scale fleet that operated in 2016 was composed of 1,408 vessels smaller than 18 meters in length, which landed 141,576 tons (Table I). 98% of the small-scale landings was made by the fleet smaller than 12 meters in length, with hand jiggers as fishing gear.

Table I: Small-scale fleet operating between 2005 and 2016. It is composed by vessels smaller than 18 meters in length and distributed throughout Chile. They are authorized to catch jumbo squid. Source: SERNAPESCA.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
N° Boats (< 18 m)	926	788	688	708	613	706	1880	2180	1540	1747	1419	1408
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

Industrial Fleet

Industrial vessels with activity and landings higher than three tons per trip during the 2005-2016 period are shown in Table II. This last year shows the lowest number of fishing vessels operating jumbo squid of the historical series presented.

Table II. Industrial fleet operating between 2005 and 2017. They register landings higher than 3 tons per trip. Landing includes the total reported by the industrial fleet.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
N° Ships	104	59	60	73	41	83	86	57	32	33	29	16
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

Source: own elaboration based on information from SERNAPESCA.

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

1.2.1 Catches

The greatest jumbo squid landings in the last years can be identified in 2010, 2014, and 2016 (Figure 1). In 2010 industrial landings exceed small-scale landings (Figure 2), which can explain the high level of total landings recorded that year. The total of catches is conducted within the Exclusive Economic Zone (EEZ) of the country.

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[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.

