SPRFMO
South Pacific Regional Fisheries Management Organisation

7th MEETING OF THE SCIENTIFIC COMMITTEE

La Havana, Cuba, 7 to 12 October 2019

SC7-DW03_rev3

Exploratory fishing for Patagonian toothfish within the SPRFMO Convention Area

Chile

Background document:
Exploratory fishing for Patagonian toothfish within the SPRFMO Convention area (FAO 87.3)

REPUBLIC OF CHILE

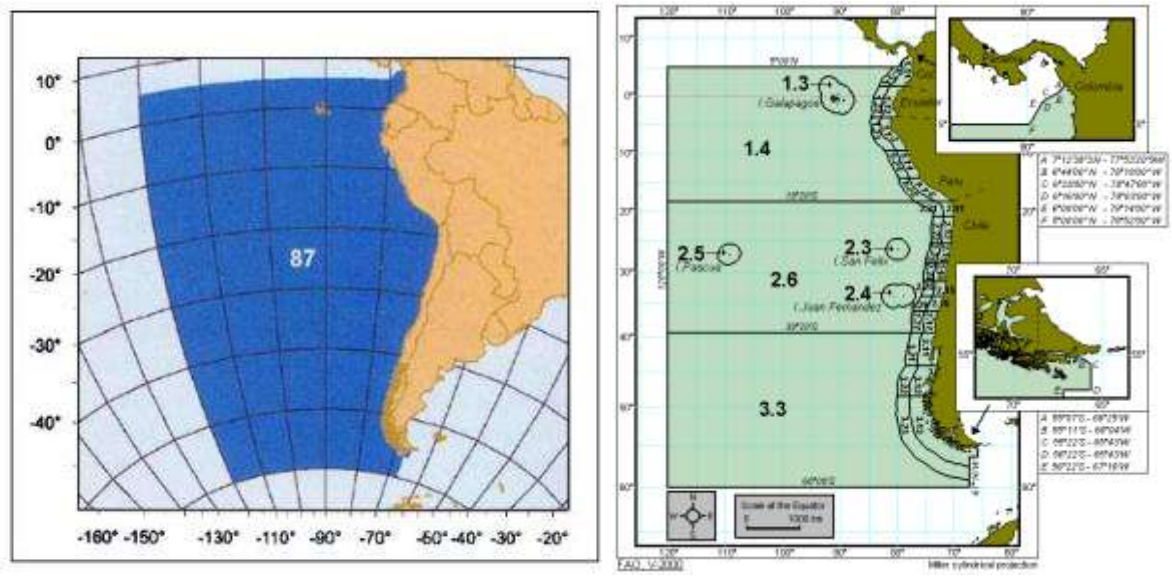
Purpose

The current document contains an application by Chile to the SPRFMO Commission for the development of a Toothfish (Dissostichus sp.) Exploratory Fishing in the area FAO 87.3 under the terms of CMM 13-2019. This application is being presented to the Scientific Committee in their next meeting SC7 to be held in La Havana, Cuba on October 7-12, 2019.

It has to be noted that the main catch is supposed to be Dissostichus eleginoides (Patagonian Toothfish) but it also includes Dissostichus mawsoni (Antarctic Toothfish) since it is not known the distribution of each species in this area.

The current paper develops the proposed Fisheries Operation Plan, including area, target species, fishing methods, fishing gear, period and a data collection plan for the exploratory fishing activities to be undertaken in 2020 and 2021 in the area FAO 87.3 (Pacific Southeast excluding coastal states ZEE).

Whenever is possible the Fisheries Operation Plan has been prepared following the standards of CMM 13-2019 to be easier to follow and review. These requirements are as follows:



FAO 87 South Pacific

Requirements for Exploratory Fisheries

5. Any Member or CNCP seeking to permit a vessel that flies its flag to fish in an exploratory fishery, or to fish in an exploratory fishery with a gear type that has not been used in that fishery for the previous ten years; shall, not less than 60 days in advance of the next annual meeting of the Scientific Committee:

a) submit an application to the Commission to permit a vessel or vessels that fly its flag to fish in that exploratory fishery. This application shall include information that satisfies paragraphs 2 and 3 of Annex 1 of CMM 05-2019 (Record of Vessels);

b) prepare and submit Fisheries Operation Plan to the Scientific Committee. The Fisheries Operation Plan shall include the following information, to the extent it is available:

i. a description of the exploratory fishery, including area, target species, proposed methods of fishing, proposed maximum catch limits and any apportionment of that catch limit among areas or species;
ii. specification and full description of the types of fishing gear to be used, including any modifications made to gear intended to mitigate the effects of the proposed fishing on non- target and associated or dependent species or the marine ecosystem in which the fishery occurs;
iii. the time period the Fisheries Operation Plan covers (up to a maximum period of three years);
iv. any biological information on the target species from comprehensive research and/or survey cruises, such as distribution, abundance, demographic data and information on stock identity;
v. details of non-target and associated or dependent species and the marine ecosystem in which the fishery occurs, the extent to which these would be likely to be affected by the proposed fishing activity and any measures that will be taken to mitigate these effects;
vi. the anticipated cumulative impact of all fishing activity in the area of the exploratory fishery if applicable;
vii. information from other fisheries in the region or similar fisheries elsewhere that may assist in the evaluation of the relevant exploratory fishery's potential yield, to the extent the Member or CNCP is able to provide this information;
viii. if the proposed fishing activity is bottom fishing, as defined in CMM 03-2019 (Bottom Fishing), the assessment of the impact of their flagged vessels' bottom fishing activities, prepared pursuant to paragraph 20(a) of CMM 03-2019 (Bottom Fishing); and
ix. where the target species is also managed by an adjacent Regional Fisheries Management Organization or similar organization, a description of that neighboring fishery sufficient to allow the Scientific Committee to formulate its advice in accordance with paragraph 8.

c) provide a commitment in its proposal to implement the Data Collection Plan for the exploratory fishery developed in accordance with paragraph 9, should the Commission approve fishing in accordance with the Fisheries Operation Plan.

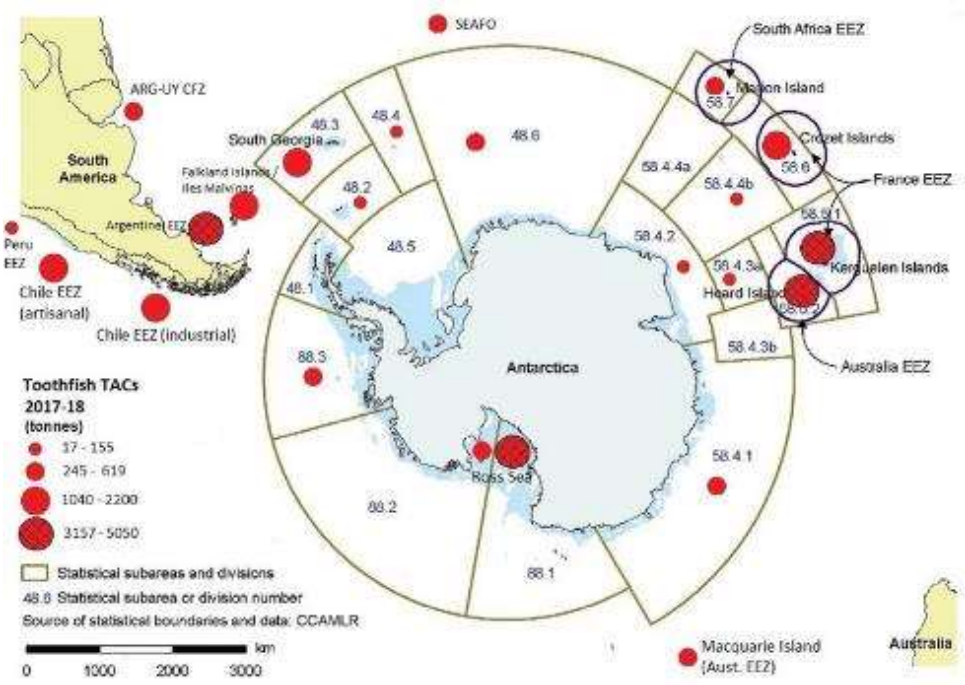
6. The requirements in paragraphs 5 shall be considered as a proposal for the next annual meeting of the Commission and will be made available to all Members and CNCPs in accordance with the Rules of Procedure.

Introduction

So far Chile has not participated in new or exploratory fishing within the SPRFMO waters in the area FAO 87.3. Pacific Southeast. This document is a proposal for an exploratory research fishing survey targeting toothfish (*Dissostichus spp*.) using the bottom longline fishing system known as trotline for a maximum period of 6 weeks per year divided in 1 or 2 trips. As it is widely known Chile has a long experience in the toothfish fishery since it was the world first commercial fishery established. (in fact in many markets the fish is still sold as Chilean Sea Bass regardless of its origin).

There has been no reported bottom longline fishing for toothfish, or other species, in the area FAO 87.3. Pacific Southeast. No written evidence of the presence of this species in the area has been found but the geographical latitude, oceanography depth ranges and bathymetry of the area of interest suggests that toothfish may live in this area too.

The distribution of current commercial and exploratory fisheries can be seen in the below image. (Source: Colto – Coalition of Legal Toothfish Operators)



For the Chilean toothfish fishing industry is very relevant to know if there is toothfish in commercial quantities in that area that is close to its EEZ and to investigate if it is the same population of the fish

caught in Chile and eventually in Argentina. In fact, Chilean biologists doesn't know if toothfish populations in Chile, Argentina, the Falklands Islands are all the same biological population or not. This uncertainty is very relevant for the stock assessment and the management of the fishery.

Proposal

A gradual and precautionary exploratory fishing program

It is proposed that a precautionary and gradual exploratory fishing program be undertaken for toothfish in the southern part of the SPRFMO area. There will be a stepwise process of ground location, ground observation for fishing feasibility, structured test fishing, and if a successful result is achieved then ultimately fishing in accordance with annual precautionary catch limits will be proposed. It is envisaged that the first three steps would take place opportunistically when occasions permitted but, contingent on the approval of the Scientific Committee and the SPRFMO Commission, the first trip will take place between July and December 2020 with a precautionary retention limit of 54 tons green weight.

The structured approach will start with acoustic observation of bathymetry across the more promising parts of the proposed exploratory fishing boxes. This will be followed by systematic fishing trials using relatively short demersal longlines.

Fishing, data collection, and tagging will be structured to:

- Map the bathymetry of the fishable area,
- Documenting relative abundance of Patagonian and/or Antarctic toothfish,
- Understand the stock structure and movement patterns of toothfish in the SPRFMO area and between SPRFMO, CCAMLR and other management areas (coastal states EEZ),
- Tag toothfish for stock linkage studies, and, potentially, for biomass estimation,
- Collect samples for genetic studies.
- Collect information on distribution and relative abundance of bycatch species.

Effort will be spread throughout apparently suitable areas of the exploratory boxes looking for areas that looks more fishable. It is hard to say more at this stage since the bathymetry information of the area is very poor and most probably unreliable.

Total effort, effort at a given location, and retained catch (limited to 54 tons green weight of toothfish) will be limited during the first exploratory fishing visit and any results will be used to develop proposals for the consideration of relevant scientific bodies on the design of subsequent trips and fishing.

Description of the exploratory fishery

The main objective of the exploratory fisheries survey will be to establish whether it is possible to develop a long-term sustainable toothfish fishery in the area FAO 87.3 and to provide SPRFMO Scientific Committee with solid and up to date data about fishing, by-catch, incidental catch and Vulnerable Marine Ecosystems (VMEs).

