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**Overview of the fisheries and seabird bycatch in Chile**

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## Overview of the fisheries and seabird bycatch in Chile

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### **Executive Summary**

This document briefly describes the fishing activity in Chile as of 2012 and the active role of fisheries management in the mitigation of seabird bycatch in some of its fisheries.

The Chilean fishing fleet lands around 3 million tons every year. The fleet consists of 200 industrial vessels and 13,000 small-scale vessels, both accumulating a hold capacity of 219,219 cubic meters and a power of 1,182,785 hp. The most commonly used fishing gears correspond to gillnets, hand lines, long-line, purse-seine, trawling, and traps. However, the greatest catches correspond to purse-seine, trawling, hand line and long-line fleets.

The current General Law on Fisheries and Aquaculture of Chile (2013) adds conservation measures for minimizing bycatch as well as good practices in fishing operations. Chile has a real-time satellite monitoring system of the entire industrial fleet and from 2015, small-scale vessels greater than 15 m length shall also be included in this monitoring system.

Investigations conducted in some fisheries in Chile confirm the existence of seabird bycatch in coastal and high sea waters, and by both industrial and small-scale vessels.

This document provides details on the progress of the reduction of seabird bycatch in some Chilean fisheries.

### **National and international context of seabird bycatch**

Three challenges for making fishing a sustainable activity are set out at an international level: a) harmful practices of fisheries; b) fight against illegal fishing and; c) poor governance (FAO, 2014). In this regard, on February 2013, the General Law on Fisheries and Aquaculture (LGPA) modified significantly the general management objective of fisheries towards *the conservation and sustainable use of the hydrobiological resources through the application of the precautionary approach, of an ecosystem approach on fisheries regulation and the safeguard of the marine ecosystems where they exist.*

This change in the objective requires a powerful effort of end-to-end observation of additional fishing operations that shall include monitoring and assessment of bycatch and non-target species, as well as impacts of fishing operations in the marine ecosystem (e.g. waste).

Chile had an early involvement in minimizing the undesired effects of fishing, especially regarding bycatch through its participation in the *“Forum on solving the incidental capture of seabird in longline fisheries”* held in Auckland, New Zealand in 2000.

During 2001 and 2002, the first projects to assess the ecosystem effect of demersal longline fisheries were funded. The results showed the existence of a significant mortality of seabirds, higher than 0,05 dead birds per 1,000 hooks set. With this evidence, Chile entered the Agreement on the Conservation of Albatrosses and Petrels (ACAP), with the aim at improving the conservation status of these birds as well as gaining access to technical and management advice, specialized in minimizing bycatch of seabirds at a national and international waters level. The focal point of ACAP in Chile is the Undersecretariat for Fisheries and Aquaculture.

Then in 2007, a National Plan of Action for Minimizing Bycatch of Seabirds in Longline Fisheries (PAN/AM-Chile) was approved.

### **The Chilean fishing fleet**

The Chilean fishing fleet is composed of an official list of 200 industrial vessels. However, only 166 vessels operate effectively and 15 of them are processing vessels (Table 1). The small-scale fishing fleet is officially composed, on the other hand, of 12,628 vessels including rowing boats (length<8 m); small motor-boats (length 8 >and<12 m); and medium motor-boats (length>12 and<18m), (Table 2).

In Chile, annual fishing operations result in the capture and collection of 210 species and a volume of 2,8 to 3,0 million tons in national waters. These species mainly include small pelagic fish such as anchovy, sardine and jack mackerel. Also, approximately 60 thousand tons are captured in international waters, including jack mackerel, mackerel, krill, and sword fish.

**Table 1.** Summary of the Chilean fishing fleet in 2012.

Category	Vessel	Gears	N° of Vessels
Industrial	Freezer	Trawling	38
Industrial	Freezer	Mid-water trawling	2
Industrial	Freezer	Purse-seine	101
Industrial	Freezer	Gillnet	2
Industrial	Freezer	Longline	6
Industrial	Freezer	traps-potera	2
Industrial	Processing	Longline	9
Industrial	Processing	Trawling	6
<b>Total</b>		<b>8 fleets</b>	<b>166</b>

The industrial fleet which conduct operations regularly (166 vessels), accumulates a hold capacity of 95,689 m<sup>3</sup> and 266,526 HP of power. Industrial fishing operations amount landings for 1,044,248 tons. The most common fishing gears are purse-seine aimed at small pelagic resources followed by trawling, longline, and gillnets.