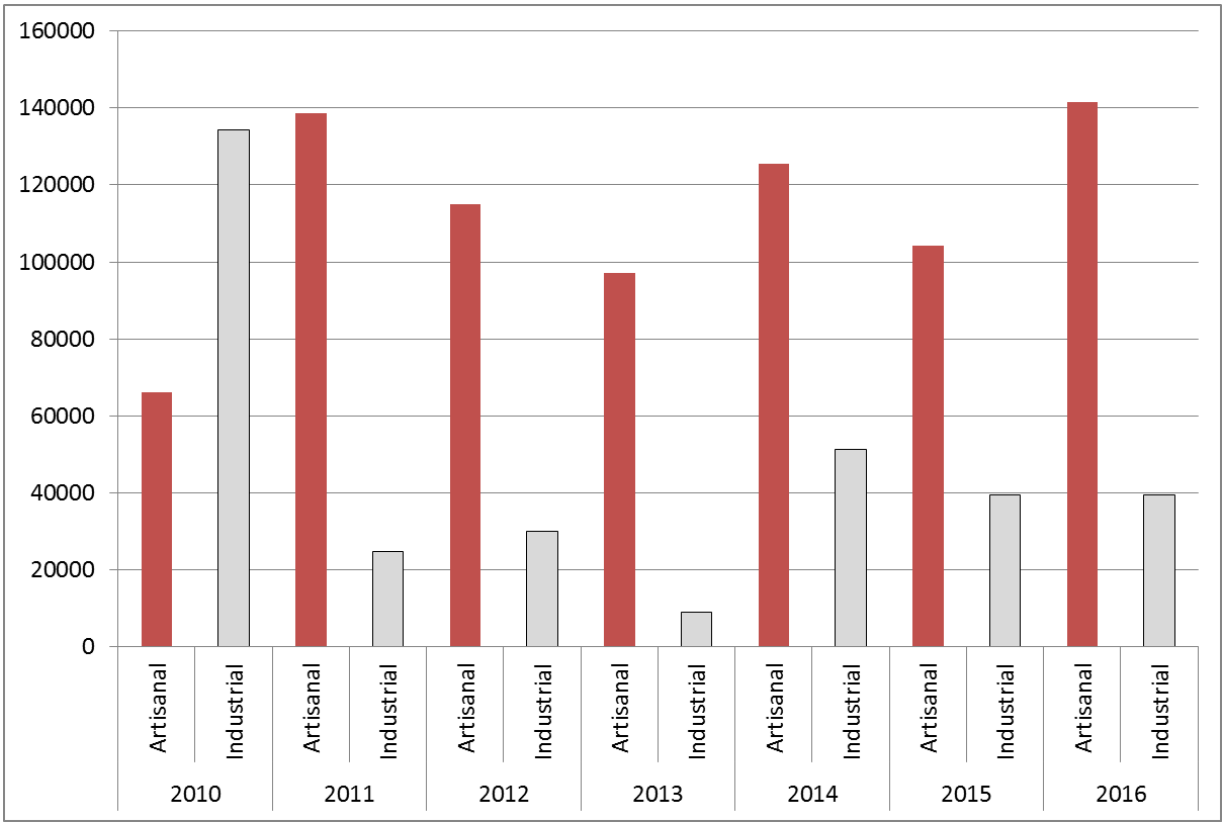

Figure 1. Landing per sector of small-scale and industrial fisheries.

1.2.2 **Seasonality of Catches**

Catches concentrate mainly during the first 9 months of the year, reducing the extractive activity from October. In this respect, there are records of irregular season monthly variations explained by operating and economic aspects of the fishery (Figure 2).

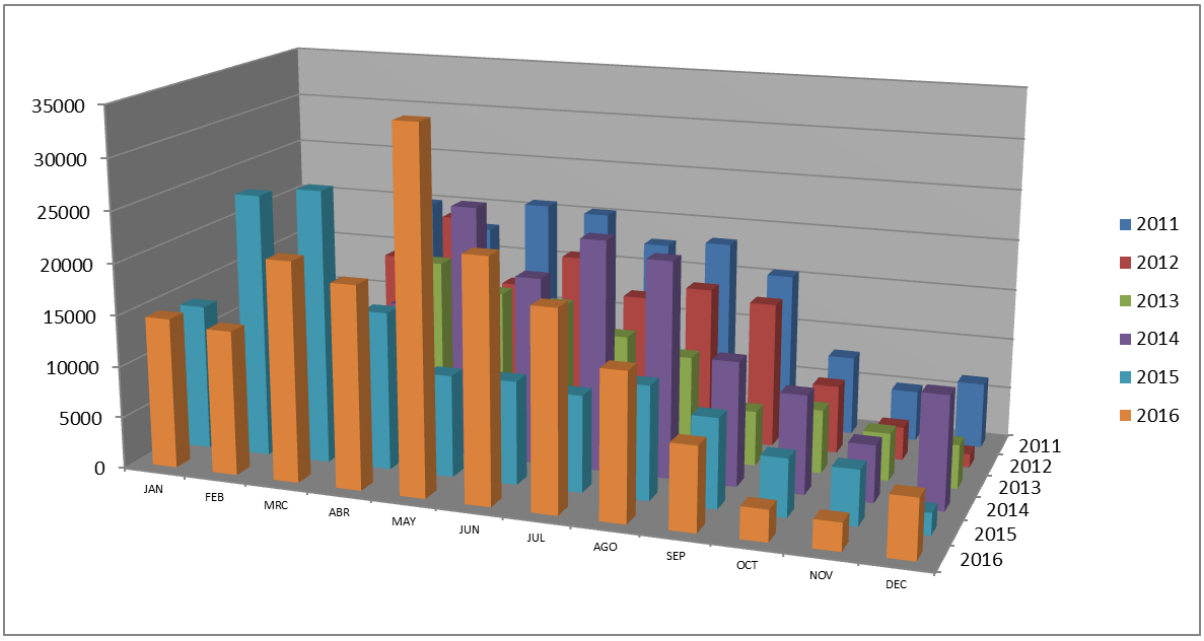

Figure 2. Total monthly landing in jumbo squid tons, 2011-2016.

1.2.2 **Spatial Distribution of Catches**

For 2016, geographical distribution of sets of the industrial fleet operating jumbo squid center-south, catching with mid-water trawling was focused between 36°00´SL and 38°00´SL, between 5 and 50 miles from the coast, benefiting from the coastal distribution of the resource during that year. (**Figure 3**).