It is also very important to contribute to the bathymetric mapping of the area and collect all relevant catch/by-catch and biological data (including tagging) as detailed below. The intention is to be able to draft a Patagonian toothfish stock hypotheses and connectivity analysis with other areas.

It has not been easy to decide the specific areas of study having little or no information. For this reason areas of 750 to 2.500 m depth, usual Dissostichus habitat has been chosen and the research boxes has been defines based more on intuition than science. 4 research boxes has been defined in order to facilitate a systematic approach and allow a spatial analysis of the results.

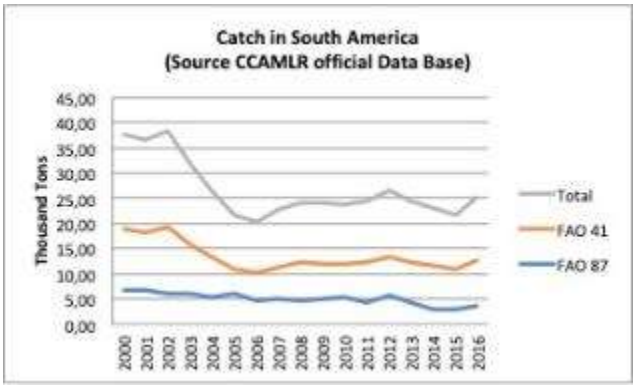
The proposed survey will be limited by both fishing effort and TAC. Globalpesca II will use sets of maximum 5.000 hooks. The vessels usually operate with 2 to 3 sets in the water at any given moment in time or up to 15.000 hooks per day.

It is very hard to estimate the expected catch due to lack of information. It can range from nothing if the fish doesn't live there to very high number if we found a under exploited population. It seems reasonable to use the numbers of the closest known fishing ground and this is Chile EEZ. Globalpesca II current catch in Chile EEZ it is an average of 5 ton/day green weight meaning a cpue of 0.3kgs/hook.

The Fishing Plan consists in 3 fishing days per research block and then move to the net one. Based on previous numbers and considering that 45.000 hooks will be set per block the expected catch will be about13,5 ton green weight by research block. As the intention is to cover 4 blocks in the first year a TAC of 54 tons will be needed for 2020. In case there is no time to present a report during SC8 (Due to seasonality) the same TAC (54 ton) will apply for 2021.

Considering that actual catch in the South American coast is about 12.000 ton the proposed TAC of 54 tons seems to be quite precautionary and by no means will affect the stock. Please note that CCAMLR figures are used instead of stock assessments of each country because results of such assessments are very different one to the other and there is no common management. CCAMLR figures instead are the real quantities declared by each fishing vessel and those are the official CDS numbers.

It has to be noticed that 54 tons are just the 0.02% of the total catch in South America and 1% of the total in the Pacific side.



For the following years the TAC will be adjusted based on the knowledge of the first survey an also depending the number of research areas to be surveyed.

The blocks proposed for the first year are as follows:

Block	1	2	3	4
NW	42º52 S; 98º28 W	59º 00'S; 096º 00'W	59º 00'S; 75º 00'W	55º 00'S; 95º 00'W
NE	42º52 S; 96º00 W	58º 21'S; 096º00'W	59º 00'S; 73º 00'W	54º 00'S; 92º 00'W
SE	43º30 S; 96º 00 W	58º 21'S; 93º 47,60'W	60º 00'S; 70º 00'W	55º 00'S; 92º 00'W
SW	43º30'S; 98º 28'W	59º 00'S; 96º 60'W	60º 00'S; 75º 00'W	55º 00'S; 95º 00'W

Details of the vessel to be used

Vessel Specific Details as required under paragraphs 2 and 3 of Annex 1 of CMM 05-2019 (Record of Vessels) are as follows:

Current vessel flag	Chile (CHL)
Name of the vessel	Globalpesca II
Registration number	3110
International Radio Call Sign	CB 8364
UVI/IMO	IMO Nº 9262388
Previous Name	Strela
Port of Registry	Valparaíso, Chile
Previous flag	Russia (RUS)
Type of vessel	Bottom Longliner (LL)
Type of fishing methods	Trotline with “cachaloteras”
Length	63,15 m
Length type “LOA” “LBT”	55,37 m
Gross Tonnage	1.197 Tons
Nett Registered Tonnage	359 ton
Power of Main Engine (kW)	1.176 KW
Hold capacity (m3)	918,33
Freezer type	Blast Freezer
Number of freezers units	4
Freezing Capacity	20 ton/day
Vessel Communication numbers	Inmarsat C: 472599095 Fleet Broad Band: 870 773 992 461 Email: : gp2.puente@globalpesca.cl
VMS system details	2 units Mar G.E. V.2 Martec Serpe IESM

Name of owner	Globalpesca SPA
Address of Owner	21 de Mayo 3200, Punta Arenas, Chile
Date of Inclusion into the SPRFMO Record	19/07/2017
Flag authorization end date	31/12/2999
Flag authorization start date	19/7/2017
External Markings	Vessel name, Registration Port, IMO number, International call sign, Company logo.
Types of fish processing lines	HGT
When built	2002
Where built	Taiwan
Moulded Depth	4,20 m
Beam	10,00 m
Electronic equipment on board	AIS (Class A), GPS, 2 Radar units, Radio, VHF Radio, Video sounder, Inmarsat C, MF/HF, RLS, SART
Name of Vessel Master	Ernesto Sandoval (or Replacement)
Nationality of Fishing Master	Chilean

The vessel is fully equipped for toothfish deep sea long lining and processing on board. In fact, the vessel is used for this sole purpose whole year round. Normal zone of operation is Chile EEZ and International waters in the Atlantic coast of south America. Eventually she has been chartered to operate in the Falkland's Islands and, years ago, also participated in CCAMLR exploratory fishing.

The crew is fully trained for the fishery and Captain and Officers are used to work closely with observers on board. The vessel prepares daily reports that are available on line.

Globalpesca II Port Side

Globalpesca II Starboard

Globalpesca II Astern

Globalpesca II Stem

Detailed description of fishing methods

Globalpesca II will use a trotline system with umbrella (cachalotera). This system has been used in Chile for more than 10 years and has proven to be effective avoiding sperm whale depredation and also eliminating interaction with marine birds. The system used is shown below:

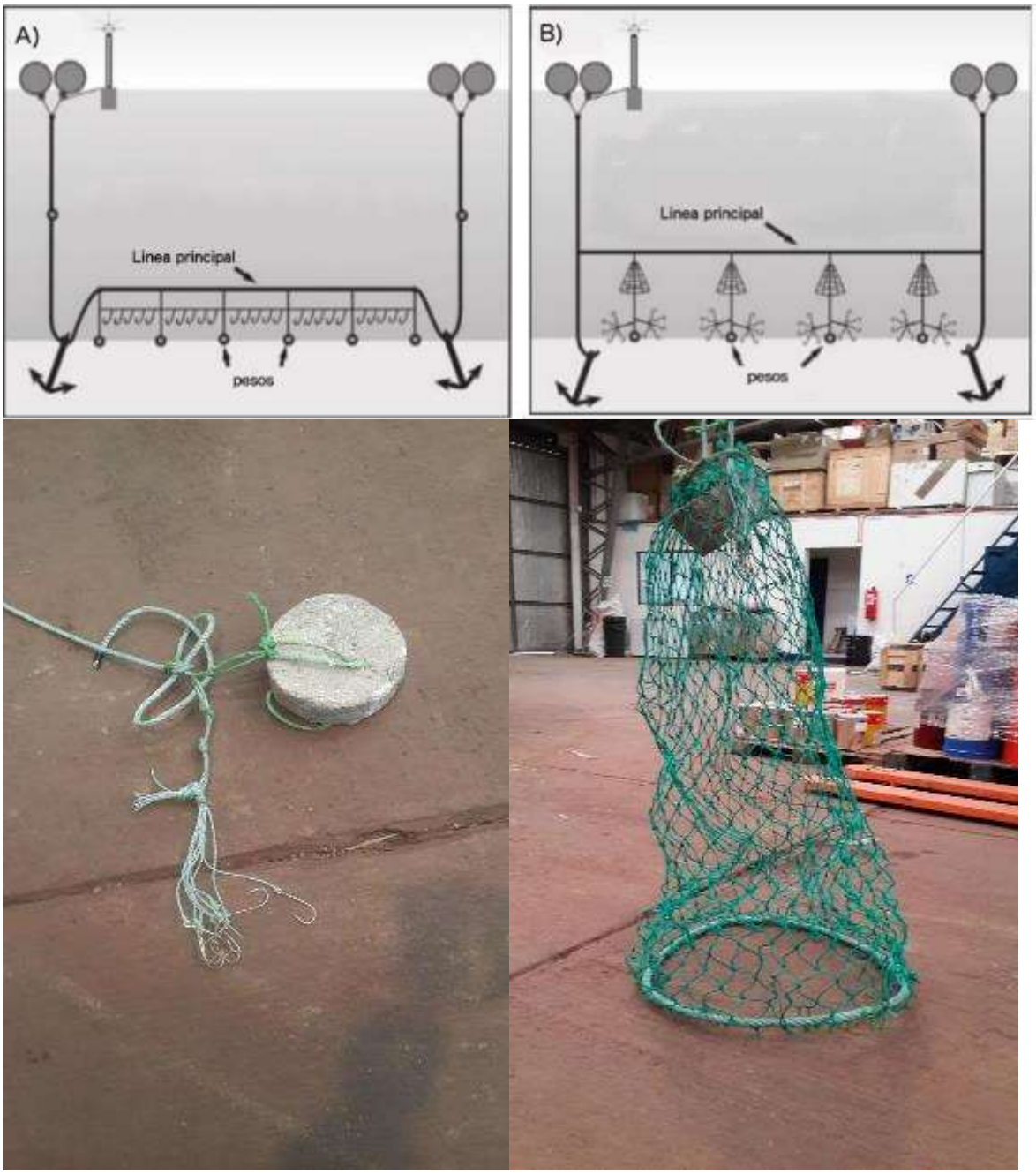


Figure (A) shows the traditional Spanish system while (B) shows the trotline. Below it is the group of hooks (10) and the concrete weight and to the right is the "umbrella" that covers the fish when is being hauled.

The trotline system (fig B) is a modification to the traditional Spanish system (Fig A). The mother line is eliminated, and the hooks are arranged in clusters of several units attached to branch lines (barandillo) that carry the weight. This system increases the sink speed of the baited hooks eliminating the sea-birds mortality that was normal with the traditional system (Moreno *et al.,* 2008, Goetz *et al.,* 2011). An "umbrella" or "cachalotera" is a cone made of net that covers the fish when it is being hauled reducing the depredation of marine mammals specially sperm whales.

A regular set is 14 kms long and includes 720 to 780 branch lines (barandillo). Each unit has a cluster of 6 to 10 hooks depending of the company and the fishing master. So, one set is equal to 7-8.000 hooks, but this can be adjusted depending on the specific fishing grounds.

Seabed Depth range to be fished

According to the experience in most fisheries adult toothfish lives in depths of 500 to 2.500 m but most well managed fisheries around the world has imposed a minimum depth of 500-700 m to avoid the catch of juveniles. In this case the fishable areas that are being targeted are from 750 to 2.500 m.

