

**STATUS REPORT**

*Beryx splendens*  
Alfonsino



**2018**

**Updated 22 November 2018**

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## 1. Description of the fishery

### 1.1 Description of fishing vessels and fishing gear

In recent years the Korean trawl fishery was the only fishery targeting the alfonsino in the SEAFO CA. This fishery finished its activity in 2014. During the period 2010-2013 two fishing vessels participated in the fishery. In 2018, no fishing activity targeting this species was conducted in SEAFO CA, up to date.

Although primarily considered as a midwater trawl fishery, 94% of the tows recorded by onboard observers were classified as “Demersal”. Whether or not these trawls were bottom trawls remains uncertain, and this is an issue that still requires clarification.

At the SEAFO CA the vessel1 stern trawler operated with the following fishing gears (Table 1 and Figs. 1- 4 provide the specifications of the fishing gears):

- HAMPIDJAN NET is a bottom otter trawl with two-piece nets of 66 m in length. The head rope is 48 m long; ground rope is 50 m; the height, width and girth of the net are 5.5 m, 30 m and 100 m, respectively. The cod-end mesh size is 120 mm. The ground gear is 50 m in length and 903 kg in weight, and the float is 1,018 kg.
- MANUFACTURED NET is a four-piece net with an overall length of 66.9 m. The lengths of the head rope and ground rope are 59.0 m and 77.9 m, respectively. The height, width and girth of the net are 5.5 m, 200 m and 83 m, respectively. The cod-end mesh size is 120 mm. The ground is 77.9 m in length and the weight of the ground is 2,068 kg. The float is 913.200 kg with the floating rate of 44%.
- MIDWATER NET is 210 m long. The lengths of head rope and ground ropes are 93.6 m. The height and width of the net are 70.0 m and 240-260 m, respectively. The girth of the net is 816 m and the cod-end mesh size is 120 mm.

**Table 1:** Fishing gear specifications at vessel 1

Gear Specifications		HAMPIDJAN NET	MANUFACTURED NET	MIDWATER NET
		bottom trawl	bottom trawl	
Otter board	type	VRS-TYPE	VRS-TYPE	VRS-TYPE
	material	Steel	Steel	Steel
	size (mm)	2,300 x 4,030	2,750 x 4,900	1,854 x 3,818
	weight (kg)	3,930	4,320	2,000
	under water weight (kg)	2,619	2,473	1,145
Trawl Net	purpose	bottom fishing (figure1)	bottom fishing (figure2)	mid-water fishing (figure3)
	net length overall(m)	66	66.9	210.0
	head rope (m)	48	59.0	93.6
	ground rope (m)	50	77.9	93.6
	net height (m)	5.5	5.5	70
	net width (m)	30	200	240~260
	net girth (m)	100	83	816
	mesh size (mm)	120	120	120

The vessel2 was a stern trawler which operated with two types of fishing gears: a mid-water trawl net; and the bottom trawl net. The gear used for the operation in the SEAFO Convention Area was the mid-water KITE gear (Figure 4).

The height of the net’s gate is approximately 50 m, and the total length is around 280 m. When net is settled, it sinks underwater and the sinking depth of the net is controlled by the wire ropes. The upper

and lower parts of the bottom trawl net PE Net have attached plastic buoys and rubber balls respectively. As in the case of KITE gear the wire ropes control the sinking depth of the settled gear.

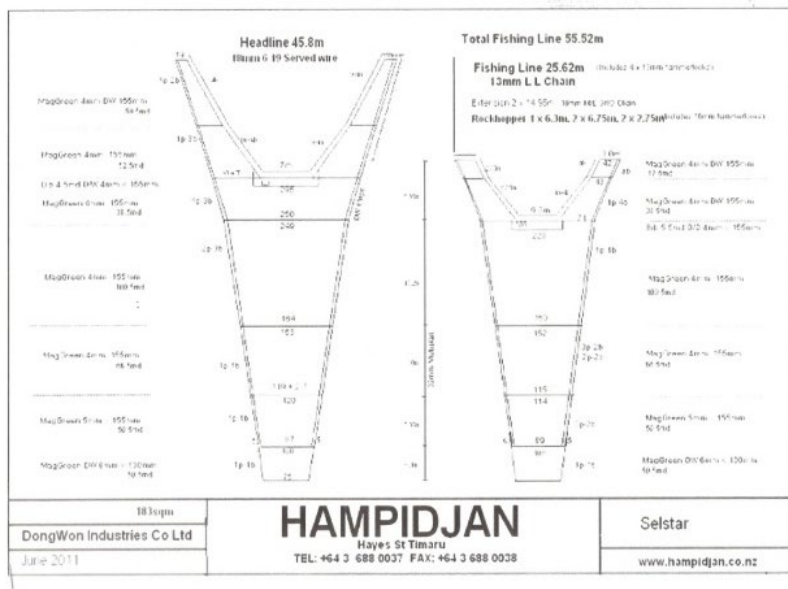


Figure 1: Diagram of HAMPIDJAN NET of the vessel1.