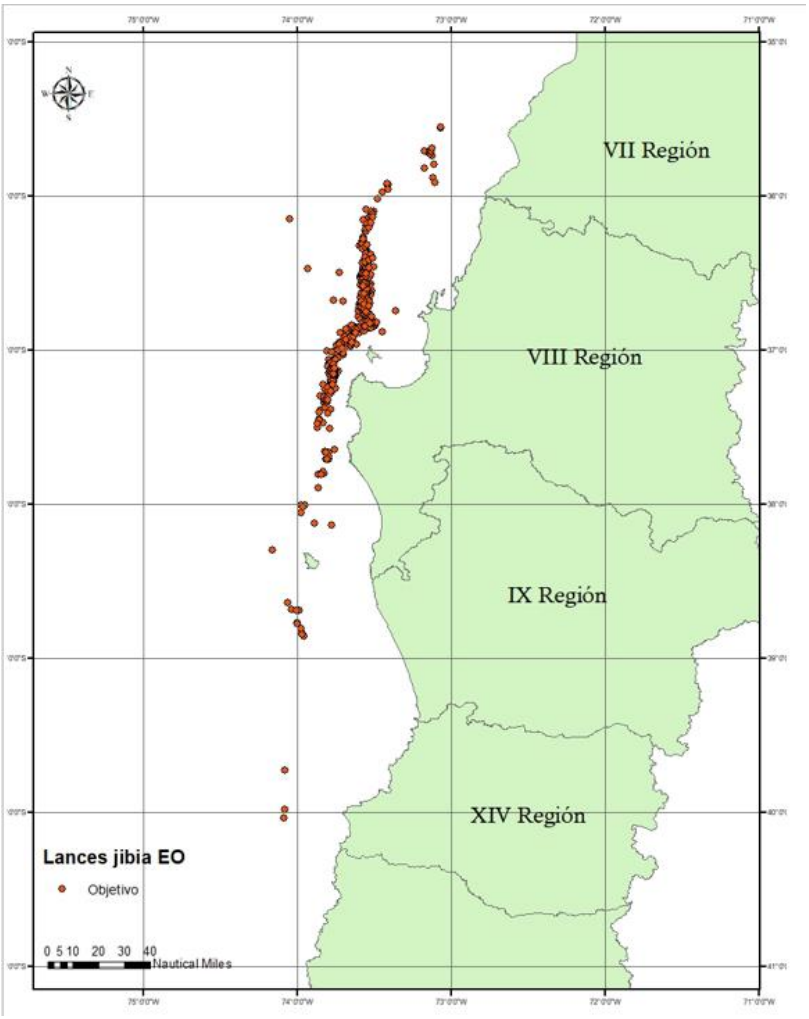

Figure 3. Geographical distribution of sets with target catch of jumbo squid in the center-south area, season 2016. Source: IFOP.

Small Scale fisheries concentrates its operation mainly between 33°00´SL and 34°00´SL and between the 1 and 10 mile, with around 46.4% of the total small-scale landings. **(Figure 4)**.

Around 30% of the small-scale fleet that operates this resource concentrates in this area, mainly vessels smaller than 12 m in length.