Intended period and duration of fishing

As this is not a commercial operation the actual research fishing would take place opportunistically when occasions permitted, such as:

- Last trimester of each year when the TAC in Chilean EEZ is over and the vessels are normally tied up at port.
- Winter months during closed season (Spawning) in Chilean waters (June 1 to August 30)
- With a good planning it will be able to do it any time of the year most specially when some experience has been gained in the area.

The first exploratory trip is proposed to be done in 2020 subject to approval of the Scientific Committee and, ultimately, the SPRFMO Commission to be held next February in Port Vila, Vanuatu. The objective of the first trip will be mainly to check the bathymetry and the feasibility of a future fishing operation. Once the first-year operation has been completed a fishing plan for 2021 and 2022 will be prepared with the goal to have a better understanding of the fishery.

Target Species

Target specie will be solely toothfish, anyone of the species Dissostichus eleginoides (Patagonian Toothfish) or Dissostichus mawsoni (Antarctic toothfish). At this stage it is impossible to be more specific since there is no information of any previous catch in the region. In any case, the fish caught in Chile EEZ is almost 100% Dissostichus eleginoides and the one caught in CCAMLR waters is predominantly Dissostichus mawsoni. As the first-year operation will be done just north of CCAMR territory it is possible that the catch may be a mixture of both species

Biological information of the target species (Source Tascheri et al, 2019)

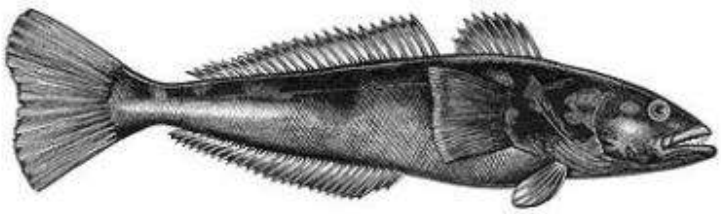


Figure 1. Bacalao de profundidad (Dissostichus eleginoides Smitt, 1898). Illustrated by: Bruce Mahalski.

The Patagonian Toothfish (In Chile known as Bacalao de profundidad) resource is a deep-water specie (50-3.000 m) belonging to the Nototheniidae family that is internationally known as Chilean Sea Bass, Patagonian Toothfish or Merluza Negra.

D. eleginoides has a circum-sub-Antarctic distribution and is found in the continental shelve of the of the South of Patagonia and Chile around sub-Antarctic islands (South Georgia, Shag Rocks, Crozet, Kerguelen, Heard and MacDonald. Macquarie and Prince Edward, banks (e.g. Banzare Bank) and submarine mounts (e.g. Lena and Ob) among latitudes 45 and 62%.

The distribution runs the Antarctic convergence and goes to the North up to 37º S in the Atlantic Plateau (Nakamura 1986), from the north of Peru until the south end of Chile in the Pacific (Oyarzún y Campos 1987, Guerrero y Arana 2009) and until the 40º in the Southwest of the Indian ocean (Abellán 2005).

In the Scotia Ridge the species distributes form the west of the Shag Rocks up to South Georgia and the South Sandwich Islands northern region. The southern register corresponds to 61°24'S in King George Island waters (Arana y Vega, 1999) and the northern one in Davis Strait (63º 02” N, 53º 32” W, at 1.331 m) depth in front of Greenland (Møller et al., 2003). It is also common in the northern part of the Ross Sea (Hanchet et al., 2004). During its life cycle the toothfish uses an ample bathymetric scope. Recruitment is often done in reduced areas and the juvenile stage happens in shallow waters for a period of 4 to 5 months. In the Patagonic plateau the Isla de Los Estados is the main recruitment area but recruits can also be found in smaller numbers through the southern section of the plateau (Collins et al., 2010).

In the Patagonian plateau the juveniles and sub-adults are found in a depth ranging from 150-400 m until they are 7-8 years old (Laptikhovsky and Brickle 2005). When they are of a size of 50-70 cm LT, the juveniles disseminate and migrate gradually to deeper waters though the continental slope. That can be associated with growth in size, the diet and/or the beginning of sexual maturity (Laptikhovsky et al. 2006, Collins et al., 2010). Generally the adults lives in deeper waters (>500 m) and this way they follow the typical stratification pattern of size with the depth, usually found in deep sea species (Collins et al., 2010).

The genetic study of Canales-Aguirre et al., (2018) suggests the existence of only one large population distributed form the north of Perú to the south of Chile and from there to Argentinean coast including the Falkland Islands.

The dispersion may happen through two mechanisms, eggs and larvae dispersion and adults' movements. The deep waters may represent a barrier for the adults and the Antarctic Polar Front may avoid the larvae transport (Smith y McVeagh 2000, Shaw et al. 2004). Anyhow in strong currents areas the dispersion of juveniles may be favored by the long larvae state (Toomey et al., 2016). According to studies of fish tagging and recapture the toothfish doesn't make large distance movements (Welsford et al., 2012, Brown et al., 2013) thus the existence of meta populations is a viable hypothesis (Toomey et al., 2016). Exceptionally large movement has also been documented (Møller et al., 2003, Welsford et al.,2011). Anyhow these movements not necessary represents genetic contributions and D. eleginoides is still a specie that shows a high grade of filopatry (Welsford et al.,2011).

In general terms toothfish spawning happens during austral months among June and September (Agnew et al., 1999, Laptikhovsky et al., 2006, Lord et al., 2006). In the pacific coast of south America this species shows an ample spawning period and the evidence shows that this process only happens in the Chilean austral region (Young et al., 1999, Arana 2009). Here the spawning period starts in July and ends in October showing the maximum in September (Arana 2009). This spawning region connects with the spawning area in the Argentinean plateau delimited by the Burwood Bank, south of Le Maire Strait and South of Tierra del Fuego (57°S) (Pájaro et al., 2005, Laptikhovsky et al., 2006 where spawning happens annually among April and August (Boucher 2018).

A very important characteristic that requires further study is the possibility that not all the females spawns every year. In his study of the reproductive biology on the Falklands Boucher (2018) found that with the beginning of maturation females maintain at least two populations of oocytes, suggesting that toothfish requires up to two years for oocytes development. Females become mature at an average size of 79.1 cm indicating a decrease of first maturity size if toothfish females in the Falkland Island waters. The majority of females spawn at the size from 101 to 130 cm total length. Distribution of reproductive phases shows an increase of females at developing stage in December and March prior to the spawning peaks in May and August respectively. However, the majority of the toothfish population consist of non-spawning individuals remaining in regressing phase (55.8 to 85.6%) including the spawning period. The skip-spawning for toothfish has been defined as reabsorbing non-reproductive and resting types. The abbreviation of oocytes development in the gonads was observed from 1 to 22.1% of females which omitted the spawning season. Most likely females which remain in the spawning area have the opportunity to spawn more often, whereas females which undergo foraging migration toward Northern parts of the Falklands waters return to the spawning ground less often. Females remain Northern area longer to accumulate necessary amount of energy. This hypothesis is supported by the presence of females in immature, developing and regressing phase throughout surrounding Falkland Islands waters. Presence of post-spawning females in regressing stage throughout the Falklands waters suggest that toothfish may undertake irregular spawning**/**foraging migration when favorable for spawning condition occur

D. eleginoides has a longevity of 35 to 53 years (Kalish y Timmiss 1998, Horn 2002, Oyarzún et al., 2003b) and reaches the first sexual maturity at the ages of 8-10 years (Kock et al., 1985). The diet of adult fishes is of generalist type with a preference to the osseous fish (Oyarzún et al., 2003b, Collins et al., 2010, López et al., 2014). With the increase in size of the individuals foraging habits changes to include larger size species that lives in deeper waters. (Arkhipkin et al.,2003).

In deep waters of the Pacific continental shelve (South of parallel 47º S) D. eleginoides shows a high degree of depredation foraging mainly gadiformes (Cohen et al., 1990) from the Merluccidae family (Hake and whiting) and Macrouridae (grenadier) (Sallaberry-Pincheira et al., 2018). Ofidae fishes (Genypterus maculatus Tschudi, 1846), has also been referred as important forage (Murillo et al., 2008).

Information about toothfish predators are relatively limited. In shallow waters predators of juveniles includes penguins (Goldsworthy et al.,2001), sea lions (Reid y Arnould, 1996) and marine elephants (Reid y Nevitt, 1998). But with the increase pf size and deeper habitat probably the number of potential predators is smaller (Collins et al., 2010).

Most probably the main depredators of the adult fish are large vertebrates capable of diving to deep waters such as sperm whales (Physeter macrocephalus) and marine elephants (Mirounga leonina; Reid y Nevitt 1998, van den Hoff et al., 2017). The sperms whales are usually considered large squid depredators, but the stomach content of the sperm whales also shows that they are large toothfish depredators. (Abe y Iwami 1989).

Recently Tixier el al., (2019) used stable isotopes to get evidence that toothfish is also a natural forage for Killer whales (Orcinus orca) in the Crozet Islands. Before it was the general believe that Killer Whales learned eating toothfish when the commercial fishery started.

Sperm and Killer whales stole fish from the line when it was being hauled (Ashford et al., 1996, Nolan et al., 2000, Kock et al., 2006, Purves et al., 2004, Rubilar et al., 2014, Tixier et al., 2019). Recently van den Hoff et al., (2017) using a deep-water video camera captured images of M. leonina depredating fish from the hooks at depths of over 1.000 m. proving that these species feed themselves with toothfish being fished and no only by nature.

Most likely or potential by-catch species

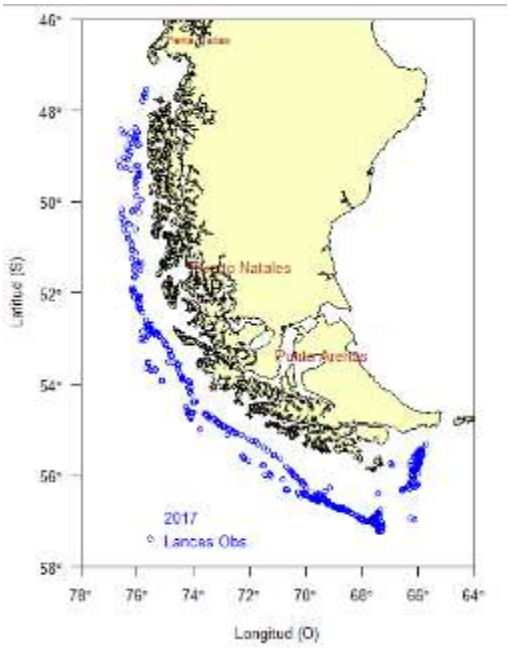
There is no information available of potential by-catch in the area so it seems reasonable to suppose that it will be similar to the conditions in the Chilean EEZ. The by catch details has been recently published by IFOP (figures in tons green weight) and can be summarized as follows (Bernal et al, 2018):

Spanish name	Latin name	2015	2016	2017
Bacalao	*Dissostichus eleginoides*	647	1.750	1.566
Antimora	*Antimora rostrata*	0	11	0
Raya Volantín	*Zearaja chilensis*	15	1	2
Raya Espinoza	*Dipturus trachyderma*	4	5	0
Raya de Magallanes	*Raja magallanicus*	2	0	1
Pejerrata grande	*Macrourus holotrachys*	12	31	47
Granadero Patagónico	*Coelorinchus fasciatus*	8	0	0
Granadero Chileno	*Coelorinchus chilensis*	0	29	0
Rata Café	*Macrourus carinatus*	0	9	0
Otras Especies	*Other species*	5	0	0
Total		693	1.836	1.615

It is clear that, in terms of by-catch this is a quite "clean" fishery. About 95% of the total catch corresponds to the target specie. Most of the by-catch species has no commercial value. In the case of grenadiers and "ratas" the catch is used only for consumption on board, the crew takes some home after arrival and the rest is discarded.