**Table 2.** Summary of the Chilean small-scale fleet (2012)

Category	N° vessels	Accumulated Hold capacity (m <sup>3</sup> )	Accumulated length	Accumulated power (HP)
Rowing or sailing boat	977	2,377	5,773	0
Small motor- boat	7,856	36,508	59,754	336,904
Medium motor- boat	3,851	84,645	45,684	579,355
<b>Total</b>	<b>12,684</b>	<b>123,530</b>	<b>111,211</b>	<b>916,259</b>

In 2012, 9,238 vessels, out of the total of vessels registered in the small-scale fleet, carried out effective fishing operations with a total of 41,630 records (fishing logbooks). The most common fishing gears/systems used in Chile are gillnets and diving (Table3).

**Table 3.** Frequency of registered operations estimated by fishing logbooks of the small-scale fleet and per fishing gear in 2012.

Gear	Proportion
GILLNET	34.86%
DIVING	21.71%
ARTISANAL LONGLINE	12.39%
HAND LINE	10.25%
PURSE-SEINE	9.74%
TRAPS	5.58%
POTERAS	4.48%
ARAÑA	0.26%
SHORE COLLECTION	0.20%
HARPOON	0.19%
TRAWLING	0.11%
LONGLINE	0.08%
CHINCHORRO	0.05%
TUBE TRAPS	0.04%
CURRICAN	0.03%
CANASTILLO	0.02%
UNKNWON	0.02%
Total	100.0%

The landing declaration of the small-scale fleet during 2012 reached 1,314,685 tons. The main species are common sardine with 49.1%, followed by anchovy with 19.7% of the total (Table 4).

**Table 4.** Main species and participation in the total declared volume, 2012

Species	Tons	Proportion
COMMON SARDINE	646,077	49.1%
ANCHOVY	258,554	19.7%
GIANT SQUID	115,189	8.8%
MOTE SCULPIN	59,763	4.5%
URCHIN	27,706	2.1%
SOUTHERN SARDINE	23,798	1.8%
PACIFIC POMFRET	20,392	1.6%
GIANT KELP	16,372	1.2%
PIGSKIN SEAWEED	14,726	1.1%
COMMON HAKE	14,354	1.1%

**Control of fisheries:**

Since 2000, Chile has a Vessel Monitoring System (VMS) for fishing vessels. This system is controlled by the National Fisheries and Aquaculture Service (SERNAPESCA) and the Chilean Navy. It allows monitoring in real time the entire industrial fishing fleet. In 2015, small-scale vessels larger than 15 m in length shall be also monitored by satellite in conformity with provisions set out in the current LGPA.

Between 107 and 156 vessels are monitored with the VMS at a national level on a daily basis and 80% of those corresponds to purse-seine vessels.

The annual monitoring of fisheries is conducted by the Fisheries Research Institute (IFOP) under a consultancy contract with the Ministry of Economy, Development and Tourism. This consultancy includes monitoring of biological aspects of the main target species in the country and direct or indirect stock or population assessments. It also includes monitoring of extraction activities carried out by fishing fleets or in-shore fishermen. In addition, the oceanographic conditions and economic aspects of the fisheries are to be included.

**Taxonomic diversity of seabirds**

In Chile, the presence of at least 473 bird species has been determined. Out of the bioclimatic regions described for Chile, the macro zone presenting the greatest richness of seabird species is precisely the marine environment due to its extension and latitudinal variation. According to the review conducted by Vilina and Pizarro (2006), 150 species can be considered as seabirds, representing 32% of the national avifauna. Most of the seabirds consists of long-lived species that show reduced laying of eggs and high philopatry, monogamy, and nest in colonies. From the birds observed in Chilean coasts, 56% are residents and 29% are migrants; the rest corresponds to migrating oceanic birds.

Observations on the interferences of fishing activities with seabirds point the existence of incidental mortality and the active or passive presence of more than 18 species around fishing vessels (Moreno, 2003). Fishing operations conducted near the coast show up to 16 species (IFOP, 2014).

### **Monitoring of seabird mortality in national fisheries**

Since 2004, Chile has provided statistics of seabird bycatch to the ACAP Data Portal. The provision of information has been progressive, according to the capabilities of collection of its scientific observers programs, fisheries monitoring projects, and projects of estimation of bycatch and discard. Furthermore, it can be added other sources of information such as observations of the NGO ATF-Chile and academic research centers (Table 4).

