Contributions of marine capture fisheries to the domestic livelihoods and seafood consumption of Chile

Exerpt of report written by Camila Vargas and Ignacia Rivera

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Results

Fisheries Context

There are three subsectors that supply seafood in Chile for domestic and international consumption; aquaculture, and industrial and artisanal fisheries, which are mostly commercial. Despite being recognized as a major producer of salmon, Peruvian anchoveta and Araucarian herring, Chile presents a high diversity of species that are used in the seafood industry. Important fisheries range from valuable endemic invertebrates like the loco (*Concholepas concholepas*) to large migratory pelagics like giant jumbo squid. This biological diversity together with the heterogeneity of the sectors involved must be considered when addressing the relevance of fisheries and aquaculture for national food and economic security.

The composition of catch and harvest varies between subsectors as well as the supply chains that their raw material enters. These differences could highly impact the quantity and quality of seafood that different socio-economic groups can access. Thus, identifying what are the different species being harvested in each subsector, and where and how are they processed and commercialized is the first step to define cost-effective strategies to improve access to seafood and employment. In this report, we used available information to characterize and analyze the role of different sectors in national food security and Chilean economy as a first step to identify main actors and species.

Wild-caught marine species landings

According to landing records from SERNAPESCA over the last five years, the artisanal sector lands on average 1.6 ± 0.58 million annual tonnes of marine species while the industrial sector lands around 0.9 ± 0.16 million tonnes per year. Is worth noting that large part of the artisanal landings are of algae and benthic species that are not targeted by the industrial sector. Moreover, some volumes landed by the artisanal sector are processed in facilities owned by the industrial sector.

Both sectors have among their most landed species the Peruvian anchoveta (*Engraulis ringens*) and the Araucanian herring (*Strangomera bentincki*) (Figure 23). Other important species in artisanal landings are the Giant grey kelp (*Lessonia nigrescens*) and the jumbo squid (*Dosidicus gigas*). The Chilean jack mackerel (*Trachurus murphyi*) is also an important fishery in terms of volume for the industrial sector.

Over the last years the catch composition of the artisanal sector has presented no major changes (the abrupt increase in artisanal landings for 2015 was identified as a data error in SERNAPESCA's records (See Appendix Chile Methods 1). In the case of the industrial sector, composition of the main species is also stable over the last years. Yet, the landings of Peruvian anchoveta (*Engraulis ringens*) started declining in 2014 relative to previous years, increasing the relevance of the Chilean jack mackerel (*Trachurus murphyi*) (Table 20) [1].

SAU and FAO databases also identify Peruvian anchoveta (*Engraulis ringens*), the Araucarian herring (*Strangomera bentincki*) and the Chilean jack mackerel (*Trachurus murphyi*) as the main landed species in Chile.

[1] We included in Appendix Chile Results 1, a figure with the evolution of landings for South Pacific or Common hake and a table with its contribution to each sector since there has been special concern about the status of this fishery over the last years in Chile.