In the case of Rays the situation is completely different since in Chile they are protected species. Some of them has a TAC and biological closed seasons. Current regulations imposed to return these species alive to the sea.

All this information has been documented by IFOP Scientific observers on board the vessels. The areas covered by these fishing trips are shown in the next figure.

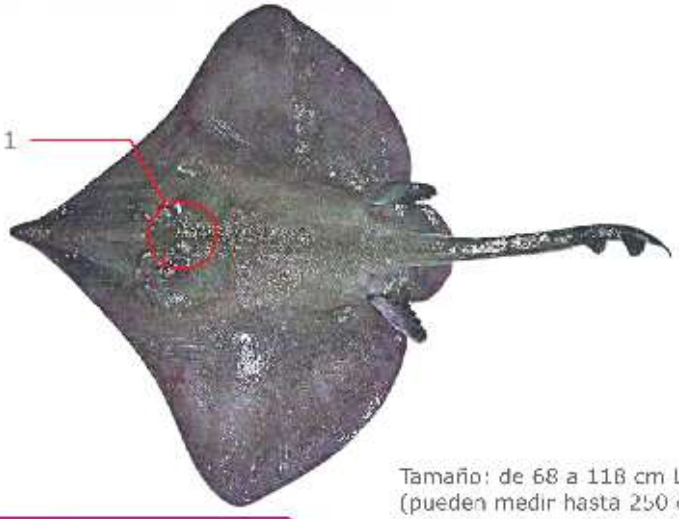


The observers count with a handbook of species to help them to correctly identify any unknown one and apply the right code. In the following pages are some examples of this handbook. A new one was just published but it is not available in electronic format yet.

103 Raya espinosa

Código Ifop

Dipturus trachyderma (Krefft & Stehmann, 1975)



Tamaño: de 68 a 118 cm LT
(pueden medir hasta 250 cm LT)

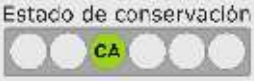
Descripción

El cuerpo de la raya volantín espinuda tiene aspecto rómbico, con una cola espinosa.

(1) Se parece a la raya volantín (*Zearaja chilensis*), sin embargo, se puede diferenciar rápidamente ya que la raya espinosa (*Dipturus trachyderma*) carece de aguijones nucales.

Distribución

Estado de conservación



Estado de explotación de la pesquería

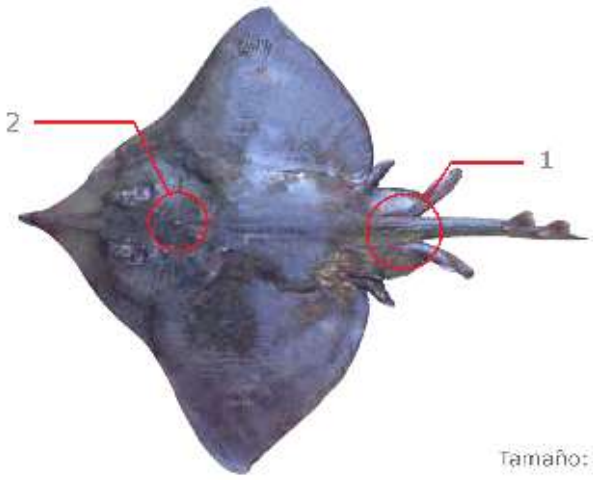
Profundidad

Se ha observado en

Raya volantín

Zearaja chilensis (Guichenot, 1848)

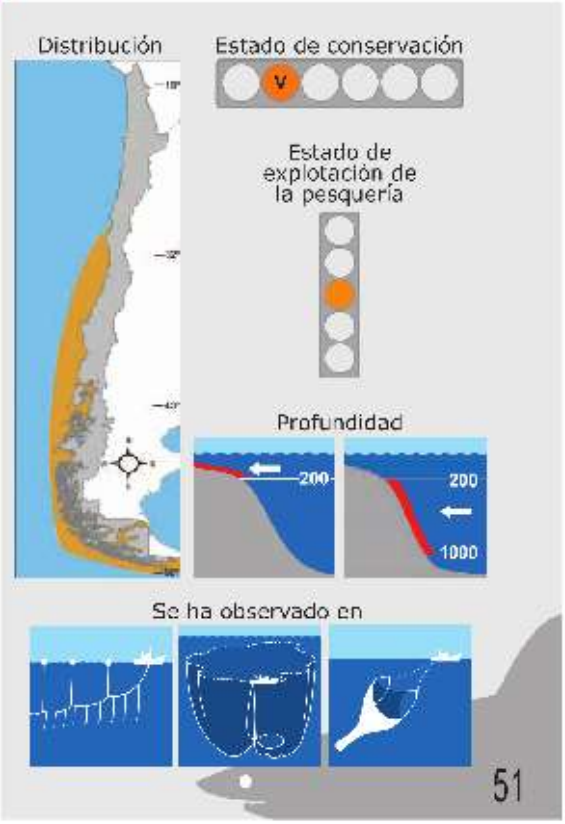
81
Código lfop



Tamaño: 16 a 162 cm LT

Descripción

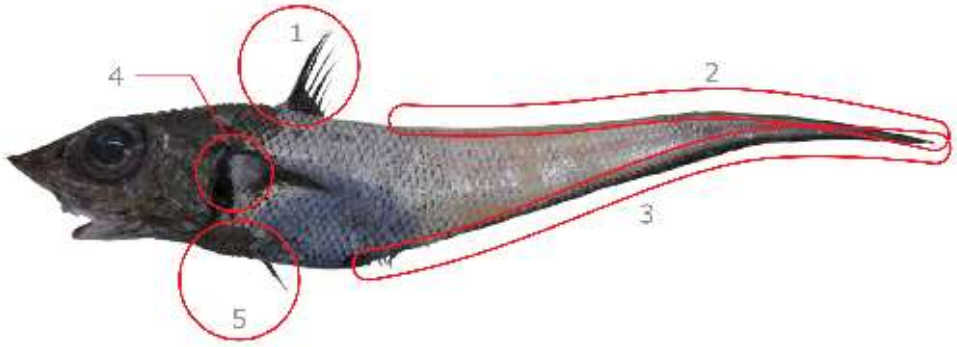
1. Tiene cola proporcionalmente delgada y cuerpo romboidal, como el de un volantín.
2. Tiene una hilera central a lo largo de la cola, con 12 a 30 aguijones y un aguijón en la nuca.



Peje rata chileno

Coelorinchus chilensis Gilbert & Thompson, 1916

17
Código Ifop



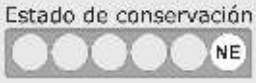
Tamaño: 25 a 40 cm LT.

Descripción

1. Son peces con 2 aletas dorsales; la primera es corta y alta, la segunda es larga y baja. En la primera dorsal tienen 2 espinas, la segunda con el borde anterior liso, y 6 a 10 radios.
2. La segunda dorsal tiene entre 100 y 110 radios.
3. La aleta anal tiene entre 90 y 95 radios.
4. En las aletas pectorales tienen de 17 a 23 radios.
5. En las aletas pélvicas tienen 7 a 9 radios.

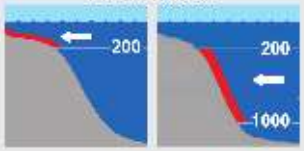
Distribución

Estado de conservación



Estado de explotación de la pesquería

Profundidad



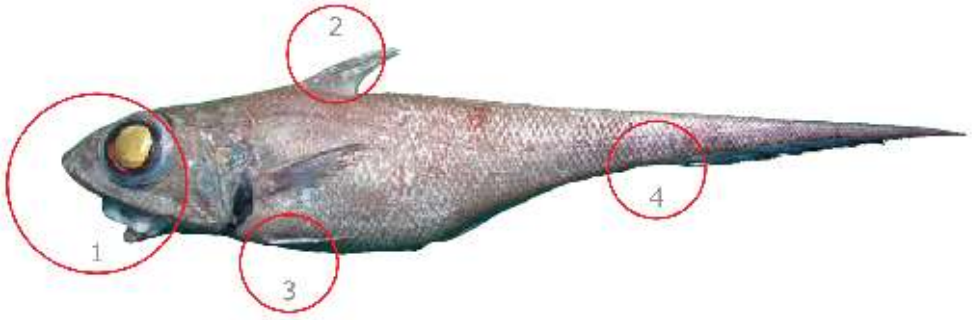
Se ha observado en

91

16 Peje rata patagónico

Código ifop

Coelorinchus fasciatus (Günther, 1878)



Tamaño: alcanza de 50 a 90 cm LT.

Descripción

1. En la zona ventral de la cabeza no poseen escamas, las órbitas oculares son grandes, caben aproximadamente tres veces entre la punta de la nariz y el opérculo y una vez en la distancia que hay entre la punta de la nariz y el mismo ojo.
2. Poseen 2 aletas dorsales, la primera tiene su segunda espina denticulada en su borde anterior, ambas dorsales en conjunto poseen entre 124 y 125 radios.
3. La aleta pélvica tiene de 9 a 10 radios, siendo el radio exterior el más largo de la aleta.
4. La aleta anal tienen 110 radios.

Estado de conservación

Distribución

Estado de explotación de la pesquería

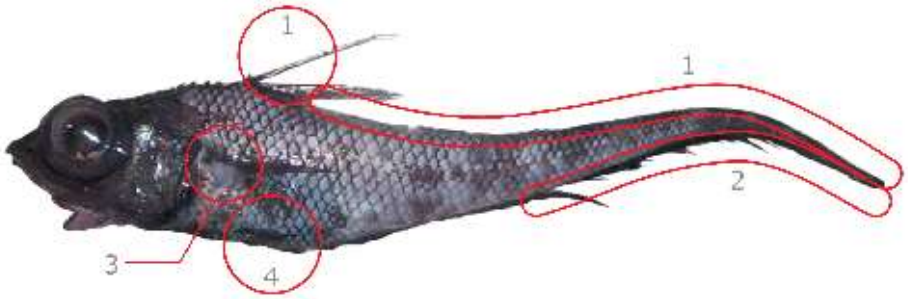
Profundidad

Se ha observado en

Granadero ojos grandes

Macrourus holotrachys (Günther, 1878)

18
Código Ifop



Tamaño: alcanza de 25 a 50 cm LT.

Descripción

1. Son peces con 2 aletas dorsales; la primera con 2 espinas con borde liso y 8 a 12 radios; la segunda aleta dorsal tiene de 79 a 105 radios.
2. En la aleta anal tienen 86 a 95 radios.
3. En sus aletas pectorales tienen de 16 a 20 radios.
4. Sus aletas pélvicas tienen de 7 a 8 radios.

Seabirds

By catch of sea birds is almost zero since the introduction of cachaloteras in 2006-1007. IFOP reported only 3 dead birds (giant petrels) in the last 3 years of operation of the fleet and none of them for interaction with the fishing gear but due to accidental hitting of cables or antennas of the vessel. It has to be noticed that in Chile, since the introduction of trotline streamlines and other birds deterrents are not anymore in use and also specifically excepted in the Chilean regulation.

Offal and discards should preferably be retained on board during hauling (and definitely during setting) or released on the opposite side of the vessel to the hauling bay. All hooks should be removed and retained on board before discards are discharged from the vessel.