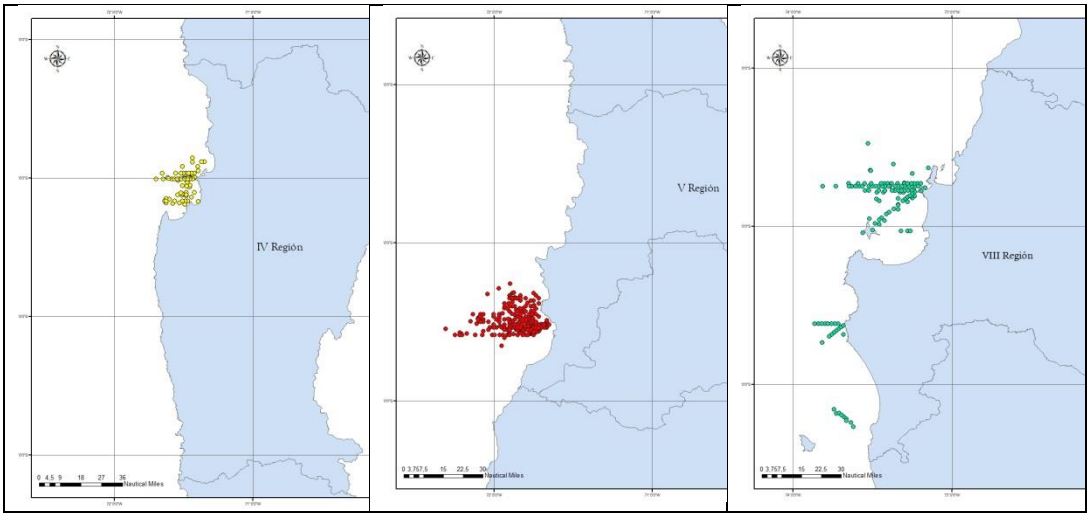

Figure 4. Geographical distribution of sets with artisanal target catch of jumbo squid in season 2016. Source: IFOP.

2 EFFORT AND CPUE FOR INDUSTRIAL *DOSIDICUS GIGAS* FISHERY

The monthly effort in trawling time [in hours, (t.t.)] of vessels larger than 18 m in length, considering the jumbo squid fishery as target species during the season 2016 showed a reduction when compared to the season 2015, mainly due to the fact that the quote of the industrial fleet was established in an 8-month period. This eliminated the need to compete for monthly landings. However, an increase of the number of sets per average trip was observed in July, indicating a difficulty by the fleet to achieve catches required by processing plants which could indicate a lower availability of the resource in this fishing ground **(Figure 5).**

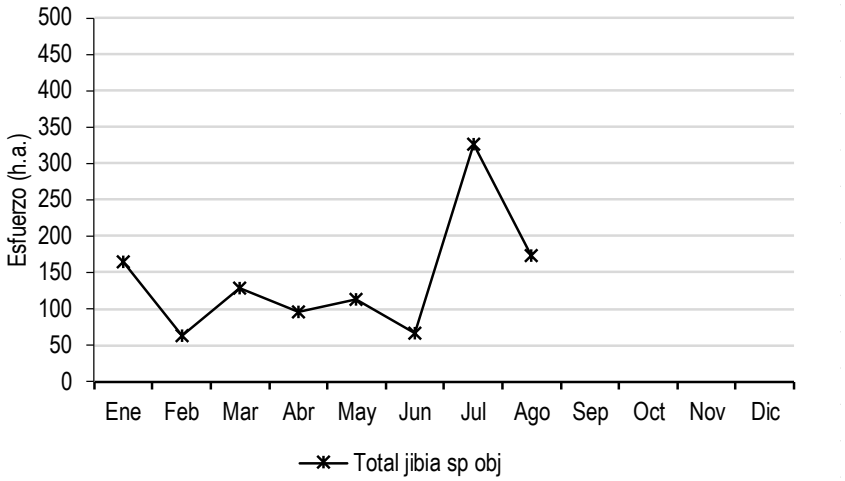

Figure 5. Monthly effort (trawling time) of jumbo squid as target species (above figure) and accompanying fauna (figure below) of the fleet larger than 18 m in length, fishing season 2016. Source: IFOP-SERNAPesca.

When analyzing the historical series of the effort of vessels larger than 18 m in length on the resource, the high periods corresponded to autumn-winter during 2013-2014 were observed. During 2015, the fishing effort was recorded only in the first quarter as a result of the early quota exhaustion **(Figura 6).**