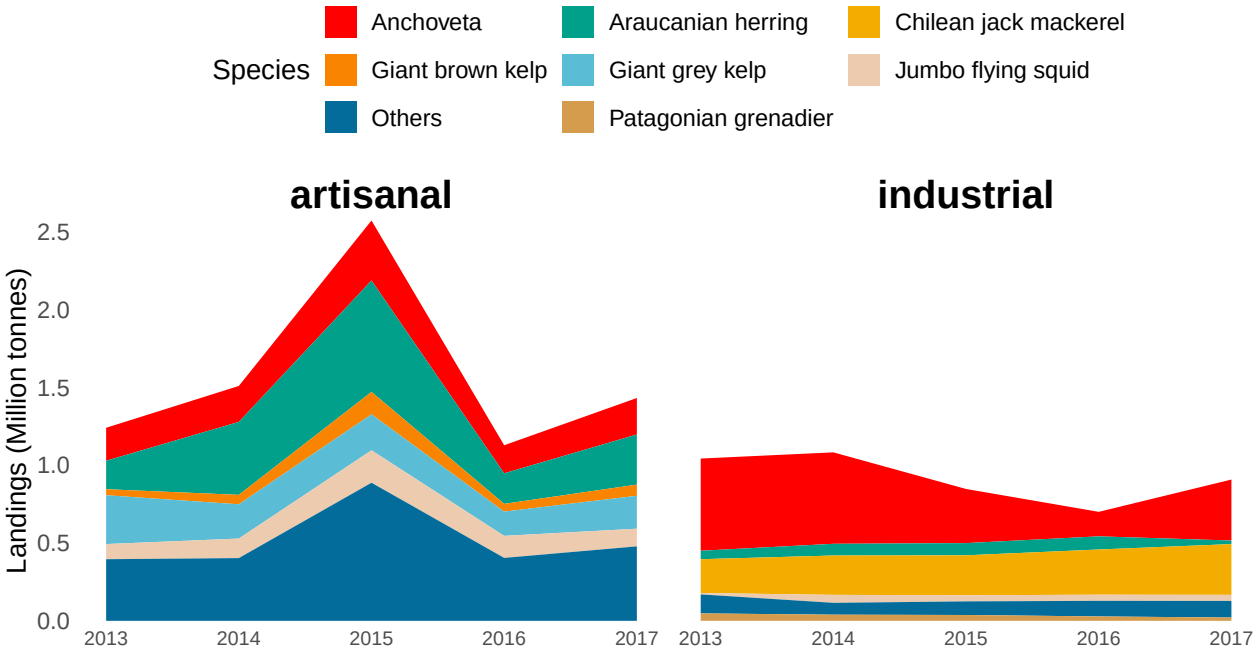

Figure 1: Main species landed in Chile by the artisanal and industrial sector between 2013 and 2017. Data SERNAPESCA, 2018.

Regional Diferences in volumes of wild-caught fisheries

Landings varies widely along the coast of Chile for both artisanal and industrial sectors. Figure 24 shows the mean total landing per sector and region. The color of the bars represents the most landed species in 2017. We observe that the VIII region is by far the region with most landings from both sectors. However, the industrial sector, also concentrates landings in the north of the country. Artisanals are spread throughout the country. The most landed species vary geographically but tend to be the same over the years (Appendix Results Chile 2 and 3).

Conclusions

The main takeaway of our analysis regarding the contribution of domestic fisheries for human consumption is that most of the wild-caught fish currently does not go to human consumption, but for fish meal and oil or algae products. In addition, most of the aquaculture production in the country is for human consumption but it is exported elsewhere. Less than 30% of local production stays in the country for human consumption. Additionally, one of the most relevant species for human consumption in Chile is tuna, which is mainly imported and can. In economic terms, aquaculture is more important than fisheries, producing ~ 90% of the sales of the economic sector. Nontheless, fisheries are more important in terms of employment if we consider the artisanal and industrial sectors.

There is poor undertanding regarding the specific species that support food and economic security in Chile. There has been research into this issue but no systematic data collection and analysis. An approach like the one presented here could be easily automatized to keep track of the trends in domestic seafood consumption. Nonetheless, this would require some improvements, transparent assumptions, and improved data availability.

A major challenge we faced was to combine all datasets without losing species resolution, and there is more potential in using trade databases. Other two things that would improve the estimates we obtained here are species-specific IUU estimates and yields per type of product for Chilean species. IUU estimates increasingly