All these issues are covered in detail by ACAP Review and Best Practice Advice for Reducing the Impact of Demersal Longline Fisheries on Seabirds (*Reviewed at the Eleventh Meeting of the Advisory Committee Florianópolis, Brazil, 13 – 17 May 2019).* From their conclusions: "Current knowledge indicates that the Chilean, or trotline, system with appropriate line weighting and branch line length, will prevent albatross and petrel mortality and is considered best practice mitigation for demersal longline fishing.

It is important to note that there is no single solution to reduce or avoid incidental mortality of seabirds, and that the most effective approach is to use the measures listed above in combination".

In the specific case of Globalpesca II regular operation in Chile the vessels do not use a tori line or a Brickell curtain and the vessel has not killed any bird. In the case of the operation in Falklands the vessel has used both a tori line and a brickel curtain with the same good results.

CMM 09-2017 provides specifications for seabird mitigation for demersal longline as shown in the Annex 1. According to this Conservation Measure every vessel should prohibit the discharge of any biological material while shooting and hauling to avoid attracting seabirds to the vessel.

Where a Member or CNCP has maintained spatially and temporally appropriate observer coverage for the previous 5 consecutive years at levels greater than 10% and recorded a seabird mortality rate less than 0.01 birds/ 1000 hooks, that Member may choose to:

1. require its vessels to apply only one of the three measures specified below; and
2. ensure a minimum of 10% observer coverage that is adequately representative of the spatial and temporal distribution of the fishing fleet.

The mentioned 3 measures are the following:

a. a line weighting regime as specified in the same CM
b. a bird scaring line
c. Setting at night

If the recorded bird mortality in the past 5 years has exceeded the rate of 0.01 birds/ 1000 hooks

a) apply at least one additional measure detailed in paragraph 1 for at least one year from the time of the mortality;
b) report details of the event to the Secretariat within seven days; and
c) report details of the event in their national report.

As mentioned below, and reported by IFOP observers, birds mortality rate of Globalpesca II has been cero for the last years so it seems that it would be enough with the basic measure plus the standard operation of the vessel (Discards on the opposite side of the vessel not at the time of setting and hauling, collection of used hooks and so on).

The following photos are from the vessel operation in Falkland's and show the tori line and the brickle curtain in operation.

Detail of the Tori line deployed during the setting at the Globalpesca II

Detail of the Brickle curtain on Globalpesca II

In any case the vessel will be equipped with a tori line as an emergency matter and will deploy it if needed. The following figure shows IFOP official report that covers the whole Chilean fleet not any vessel in particular.

Year	Toothfish Fishery South of 47º South Latitude					
	Seabirds Caught (Nº)			Marine mammals caught (Nº)		
	Alive	Dead	Total	Alive	Dead	Total
2014	0	0	0	0	0	0
2015	0	3	3	0	0	0
2016	0	0	0	0	0	0
Total	**0**	**3**	**3**	**0**	**0**	**0**

Note:

Only 3 years are included in this report since 2017 and 2018 has not been published yet. In any case numbers are not different from the one shown above.

In the case of marine mammals, the by catch has been inexistent for as long as there are records. But interaction with marine mammals in the form of depredation of the fishing lines is very common and has been profusely studied.

Bottom Fishing Impact Assessment (BFIAS)

Each potential impact was assessed, based on the FAO Deepwater Guidelines (FAO 2008), using specific definitions for the various rating criteria. To the extent possible, allocation to ranks was based on quantifiable criteria. Elements of risk specifically evaluated were:

- Description of Impact - Provides a brief description of the expected impacts, answering the question, "What will be affected and how?"

- Extent - Indicates whether the impact will be: Site Specific (limited to within one kilometre of the fished site); Local (limited to within one fished 20' block, or 50km of the fished site); Regional (limited to the fishing area ~200-500 km radius); or Oceanic (extending across a significant proportion of an ocean basin, or of the SPRFMO Area).

- Duration - Gives the expected duration of the effects of the impact, being: Short (months, <1 year); Medium (years, 5-20); or Long (> 20 years, decades to centuries).

- Intensity - Provides an expert evaluation of whether the magnitude of the impact is destructive or innocuous and whether or not it exceeds set standards, and is described as: None (no impact); Low (where environmental processes are slightly affected); Medium (where environmental processes continue to function but in a noticeably modified manner); or High (where environmental functions and processes are altered such that they temporarily or permanently cease and/or exceed established standards / requirements).

- Cumulative Impact - An assessment of whether the impact is cumulative over time or space or not, and is expressed as being: Unlikely (the event is either a low-impact rare event, or recovery is rapid, such that effects will not accumulate over time or area); Possible (depending on extent, severity, natural disturbance levels and recovery rates); or Definite (at the intensities occurring, effects will endure such that, over time or space, impacts from a number of separate operations will accumulate).

- Overall Significance - The overall significance of each impact is then evaluated from the combination of duration, extent, intensity and cumulative effects. Overall Significance is determined as follows:

  - Low: Where the impact will have a negligible influence on the environment and no active management or mitigation is required. This would be allocated to impacts of low intensity and duration, but could be allocated to impacts of any intensity, if they occur at a local scale and are of temporary duration.

- Medium: Where the impact could have an influence on the environment, which will require active modification of the management approach and / or mitigation. This would be allocated to short to medium-term impacts of moderate intensity, locally to regionally, with possibility of cumulative impact.

- High: Where the impact could have a significant negative impact on the environment, such that the activity causing the impact should not be permitted to proceed without active management and mitigation to reduce risks and impacts to acceptable levels. This would be allocated to impacts of high intensity that are local, but last for longer than 5-20 years, and/or impacts which extend regionally and beyond, with high likelihood of cumulative impact.

Target Species

	Extent	Duration	Intensity	Cumulative	Overall
Target specie overexploitation	Low	Short	Low	Possible	Low

Description of risk

The risk of overexploitation practically doesn't exist since this exploratory fishing is very limited in terms of TAC and number of lines sets. The TAC has been set at a precautionary limit and the numbers of lines set is fixed so in case in one research box catch is comparatively high and exceeds the TAC, the vessel will then move to the next block.

There is no way to assess the resource due to lack of data but if the exploratory fishing is successful some kind of precautionary regulations will have to be set before it becomes commercial. That is why the cumulative risk exists but not in the case of the current exploratory fishing.

Mitigation

In order to be sure that TAC will not be exceed and that over fishing in any particular research block happens is avoided the following set of rules will apply.

Trigger	Action
3 lines have been set in a block and catch is less than the TAC	Move to the next block
Catch in a given Block reaches the TAC	Stop fishing and move to the next block
Accumulative catch exceeds the total catch allowed	Stop fishing immediately and go back to port

Non target fish

	Extent	Duration	Intensity	Cumulative	Overall
Skates and Rays	Local	Short	Low	Unlikely	Low
Grenadiers and Ratas	Local	Short	Low	Unlikely	Low
Morids	Local	Short	Medium	Unlikely	Low
Sharks	Local	Short	Medium	Unlikely	Low

Description of risk

As mentioned before the by-catch level in the case of bottom longline in Chile is very limited and normally does not exceed 5 % of the total catch. Same thing happens in other fisheries around the world.

In the case of the Chilean fishery Grenadiers and morids are mostly discarded while rays and sharks are returned to the sea alive (Whenever it is possible), In the case of the exploratory fishing the same rule will apply.

Mitigation

The move-on rule for fish by-catch followed in CCAMLR will be used for this proposal (CCAMLR, CM 41-03, 2018) namely:

- "The by-catch of finfish shall trigger a move-on rule if the catch of skates and rays exceeds 5% of the catch of *Dissostichus* spp. in any one haul or set, or if the catch of *Macrourus* spp. reaches 150 kg and exceeds 16% of the catch of *Dissostichus* spp. in any one haul or set.
- If the move-on rule is triggered, then the fishing vessel shall move to another location at least 5 nm distant."
- the vessel will move-on to the next research block if more than 4 individuals of any of the following families Somniosidae, Lamnidae, Cetorhinidae, Alopiidae are caught or if more than 2 individuals of any one of these families of sharks are caught;
- If the skate and ray, and species of the families Centrophoridae or Squalidae by-catch exceeds 5% of toothfish catch or reaches a maximum of 100 kg in any one haul or set, the vessel will move-on to another location at least 5 nm distant;
- If the move-on rule is triggered, then the fishing vessel shall move to another location at least 5 nm distant."
- The fishing vessel shall not return to any point within 5nm of the location where the move-on rule was triggered for a period of at least five days. The location where the move-on rule was triggered is defined as the path followed by the fishing vessel".

Seabirds

	Extent	Duration	Intensity	Cumulative	Overall
Albatross	Specific	Long	Low	Unlikely	Low / Nil
Petrels	Specific	Long	Low	Unlikely	Low / Nil
Penguins and prions	Specific	Long	Low	Unlikely	Nil

The interactions with seabirds was extensively discussed above specially the advantages of using the trotline system. The attached Factsheet prepared by ACAP (Agreement on the conservation of Albatrosses and Petrels) speaks by itself.

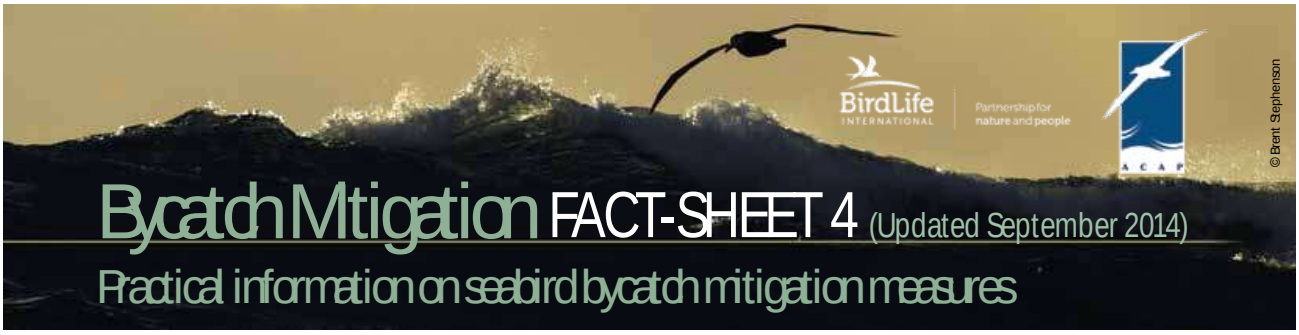
Mitigations

Globalpesca II will not use any bird's deterrent but will follow strictly the discard management rules paragraph 18 of **CMM 14b-2018**, specifically

a) no dumping of offal while lines are being set or hauled,
b) any offal or discards shall be macerated prior to discarding.
c) discarding shall take place only at the end of haul or while steaming; and no biological material shall be discarded for at least 30 minutes before the start of any set or during any set, and
d) discarding will only take place from the opposite side to the hauling position

Used hooks will be removed from fish caught and discards and stored safely on board to avoid damaging birds. Seabirds interact with deep-set longline vessels in a number of ways. At the surface, birds are attracted to baited hooks during line setting at the stern of the vessel, where some species may be caught at the surface only (e.g. most albatrosses) or underwater if the species is able to dive and chase baited hooks while descending (e.g. white chinned petrels). During line hauling, birds are attracted to the starboard side of the vessel nearest the hauling bay with the risk again being caught by hooks while attempting to feed on bait. At-risk seabirds are therefore those larger seabirds that are able to feed on large pieces of baits (Mostly sardines in case of Globalpesca II)

Additional mitigation measures will be the use of tori lines and Brickell curtains. These additional mitigations measures will be triggered by the dead of a single bird due to interaction with the fishing gear.