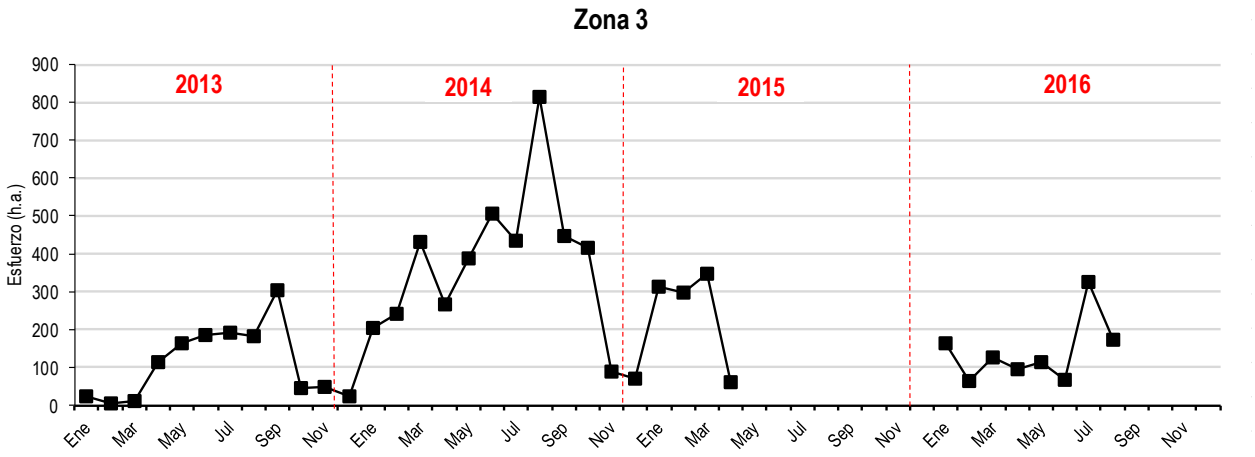

Figura 6. Monthly effort (trawling time) of jumbo squid as target species in the area between 35°30' and 38°39' SL, of vessels larger than 18 m in length, seasons 2013 - 2016. Source: IFOP-SERNAPesca.

3 RESEARCH PROGRAMS

The 2016 research program is composed mainly of the projects developed with annual agreements with the Fisheries Research Institute (IFOP), and complemented by other projects required by the Fishing Authority that support the decision-making process.

Projects developed annually by IFOP are the following:

- **Monitoring of the jumbo squid fishery (*Dosidicus gigas*)**

This study allows the real-time collection of information on the evolution of the main biological and fishing indicators, associated to the squid fishery and its accompanying fauna. Monitoring was conducted in the most important regions of the country in which the fishery is developed, with the IV, V, and VIII regions operated by the small-scale fleet and the VIII region operated by the industrial fleet.

- **Status Analysis and Exploitation Possibilities**

This project is aimed at providing the Technical Scientific Committee with the relevant technical advice, data, background and information needed to analyzing possibilities of exploitation and the determination of the Acceptable Biological Catch (ABC) levels for the next extractive season (2018) of the squid fishery.

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

4.1 Biological sampling

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

Tables III and IV show the number of specimens sampled (length and biological) for the industrial and small-scale fleet, respectively.

Table III. Number of trips, sets and specimens sampled in the industrial squid fishery. Season 2016.

PUERTO	TIPO MUESTREO					
	Longitud			Biológico		
	Viajes	Lances	Ejemplares	Viajes	Lances	Ejemplares
Coronel	8	17	346			
Talcahuano	65	127	4.915	61	79	2.351
San Vicente	38	79	3.417	41	51	1.510
Total	111	223	8.678	102	130	3.861

Source: IFOP

Table IV. Number of trips, sets and squid specimens measured per port in specific length and biological sampling in the small-scale fleet. Season 2016.

PUERTO	TIPO MUESTREO					
	Longitud			Biológico		
	Viajes	Lances	Ejemplares	Viajes	Lances	Ejemplares
Coquimbo	4	4	32			
Guayacan	53	53	1476	3	3	87
La Herradura	2	2	64			
San Antonio	55	55	1653	75	75	2263
San Vicente	11	11	469	4	4	97
Total	125	125	3694	82	82	2447

4.2 Length and age composition of catches

Regarding the industrial fleet, size structures of squid recorded mainly between parallels 35° 30’ and 38° 39’, in season 2016, presented, for both sexes, an unimodal distribution composed of specimens with sizes between 34.5 cm and 102.5 cm LM, with a mode in the size category of 74,5 cm LDM. However, it is important to highlight that during the reported

season a higher proportion of specimens in sizes between 74.5 and 80.5 cm LDM (**Figure 7**).