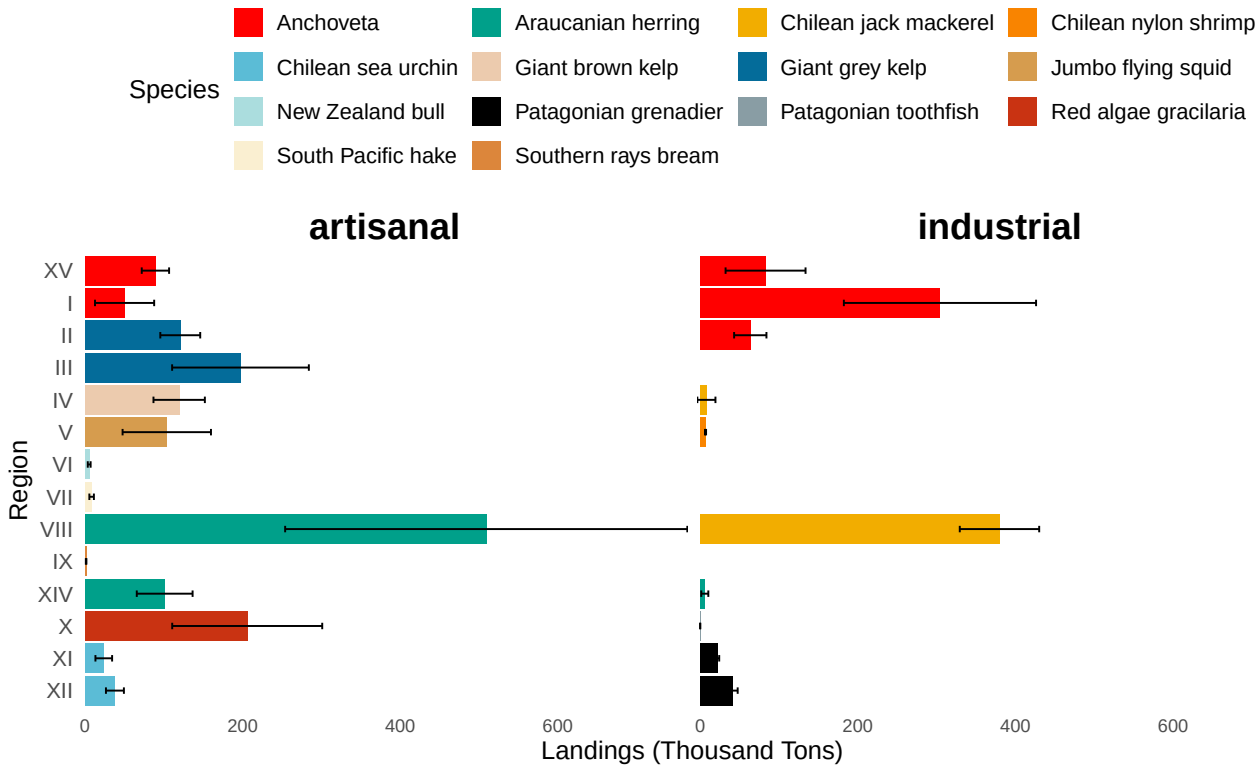

Figure 2: Mean annual total landings per region for the artisanal (left pannel) and industrial sector (right pannel) between 2013 and 2017. The color represents the most landed species in 2017 and regions are ordered from north to south. Error bars represent one standard deviation. Note that scales are different between pannels. Data Landing records from SERNAPESCA, 2018.

Table 1: Main landed (tonnes) species by sector in Chile from 2013-2017.

Species	2013	2014	2015	2016	2017	Mean	s.d.	Total
Artisanal								
Araucanian herring	183	468	715	196	322	377	221	1,883
Anchoveta	212	231	385	180	234	248	79	1,242
Giant grey kelp	313	220	231	156	211	226	57	1,131
Jumbo flying squid	97	125	208	142	113	137	43	686
Giant brown kelp	39	61	144	50	72	73	42	365
Red algae gracilaria	46	32	91	26	48	49	25	243
Mote sculpin	39	48	52	20	60	44	15	219
Black algae luga	34	35	82	31	21	41	24	203
Chilean sea urchin	30	32	62	29	30	37	14	184
Giant kelp	31	26	57	32	30	35	13	175
Industrial								
Anchoveta	592	587	348	157	391	415	182	2,075
Chilean jack mackerel	217	252	256	290	326	268	41	1,342
Araucanian herring	54	75	78	84	23	63	25	315
Jumbo flying squid	9	51	39	39	39	36	16	178
Patagonian grenadier	48	39	37	28	21	35	10	173
Chub mackerel	23	16	20	32	44	27	11	136
South Pacific hake	24	11	12	13	14	15	5	73
Southern blue whiting	15	11	9	8	8	10	3	52
Southern hake	14	7	9	10	11	10	2	51
Red squat lobster	8	8	5	4	4	6	2	29

recognized as important and different methods have been developed for estimate them, ranging from eliciation tasks to more model driven approaches [@oyanedel_illegal_2018].

Chile is increasingly pushing for an increase in seafood consumption. Currently, there are programs that promote seafood consumption like *Del Mar a Mi Mesa*.

This transition to a more fish-based diet, and the increase in domestic seafood demand that it implies, will require an improved picture of the state of marine ecosystems and fisheries in the country. More than just promoting an increase in seafood consumption, it is necessary to identify potential winners and losers from national level policies. In order to ensure sustainable food security, it is also necessary to promote eating fish from well-managed fisheries and aquaculture.

Finally, it would be interesting and timely to study Chilean preferences and attitudes towards seafood products that have not been historically consumed but are becoming important in terms of landings, such as algae and squids. Understanding the potential of these species as viable fisheries and food items, and the new value chains they could support, may help improve access to seafood throughout the country, regardless of socioeconomic status.