Bycatch Mtigation FACT-SHEET 4 (Updated September 2014)

Practical information on seabird bycatch mitigation measures

Demersal Longline: Line weighting – Chilean System

Seabirds are vulnerable to mortality on longline hooks during the short period between hooks leaving the vessel and sinking beyond the bird's diving range. The Chilean System was developed primarily to combat the problem of depredation by cetaceans, however, the conf guration of the gear leads to very high initial hook sink rates, which results in near zero seabird bycatch rates.

What is the Chilean System?

In commercial demersal longline f sheries, lines are weighted in order to deliver hooks to the target f shing depth as ef ciently as possible and maintain the line on the seabed. The Chilean System was developed to combat the problem of depredation of f sh by cetaceans (Moreno *et al*., 2007). The system uses a conf guration borrowed from Chilean artisanal f sheries. It consists of a single main line with secondary branch lines attached every 40 m. Each branchline is around 15 m long and has a weight (ranging from 4–10 kg) attached to the terminal end, hooks are attached directly to the branchline (Figure 1). The gear resembles that of the Spanish System minus the 'mother' line with hooks attached directly to branch lines, in clusters of up to ten.

The Chilean System dif ers from artisanal gear by the addition of a buoyant net funnel that shrouds f sh during hauling, concealing them from predatory cetaceans.

Ef ectiveness at reducing seabird mortality

In terms of seabird bycatch mitigation, the extremely fast initial sink rate (0.8 m/s) is the critical factor. Hooks are attached close to weights, once deployed they literally sink like a st one until the branchline becomes taut, at a depth of 15 m. Once the branch line is taut the sink rate slows due to the buoyant ef ect of the mainline (Figure 2). Hooks sink out of sight within the propeller wash and do not attract foraging attempts from seabirds.

The Chilean System has been trialled in the Patagonian toothf sh f shery in Southern Chile. When compared with unmodif ed demersal longline gear, the Chilean System performs extremely well. Baseline data suggest, prior to the introduction of mitigation measures, 1,555 birds were killed each year (98% albatrosses) in Chilean f sheries. The use of streamer lines and other mitigation measures reduced this f gure to 448 birds per year (100% albatrosses). Following the introduction of the Chilean System observers recorded zero seabird bycatch; with over 39% of hooks observed (Moreno *et al*., 2007).

Ef ectiveness at reducing depredation by cetaceans

Associations between cetaceans (e.g. sperm and killer whales) and longline vessels have been recorded in longline f sheries around the world. The relationship is complex and dif cult to quantify. Although the highest numbers of associating cetaceans can coincide with very high catch rates, it is generally accepted that the presence of toothed whales has a negative impact on f sh catch. Several mitigation measures have been tried with little success, these include; acoustic harassment devices, magnets attached to f shing lines, turning of acoustic equipment, retaining of al and leaving an area when whales are present (Purves *et al*., 2004). The driving force behind the development of the Chilean System was depredation by cetaceans. Trials indicate that this system successfully deters whales from taking f sh from the lines.

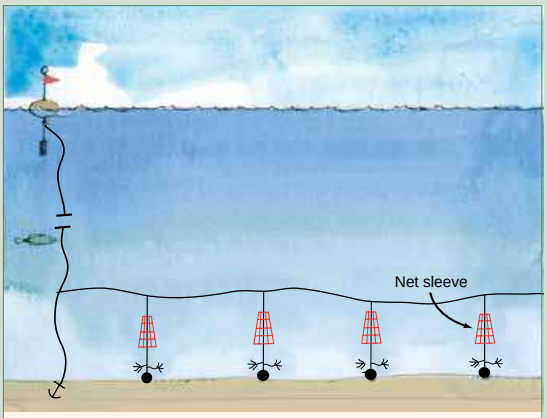


Figure 1. The conf guration of Chilean System gear.

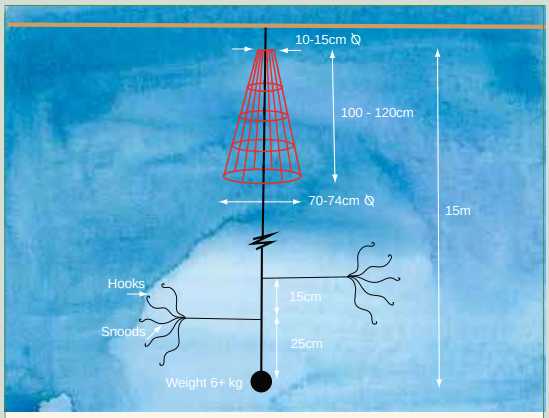


Figure 2. Branch line conf guration.

ACAP Best Practice Advice

At present, the Chilean System has shown great potential as a deterrent to cetacean depredation of target catch and as a means of seabird bycatch mitigation.

- The mass of weights used is highly variable, ranging from 4–10 kg, Moreno *et al.* (2007) report an average initial sink rate of 0.8 m/s. Although this far exceeds the sink rate reported for other demersal longline configurations, the relationship between weight mass, weight type and sink rate should be investigated to determine the minimum weight requirement.
- An unrelated consequence of the gear modifications to combat cetacean depredation is a very high initial sink rate of hooks during setting, which ensures zero, or close to zero, seabird bycatch.
- Most mitigation measures require minor modifications to fishing gear or practices, the Chilean System requires a considerable restructuring of the fishing gear. Once adopted, the mitigating effect of the gear is integral to the day-to-day fishing operations.

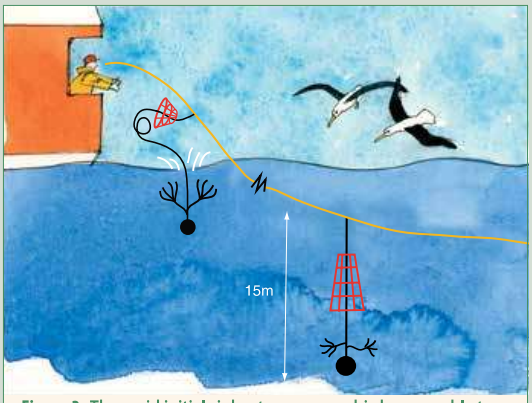


Figure 3. The rapid initial sink rate means seabirds are unable to access baited hooks.

Potential problems and solutions

- The configuration of the Chilean System more than halves the number of hooks set per metre of main line, although the simplicity of the Chilean System may allow a greater length of longline to be hauled per day. Under certain circumstances, when catches are good, this may reduce the number of fish caught. The distance between branchlines could be reduced to increase the number of hooks set but this is likely to result in more tangles between branchlines.
- Over time, cetaceans could become habituated to the net shrouds and resume fish depredation. Continued monitoring is required to observe the interactions between the Chilean System gear and cetaceans.
- A consequence of cetacean depredation is the unknown number of fish caught that are removed by whales before they reach the surface. Sometimes remains are left on the hook but the majority are likely to leave no trace. This unknown loss could have implications for fish stock assessment. Reducing the level of depredation will assist in the management of many fisheries.

Combinations of measures

Initial trials indicate that the Chilean System alone is sufficient to eliminate seabird bycatch. If this proves to be the case, there is no need to use the Chilean System in combination with other mitigation measures.

Further research

The ability of the Chilean System to eliminate seabird bycatch is a by-product of efforts to prevent depredation by cetaceans. Trials are needed in other fisheries where depredation by cetaceans is regarded as a problem.

Long-term studies are needed to ensure the Chilean System continues to deter cetaceans.

Compliance and implementation

Hook-bearing secondary lines require weights to be attached in order to sink. However, alternating between this fishing method and the traditional Spanish method within fishing trips is problematic. This is a relatively new fishing method and may be in the process of refinement. It is important to monitor changes to gear design, especially those likely to affect the sink rate of baited hooks. Observer presence on vessels is required to assess implementation. Electronic monitoring can also serve as a useful tool to monitor implementation.

References

Moreno, C.A., Costa, R. and Mujica, L. (2007) *Modification of fishing gear in the Chilean Patagonian toothfish fishery to minimise interactions with seabirds and toothed whales.* ACAP SBWG1-paper 8.

Purves, M.G., Agnew, D.J., Balguerias, E., and Moreno, C.A. (2004) Killer whale (*Orcinus orca*) and sperm whale (*Physeter macrocephalus*) interactions with longline vessels in the Patagonian toothfish fishery at South Georgia, South Atlantic. *CCAMLR Science*, **11**, 111–126.

CONTACTS

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ACAP Secretariat, Agreement on the Conservation of Albatrosses and Petrels, 27 Salamanca Square, Battery Point, Hobart, TAS 7004, Australia. Email: secretariat@acap.aq

Marine Mammals

	Extent	Duration	Intensity	Cumulative	Overall
Whales / Dolphins	Specific	Short	Low	Unlikely	Low / Nil
Otarids	Specific	Short	Low	Unlikely	Unknown
Phocids	Specific	Short	Low	Unlikely	Unknown

Summary Risk

The majority of whale species have a high degree of potential presence in the South Pacific at least in coastal waters. Whales are supposed to be at risk at or near the surface during setting or hauling, where entanglement would likely result in injury or drowning. In any case in Chilean waters not a single case of a wale killed as reported by IFOP observers on board industrial vessels.

In any case there is a lot of depredation by killer and sperm whales that takes the catch form the hook when hauling and some even dive to eat directly from the line at the bottom of the sea. They produce a large economical damage to the vessel but the crews has no way to avoid them.

Otariiid seals have been associated with toothfish longline vessels and have been observed to depredate on catcth but in the Chilean EEZ North of 47º that is reserved for artisanal fishermen. There is no information about populations of these species in high seas of the Pacific. In any case Chilean industrial fleet has no experience dealing with the interaction with sea lions. A deeper analysis will have to be done after the first year of the exploratory fishing.

Southern Elephant (*Mirounga leonina*) seals are increasingly depredating the lines but still at manageable levels. Main problem is that they are able to dive deep up to 2.000 mts.

Mitigation

The industry has invested a lot of money investigating the ways to avoid depredation. Most of the techniques tried has failed and the only way seems to be to avoid the encounters. Or leave the line set, navigate to set another one and then come back to retrieve the first one.

In summary, the risk of damaging sea mammals is almost nil. A List of marine mammals present in the Chilean EEZ is included below just for informative purposes.