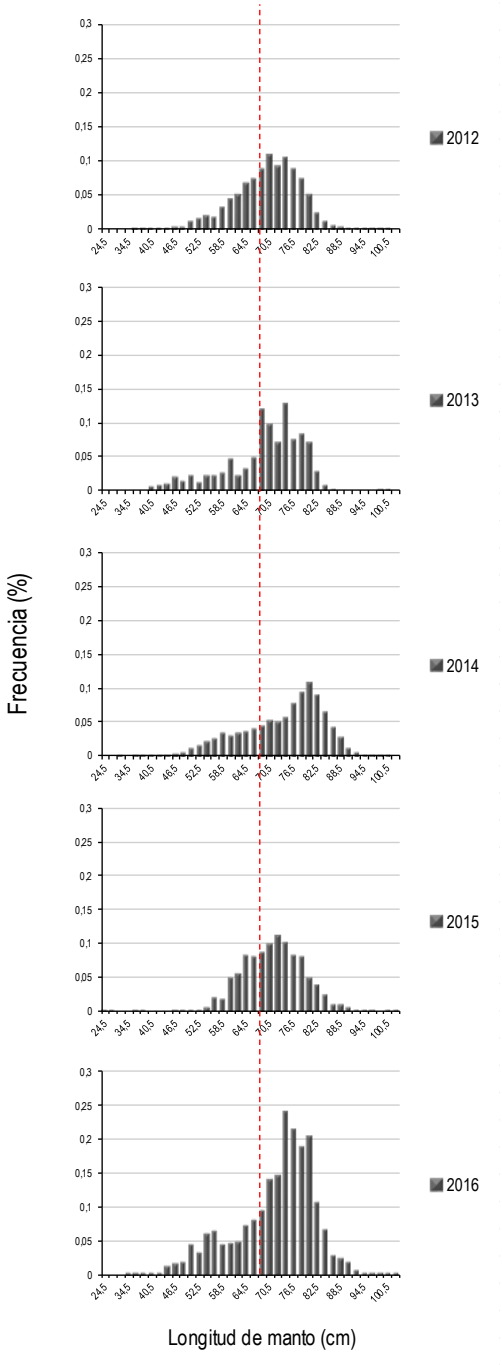

Figure 7. Annual composition of length mantle (cm) in industrial squid catches (both sexes combined) for fishing ground 3. Vertical red line corresponds to the size of sexual maturity of females estimated by Liu *et al.* (2010). Seasons 2012-2016. Source: biological sampling IFOP.

Regarding the small-scale fleet, figure 11 shows the size composition for IV, V, and VIII regions. For these regions, an unimodal distribution composed of 99% of adult specimens larger than 60 cm LDM prevailed, whose main mode is around 80.5 cm LDM (**Figure 8**).