**Table 4.** Summary of the Chilean fisheries with information of seabird bycatch.

Fishery gear–species (fleet)	By catch	Effort Observation- (año)	Total effort	unit	% observation	Dead birds
Gillnet, common hake(small-scale) <sup>1</sup>	No	98 (2010)	3,833	sets	3%	0
Gillnet, sword fish (small-scale-industrial) <sup>4</sup>	No	9	316	trips	3%	0
Purse-seine, Sardine and Anchovy <sup>5</sup> (small-scale-industrial).	Yes	10 (2011)	34,824	sets	<0.03%	22
Trawling, common hake (Industrial*) <sup>5</sup>	Yes	332,5(2011-12)	4,556	Trawling hours	7%	28
Demersal longline, Patagonian toothfish (industrial **) <sup>4</sup>	No	428,806(2013)	16,802,703	hooks	3%	0
Demersal longline,Patagonian toothfish (small-scale) <sup>6</sup>	Yes	88,280 (2002)	s/i	hooks	s/i	4
Pelagic longline, sword fish (industrial*) <sup>4</sup>	Yes	348,813(2013)	531,619	hooks	66%	3
Pelagic longline, sword fish (small-scale) <sup>4</sup>	Yes	176,235 (2013)	409,275	hooks	43%	1
Trawling , Southern blue whiting (industrial**) <sup>4</sup>	Yes	27,2(2013)	1,476	hours	2%	56
Trawling, Southern Hake and Golden Kingklip (industrial**) <sup>4</sup> .	Yes	249 (2013)	2,964	hours	8%	294
Trawling, Southern Hake and Golden Kingklip (industrial*) <sup>4</sup> .	Yes	24,6	2,836	hours	1%	16
Demersal longline, Southern hake and Golden kingklip (industrial *)	Yes	91,578	7,812,059	hooks	1%	2

Notes: (\*) Freezer vessels; (\*\*) Processing vessels.

<sup>1</sup>Queirolo *et al*, 2014; <sup>4</sup> IFOP; <sup>5</sup> ATF –Chile, 2012; <sup>6</sup> Moreno *et al* , 2006

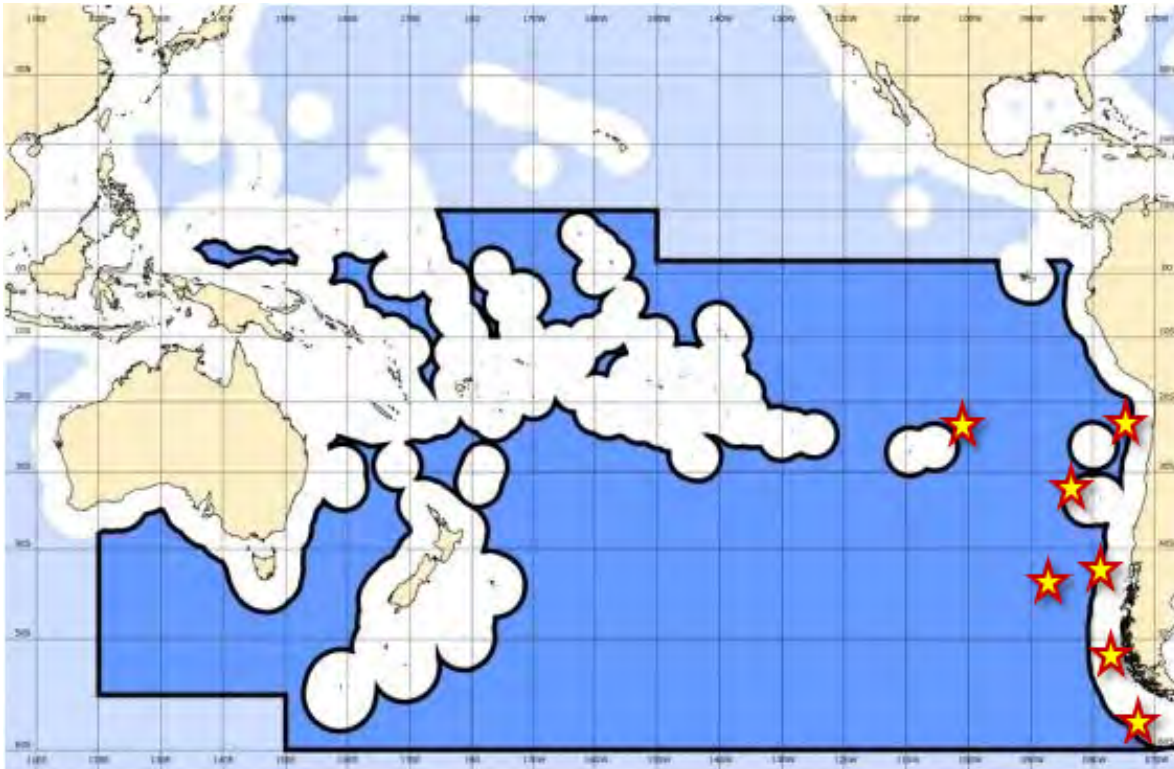
### **Seabirds showing interferences in Chilean fisheries**

The following list of species is included in seabird bycatch:

1. Southern giant petrel (*Macronectes giganteus*)
2. Black browed albatross (*Thalassarche melanophrys*)
3. White-Chinned Petrel (*Procellaria aequinoctialis*)
4. Antarctic fulmar (*Fulmarus glacialisoides*)
5. Southern royal albatross (*Diomedea pomophora*)
6. Northern giant-petrel (*Macronectes halli*)
7. Cape petrel (*Daption capense*)
8. Wandering albatross (*Diomedea exulans*)
9. Westland petrel (*Procellaria westlandica*)
10. Buller's albatross (*Thalassarche bulleri*)
11. Kermadec petrel (*Pterodroma neglecta*)
12. Grey headed albatross (*Thalassarche chrysostoma*)
13. Salvin's albatross (*Thalassarche salvini*)
14. White-tailed tropicbird (*Pheathon lepturus*)
15. Sooty shearwater (*Puffinus griseus*)
16. Pink-footed shearwater (*Puffinus creatopus*)
17. White-Chinned Petrel (*Procellaria aequinoctialis*)
18. Humboldt Penguin (*Spheniscus humboldti*)
19. Guanay cormorant (*Phalacrocorax bougainvillii*)
20. Peruvian pelican (*Pelecanus thagus*)

### **Localization of monitored fishing operations**

On the basis of the map provided at [www.southpacificfmo.org](http://www.southpacificfmo.org), monitoring zones of seabirds in Chile are shown.



Note: The Interim Secretariat has made the above map available for information purposes only. It is a pictorial illustration of the area of application of the Convention that is properly described in legal terms in Article 5. The map is not part of the Convention text and has no legal status. It is not intended to reflect exactly the maritime spaces of adjoining coastal states and cannot be considered to constitute recognition of the claims or positions of any of the participants in the negotiations leading to the adoption of the Convention concerning the legal status and extent of waters and zones claimed by such participants.

### **Mitigation measures and good fishing practices**

The National Plan of Action to reduce seabird bycatch in longline fisheries (2005) includes mitigation measures and good practices per fishery highlighted in grey in Table 4.

Mitigation measures correspond to the use of bird-scaring lines or tori lines and line weighting. Good fishing practices, on the other hand, correspond to night setting, waste management and management of hooks.



### **Some Challenges to Minimize seabird bycatch.**

The development of a fishing technique validated by scientists and fishermen in Chile has allowed the reduction to zero dead birds in the operations of demersal longline conducted by industrial vessels targeting Patagonian toothfish (*Dissostichus eleginoides*). This has resulted in the increase and recovery of nesting colonies of black-browed and grey headed albatrosses (Moreno et al, 2007; Robertson et al, 2014). With the results mentioned, the national fishing industry has started to highlight the efforts addressed to the mitigation of bycatch facilitating the presence of scientists onboard of its fleets (ATF-Chile, 2012).

Since 2012, a group of experts and scientists committed to the conservation of seabirds is working on a regular basis. This group is organized and funded by the Undersecretariat for Fisheries and Aquaculture. It is aimed at updating the knowledge, guiding research, and recommending seabird conservation measures.

One of the next challenges is to expand the National Plan of Action of Minimizing Seabird Mortality to other fisheries such as purse-seine and gillnet. A significant mortality of seabirds has been observed in these fisheries (ATF-Chile, 2012; IFOP, 2014).

There are gaps in knowledge on mitigation measures for purse-seine and gillnet operations and, therefore, further research and design of measures not only effective but also practical and safe in these fishing operations are needed.

### **Final Remarks**

Birds belonging to the order Procellariiformes (albatrosses and petrels) are pelagic birds present in all the seas of the world. Therefore, they are excellent potential indicators of the status of marine ecosystems, especially in the high seas. Chile has two colonies of albatrosses and their foraging areas include national waters and also the high seas.

Chile is a member of the Agreement on the Conservation of Albatrosses and Petrels (ACAP) since 2005. It has participated without interruption in the meetings of the Working Groups on Bycatch led by IFOP and the Working Group of Status, Trends, and Nesting Sites led by the Chilean Antarctic Institute, INACH.

Seabird bycatch has been evaluated in 12 national fisheries. In 5 of them there are formal mitigation measures included in the PAN-AM/Chile. There is still a significant evaluation gap of bycatch in fishing operations of the small-scale fleet.

There is a need to evaluate and propose mitigation measures for seabird bycatch in the industrial and small-scale purse-seine fisheries in Chile.

Chile has documented experiences with the success in minimizing seabird bycatch in fishing operations and in recovering colonies of these birds. Chile also has the technical capability to conduct bycatch assessment and support of specialized working groups which are continuously enhanced with the international advice of ACAP.

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