Nombre Común	Nombre científico	Estado de conservación (UICN)	Potencial y posible presencia
Orden Cetacea			
Ballena Sei	*Balaenoptera borealis*	En Peligro	Más frecuente en zona costera del RBCH
Ballena Minke	*Balaenoptera bonaerensis*	Datos insuficientes	Frecuente
Ballena Jorobada	*Megaptera novaeangliae*	Preocupación menor	Frecuente
Ballena Franca Austral	*Eubalaena australis*	En peligro crítico	Más frecuente en zona costera del RBCH
Cachalote	*Physeter macrocephalus*	Vulnerable	Frecuente
Delfín Cruzado	*Lagenorhynchus cruciger*	Preocupación menor	Frecuente
Delfín Oscuro	*Lagenorhynchus obscurus*	Datos insuficientes	No muy frecuente
Orca	*Orcinus orca*	Datos insuficientes	Frecuente
Hiperodonte del Sur	*Hyperoodon planifrons*	Preocupación menor	Anecdótico
Delfín Austral	*Lagenorhynchus australis*	Datos insuficientes	Más frecuente en zona costera del RBCH
Tonina Overa	*Cephalorhynchus commersonii*	Datos insuficientes	Más frecuente en zona costera del RBCH
Delfín Chileno	*Cephalorhynchus eutropia*	Casi amenazada	Más frecuente en zona costera del RBCH
Orden Carnivora			
Lobo Común	*Otaria flavescens*	Preocupación menor	Frecuente
Lobo Fino Austral	*Arctocephalus australis*	Preocupación menor	Frecuente
Elefante Marino	*Mirounga leonina*	Preocupación menor	Cada vez más frecuente
Foca Leopardo	*Hydrurga leptonyx*,	Preocupación menor	Visitante ocasional

VME

The **SPRFMO Bottom Fishery Impact Assessment Standard (BFIAS)** recommends the in areas where there is poor information of VEMs occurrence information is it is advised to use other information that allows to infer the likely presence of vulnerable populations, communities and habitats. Several of such online and published sources were consulted but little information found about the presence of VMEs. T

his approach is taken for all species groups potentially impacted by fishing. Data on species observations and predicted occurrences were gathered from multiple validated online and published sources. Misn dat base sources consulted were:

- OBIS (Ocean Biogeographic Information Database). OBIS is an open-access web-distributed global atlas of marine biodiversity and biogeographic database, containing georeferenced species occurrence and associated metadata (Grassle, 2000). OBIS data positions for combined seabirds, fish, reptiles, mammals, invertebrates, and chondrichthyans are shown in Figure 2.

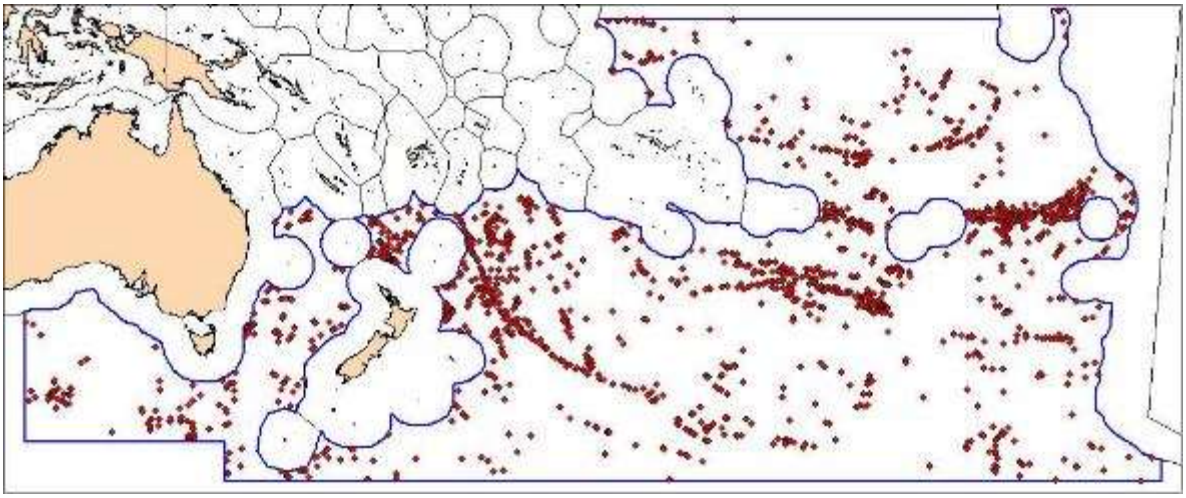
- IUCN (www.iucnredlist.org) was used to gather species distribution data using published mapped spatial data (downloaded shape files) and online Threatened Species lists.

- *Biogeographic Atlas of the Southern Ocean* (De Broyer and Koubbi (eds), 2014). A published atlas of Southern Ocean marine species.

- FishBase (www.fishbase.org). A global species database of fish species and mapped predicted distributions via www.aquamaps.org

- All SPRFMO scientific documents and sometimes also CCAMLR Conservation Measures.

A basic source of information is to study the location of seamounts since those are a usual habitat of VMEs. The following map has been prepared by Valerie Alllain et al. 2005 (SPRFMO-V-SWG-05)



Geographic distribution in the SPRFMO area of potentially trawlable seamounts, i.e. seamounts which summit depth is located between 250 and 1500 m depth.

It is easy to see that the SPRFMO are is full of seamounts so potentially full of VMEs areas to protect. But there are far too many uncertainties like the real location of the seamounts and the habitat around them. The only way to get better information is though fishing operations and seabed mapping in the area.

Prediction of Habitat Suitability and Likelihood of VMEs (Taken from BFIAS)

Data on seabed biodiversity are lacking for most deep-sea benthic areas, except for a few specifically surveyed seamount systems, and seabed biodiversity surveys are likely to remain unaffordable for all but a few areas of particular interest. In the absence of such data, biologically important physical factors (Clark 2008, Williams et al. 2009) can be used to indicate suitability of specific areas for vulnerable benthic species, and to stratify measures such as spatial closures to protect such areas. Seabed geo-morphological classification derived from seismic surveys can be used to identify areas of particular substratum types that can be correlated with particular benthic communities (Anderson et al. 2011).

Physical seabed factors can be combined with physical / chemical factors such as temperature, salinity, depth, chlorophyll, oxygen, currents, productivity and water chemistry using habitat suitability models (Tittensor et al. 2009, Davies & Guinotte 2011) to predict suitability of particular areas or features as habitats for VME species. Various analyses of this type have been conducted for the South Pacific region. Clark et al. (2006) classified the original Kitchingman and Lai (2004) seamounts in terms of suitability as habitats for coldwater corals, and Allain et al. (2008), classified South Pacific seamounts in terms of depth suitability for various deepwater fish species. Tittensor et al. (2009) and Davies & Guinotte (2011) developed global predictive habitat suitability models for coldwater scleractinian corals. Global seamount databases have been updated using the high- resolution (30 arc-second) GEBCO bathymetric data (Yesson et al. 2011) and habitat suitability of these seamounts has been classified using the habitat suitability results of Davies & Guinotte (2011). Taxonomic distinctness indices (Warwick and Clark 1998, Clark and Warwick 1998, 2001) can be used to evaluate comparative uniqueness, and therefore vulnerability, of communities on different features.

In addition to data on interactions with evidence of a VME, SPRFMO participants should collect and contribute data that are potentially useful to habitat suitability analyses. These data could include high-resolution or multi-beam bathymetry, VME by-catch data or seabed imagery, and should be used in periodic analyses coordinated by the SWG to develop habitat suitability indices, predict and map locations of seabed areas with a high likelihood of supporting VMEs in the SPRFMO Area.

Is for these reasons that Globalpesca II will collect physical and chemical data using GTDs and also will deploy a deep-water camera to see both the seabed and also the way the fishing gear acts and how it affects the seabed.

According to the same BFIAS the potential impact of bottom longline is considered to be low. Currently in Chile there are no studies about VMEs so the knowledge in that sense is very limited so most of the analysis has to be done based on suppositions or foreign scientific experience.

The fishing gear contact with the seabed is limited to the weights on the branch lines since all lines has positive buoyancy. There are no experience on how the fishing gear may move when in the bottom other that when it drift due to strong currents. The longitudinal or sidewise movement of the gear has not been measured at all but the simple fact that there is 40 meters among each branch line may be indicative of a very limited damage.

The anchors and chains used for anchoring both ends of the gear are much heavier and difficult to move. The impact of these parts on the seabed is due to their weight: the benthic organisms are crushed by them and Lateral movement of the gear, also called sweeping, could, due to water currents, increase their impact area, but not the sidewise mowing effect, which is considered to be non-existent.

Mitigation

Checking the SPRFMO literature and other countries proposals (New Zealand and EU) it seems like there are no clear mitigation measures like move on rules to follow. In any case any VMEs found has to be reported following the existing rules.

It seems like the SPRFMO SC is proposing a set of rules and measures to protect the VMEs. In the meantime it is possible to assume that the possible damage that can be produced by this experimental fishery will be minimum considering the length o the fishing gear and the low number of lines set.

Paragraph 8f of CMM-03-2018 provided for these different approaches and threshold weights: "*until the Scientific Committee has developed advice on SPRFMO threshold levels pursuant to paragraph 5(c) of this CMM, establish threshold levels for encounters with VMEs for vessels flying their flag, taking into account paragraph 68 of the FAO Deep-sea Fisheries Guidelines*;" (where paragraph 5c of the CMM requires the SC to "*develop and provide advice and recommendations to the Commission on criteria for what constitutes evidence of an encounter with a VME, in particular threshold levels and indicator species*;"). A consistent approach across all bottom fishing Members requires the development of a single set of indicator species and threshold weights if an encounter protocol is still required. (**SC6-DW09)**

Fishing Gear Loss

As mentioned before all used hooks will be removed from the target fish and from the discarded or returned fish. These hooks are kept on board and taken to port for destruction. So, unless a mistake happens there are no hooks going back to the sea.

The only potential gear loss is if the main line is cut normally due to heavy currents. In that case the line is hauled by the other end of the line and normally recovered in full. In other words it is something that may happen but it is very unlikely.

SPRFMO Data Standards and data to be collected

The data to be collected Is regulated in CMM 02-2018 Annex 3 and Annex 7 as follows:

1) ANNEX 3
   Standard for bottom long lining fishing activity data

(Taking into account Annex 8)

Data are to be collected on an un-aggregated (set by set) basis.

The following fields of data are to be collected:

a) Vessel flag

b) Vessel name

c) Vessel call sign

d) Registration number of vessel

e) Set start date and time (UTC format)

f) Set end date and time (UTC format)

g) Set start position (1/10th degree resolution – decimal format)

h) Set end position (1/10th degree resolution – decimal format)

i) Intended target species (FAO species code)

j) Number of hooks

k) Bottom depth at start of set

l) Estimated catch retained on board by species (FAO species code) in live weight

m) An estimation of the amount of living marine resources discarded by species if possible

n) Were any marine mammals, seabirds, reptiles or other species of concern caught? (Yes/No/Unknown – Y, N, U)

ANNEX 7 Standard for Observer Data

A. Vessel & Observer Data to be Collected for Each Observer Trip

Vessel and observer details are to be recorded only once for each observed trip, and must be reported in a way that links the vessel data to data required in Sections B, C, and D.

The following vessel data are to be collected for each observed trip:

a) Current vessel flag

b) Name of vessel

c) Name of the Captain

d) Name of the fishing master

e) Registration number

f) International radio call sign (if any)

g) Lloyd's / IMO number (if allocated)

h) Previous Names (if known)

i) Port of registry

j) Previous flag (if any)

k) Type of vessel (use appropriate ISSCFV codes, Annex 10)

l) Type of fishing method(s) (use appropriate ISSCFG codes, Annex 9)

m) Length (m)

n) Length type e.g. "LOA", "LBP"

o) Beam (m)

p) Gross Tonnage – GT (to be provided as the preferred unit of tonnage)

q) Gross register tonnage – GRT (to be provided if GT not available; may also be provided in addition to GT)

r) Power of main engine(s) (kilowatts)

s) Hold capacity (cubic metres)

t) Record of the equipment on board which may affect fishing power factors (navigational equipment, radar, sonar systems, weather fax or satellite weather receiver, sea-surface temperature image receiver, Doppler current monitor, radio direction finder), where practical

u) Total number of crew (all staff, excluding observers)

The following observer data are to be collected for each observed trip:

a) Observer's name

b) Observer's organisation

c) Date observer embarked (UTC date)

d) Port of embarkation

e) Date observer disembarked (UTC date)

f) Port of disembarkation

D. Catch & Effort Data to be Collected for Bottom Long Line Fishing Activity

(Taking into account Annex 8)

Data are to be collected on an un-aggregated (set by set) basis for all observed longline sets.