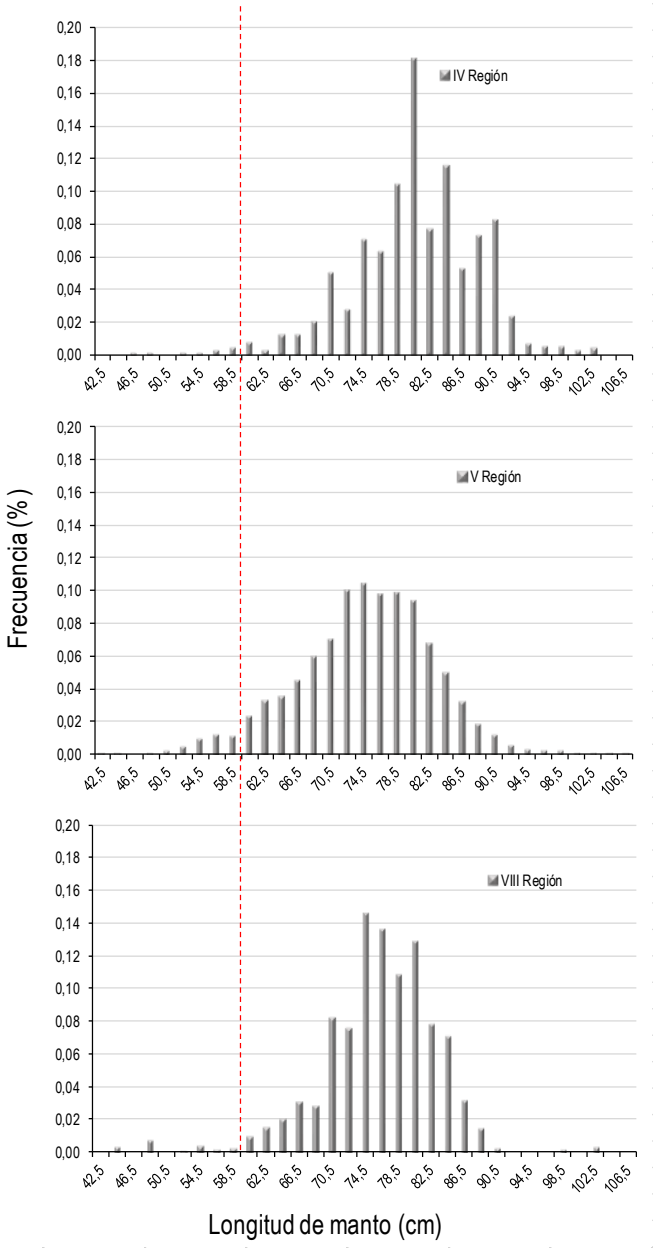

Figura 8. Weighted composition of the length mantle (cm) to the catches (both sexes combined) per region. Vertical red line corresponds to the size of sexual maturity in females estimated by Liu *et al*., (2010). Season 2016. Source: biological sampling IFOP**.**

5. AT-SEA AND PORT SAMPLING PROGRAM

Sampling was conducted with the participation of Scientific Observers (SO) onboard and at port. These activities included the small-scale and industrial fishing sector. In total, for the industrial fleet, 118 trips and 5 vessels were registered (logbooks IFOP) for trips with squid as target species and 91 trips and 5 trawling vessels with catch of squid as accompanying fauna of the fishing operations aimed at common hake and hoki. Also, all the artisanal information collected by the network of scientific observers provided in the main sampling centers of the center-south area was taken into account. Information is composed of 1,406 trips and 351 vessels monitored (logbooks and surveys) corresponded to the small-scale fleet of the IV, V, and VIII Regions.

6. ADMINISTRATIVE MEASURES

Administrative Measures in Force

Management measures applied to the squid fishery started in 2012, with the aim at conserving the resource. The Undersecretariat for Fisheries and Aquaculture declared this resource in fully exploitation, prohibited the access, established global annual quota, and prohibited elaboration of fishmeal with its catch as described below.

Administrative measures	Purpose	Regulation
Access	Suspension of the registration of the resource in the Small-scale Fisheries Registry (RPA) and the reception of applications and the granting of industrial authorizations, between XV and XII Regions, for having reached the **full exploitation status**. In force until 2019.	Art. N°50. General Law On Fisheries and Aquaculture (updated text incorporates amendment Law N°20.657) R. Ex. N° 3421/2014
Annual GlobalCatch Quota (CGAC)	Squid CGAC for 2017 is 200,000 t, with a fractioning of 80% and 20% for the small-scale and industrial fisheries sector, respectively, as indicated below: - **Squid Global Quota 200,000 t** ✓ Research Quota 1,000 t ✓ Quota for Contingencies 2,000 t - **Remaining Quota 197,000 t** - **Small-scale Sector Quota 157,600 t** - Accompanying Fauna Reservoir 1,576 t - **Small-scale Target Quota 156,024 t** **Industrial Sector Quota 39,400 t**	Exempt Decree N° 1037/2016
Other Measures	- The species Squid (***Dosidicus gigas***) is eliminated from the list of aquatic resources to be used as raw material in the production of fish meal.	Supreme Decree N° 98/2012