The following fields of data are to be collected for each set:

a) Set start date and time (UTC format)

b) Set end date and time (UTC format)

c) Set start position (Lat/Lon, 1 minute resolution – decimal format)

d) Set end position (Lat/Lon, 1 minute resolution – decimal format)

e) Intended target species (FAO species code)

f) Total length of longline set (km)

g) Number of hooks for the set

h) Bottom (seabed) depth at start of set

i) Number of hooks actually observed (including for marine mammals, seabirds, reptiles or other species of concern caught) during the haul

j) Estimated catch of all species (FAO species code) retained on board, split by species, in live weight (to the nearest kg)

k) Were any marine mammals, seabirds, reptiles or other species of concern caught? (Yes/No/Unknown)

i If yes, record the numbers by species of all marine mammals, seabirds, reptiles or other species of concern caught

l) Was there any benthic material in the catch? (Yes/No/Unknown)

ii. If yes, record sensitive benthic species in the catch, particularly vulnerable or habitat-forming species such as sponges, sea-fans or corals

m) Estimate of the amount (weight or volume) of remaining marine resources not recorded under items 2j to 2l discarded, split to the lowest known taxon

n) Record any bycatch mitigation measures employed

I. Were bird scaring (tori) lines in use? (nil/equipment code - as described in Section L)
II. Was setting restricted to between the times of nautical dusk and nautical dawn? (Yes/No)
III. What type of fishing gear was used? (external weighting system/internal weighting system/trot line/other)
IV. If external weighting system, describe weighting and float regime (using the form provided in Section M)
V. If internal weighting system, what was the line core's weight (grams per metre)?
VI. If trot line, were cachalotera nets used? (Yes/No)
VII. If other, describe

o) What haul mitigation was used? (bird deterrent curtains/other/none)

i. If other, describe.

p) What was the bait type? (fish/squid/mixed; live/dead/mixed; frozen/thawed/mixed)

q) Describe discharge of any biological material during shooting and hauling (discharge not batched for two hours or more/discharge batched for two hours or more/none/unknown)

r) Were any other measures used to reduce the bycatch of marine mammals, seabirds, reptiles or other species of concern? (Yes/No)

i. If yes, describe

E. Length-Frequency Data to Be Collected

Representative and randomly sampled length-frequency data are to be collected for the target species and, time permitting, for other main by-catch species. Length data should be collected and recorded at the most precise level appropriate for the species (cm or mm and whether to the nearest unit or unit below) and the type of measurement used (total length, fork length, or standard length) should also be recorded. If possible, total weight of length-frequency samples should be recorded, or estimated and the method of estimation recorded, and observers may be required to also determine sex of measured fish to generate length-frequency data stratified by sex.

1. Commercial Sampling Protocol

a) Fish species other than skates, rays and sharks:
   i. fork length should be measured to the nearest cm for fish which attain a maximum length greater than 40 cm fork length
   ii. fork length should be measured to the nearest mm for fish which attain a maximum length less than 40 cm fork length
b) Skates and rays:
   i. maximum disk width should be measured
c) Sharks

i. Appropriate length measurement to be used should be selected for each species (see FAO technical report 474 on measuring sharks). As a default, total length should be measured.

2. Scientific Sampling Protocol

For scientific sampling of species, length measurements may need to be made at a finer resolution than specified above.

F. Biological Sampling to be Conducted

1. The following biological data should be collected for representative samples of the main target species and, time permitting, for other main by-catch species contributing to the catch:

   a) Species

   b) Length (mm or cm), with record of the type of length measurement used. Measurement precision and type should be determined on a species by species basis consistent with that defined in Section E above.

   c) Sex (male, female, immature, unsexed)

   d) Maturity stage

2. Observers should collect tissue, otolith and/or stomach samples according to pre- determined specific research programmes implemented by the Scientific Committee or other national scientific research.
3. Observers are to be briefed and provided with written length-frequency and biological sampling protocols, where appropriate, and priorities for the above sampling specific to each observer trip.

G. Data to be Collected on Incidental Captures of seabirds, mammals, reptiles (turtles) and other species of concern

1. The following data are to be collected for all seabirds, mammals, reptiles (turtles) and other species of concern caught in fishing operations:
   a. Species (identified taxonomically as far as possible, or accompanied by photographs if identification is difficult) and size
   b. Count of the number of each species caught per tow or set
   c. Fate of bycaught animal(s) (retained or released/discarded).
   d. If released, life status (vigorous, alive, lethargic, dead) upon release
   e. If dead, then collect adequate information or samples[3] for onshore identification in accordance with pre-determined sampling protocols. Where this is not possible, observers may be required to collect sub-samples of identifying parts, as specified in biological sampling protocols.
   f. Record the type of interaction (hook/line entanglement/warp strike/net capture/other) If other, describe
2. Record sex of each individual for taxa where this is feasible from external observation, e.g. pinnipeds, small cetaceans or elasmobranchii species of concern.

3. Were there any circumstances or actions that may have contributed to the bycatch event? (e.g. tori line tangle, high levels of bait loss).

H. Detection of Fishing in Association with Vulnerable Marine Ecosystems

1. For each observed trawl, the following data are to be collected for all sensitive benthic species caught, particularly vulnerable or habitat-forming species such as sponges, sea fans, or corals:

a) Species (identified taxonomically as far as possible, or accompanied by a photograph where identification is difficult)

b) An estimate of the quantity (weight (kg) or volume (m^3)) of each listed benthic species caught in the tow

c) An overall estimate of the total quantity (weight (kg) or volume (m^3)) of all invertebrate benthic species caught in the tow

d) Where possible, and particularly for new or scarce benthic species which do not appear in ID guides, whole samples should be collected and suitably preserved for identification on shore

I. Data to be Collected for all Tag Recoveries

1. The following data are to be collected for all recovered fish, seabird, mammal or reptile tags if the organism is dead, to be retained, or alive:

a) Observer name

b) Vessel name

c) Vessel call sign

d) Vessel flag

e) Collect, label (with all details below) and store the actual tags for later return to the tagging agency

f) Species from which tag recovered

g) Tag colour and type (spaghetti, archival)

h) Tag numbers (the tag number is to be provided for all tags when multiple tags were attached to one fish. If only one tag was recorded, a statement is required that specifies whether or not the other tag was missing). If the organism is alive and to be released, tag information should be collected in accordance with pre-determined sampling protocols.

i) Date and time of capture (UTC)

j) Location of capture (Lat/Lon, to the nearest 1 minute)

k) Animal length / size (cm or mm) with description of what measurement was taken (such as total length, fork length, etc). Length measurements should be collected according to the criteria defined in Section E above

l) Sex (F=female, M=male, I=indeterminate, D=not examined)

m) Whether the tags were found during a period of fishing that was being observed (Y/N)

Reward information (e.g. name and address where to send reward)

(It is recognized that some of the data recorded here duplicates data that already exists in the previous categories of information. This is necessary because tag recovery information may be sent separately to other observer data.)

J. Hierarchies for Observer Data Collection

1 Recognizing that observers may not be able to collect all of the data described in these standards on each trip, a hierarchy of priorities is to be implemented for collection of observer data. Trip-specific or programme-specific observer task priorities may be developed in response to specific research programme requirements, in which case such priorities should be followed by observers.

2 In the absence of trip- or programme-specific priorities, the following generalized priorities should be followed by observers:

a) Fishing Operation Information

   i All vessel and tow / set / effort information

b) Reporting of Catches
   i Record time, weight of catch sampled versus total catch or effort (e.g. number of hooks), and total numbers of each species caught
   ii Identification and counts of seabirds, mammals, reptiles (turtles), sensitive benthic species and vulnerable species
   iii Record numbers or weights of each species retained or discarded
   iv Record instances of depredation, where appropriate

c) Biological Sampling
   i Check for presence of tags
   ii Length-frequency data for target species
   iii Basic biological data (sex, maturity) for target species Length-frequency data for main by-catch species
   iv Otoliths (and stomach samples, if being collected) for target species Basic biological data for by-catch species
   v Biological samples of by-catch species (if being collected)
   Take photos

d) The reporting of catches and biological sampling procedures should be prioritized among species groups as follows:

Species	Priority (1 highest)
Primary target species	1
Seabirds, mammals, reptiles (turtles) or other species of concern	2
Other species typically within top 5 in the fishery (Such as oreos and alfonsino for demersal fisheries)	3
All other species	4

The allocation of observer effort among these activities will depend on the type of operation and setting. The size of sub-samples relative to unobserved quantities (e.g. number of hooks examined for species composition relative to the number of hooks set) should be explicitly recorded under the guidance of Member and CNCP observer programmes.

Additional data

Additional data to be collected by Globalpesca II as part of other on-going investigations in Chile (data will also be shared with the SPRFMO Scientific Committee):

Marine mammal interactions with the fishery.

Photo id of marine mammals

Samples of Fish tissue for DNA tests (To complement CEQUA investigation)

Deployment of a deep-water camera to check VME

Deployment of Data Loggers on every set to collect water temperature, depth, salinity and conductivity.

It has to be noticed that AOBAC (Association of Toothfish Operators form Magallanes Region) has been participating in an international investigation about sea mammal's depredation. This investigation is being conducted by Dr. Paul Tixier and covers several fishing grounds like South Georgia, Falklands and Chile so that addition of the Pacific High Seas area is very relevant to complement the current investigation. It would be interested to know if exists any kind of latitudinal migration of these animals.

Tagging of toothfish

A minimum tagging rate of three fish of each *Dissostichus* species per green weight ton retained will be implemented for consistency with research fishing requirements in CCAMLR areas.

Globalpesca II crew have experience tagging fish it has be done in the past both in Chile and in CCAMLR waters.

IUU Detection and Reporting

Whilst undertaking the exploratory fishing survey, Globalpesca II will document and report to the SPRFMO Secretariat any sighting of fishing vessels suspected of IUU fishing activities. Additionally, any abandoned or

retrieved fishing gear suspected to be of IUU origin will be photographed, reported with relevant details on position, type of gear, any catches, and retrieved where possible. This is the standard practice under CCAMLR CM 10-02 Annex 10-02/A while fishing in the CCAMLR Convention Area.

Observer on Board

Considering the amount of work to be done and the interests in collecting the maximum quantity of quality information Globalpesca II will consider bringing in two observers (At least one of them from IFOP).

Post Survey Science Reporting

The purpose of collecting all the data outlined above is to meet all the requirements of CMM 03-2018 (Paragraph 5) The purpose of collecting all the data as outlined above is to meet all the requirements of paragraph 5 of CMM 03-2018, which, inter alia, will advise the SPRFMO Commission on spatial management and sustainable catch levels on the Southeastern Pacific., specifically the zone FAO 87.3.

It is also of paramount important for Chilean scientific bodies to better understand the behavior of this specie that is caught in our waters that are neighbors to the proposed exploratory area.

It is important to note that Globalpesca II will collect data that is not normally requested by SPRFMO Secretariat (CMM 02-2108), like environmental data, deep water video footage, mammals interaction and Identification, and others

All this information will be collected on board and further processed by IFOP through their Observers on board and on land Laboratories. DNA samples will be processed by CEQUA in Punta Arenas, mammals information by Dr. Paul Tixier (Deakin University, Australia).

All information collected will be sent to the SPRFMO and least one month in advance of the date of the Scientific Committee following each trip.

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