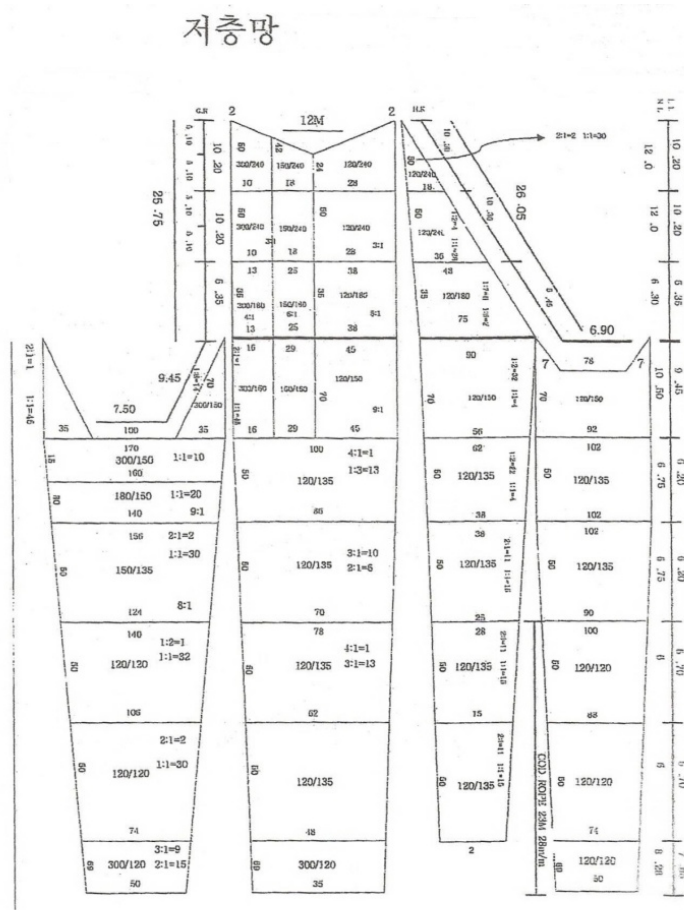
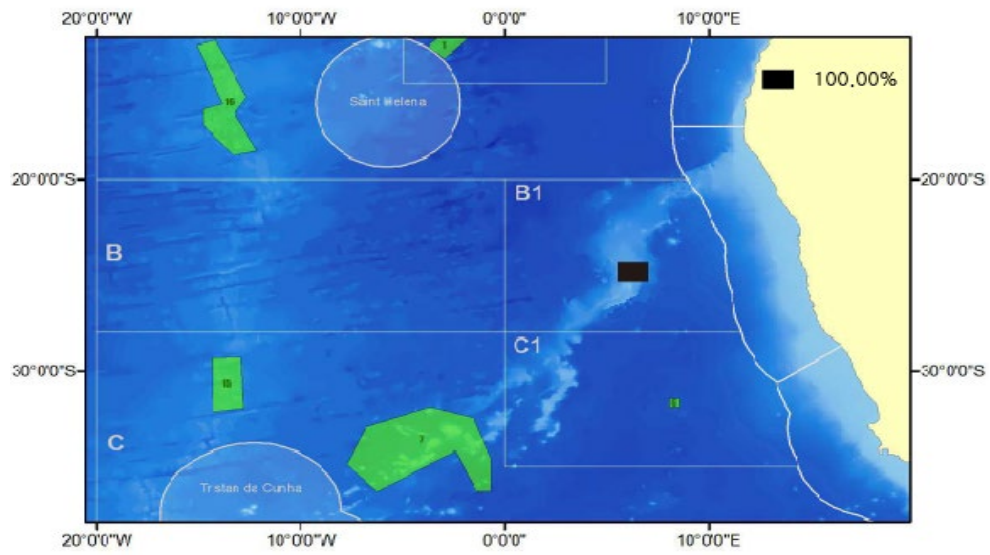
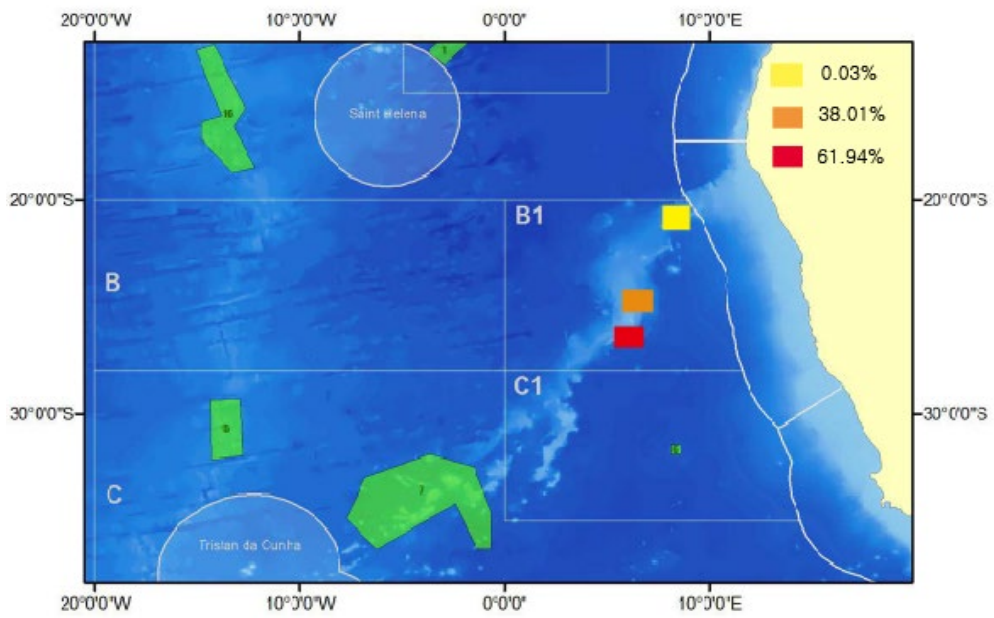


Figure 2: Drawing of the Custom Manufactured Bottom Trawl Net of the vessel1.

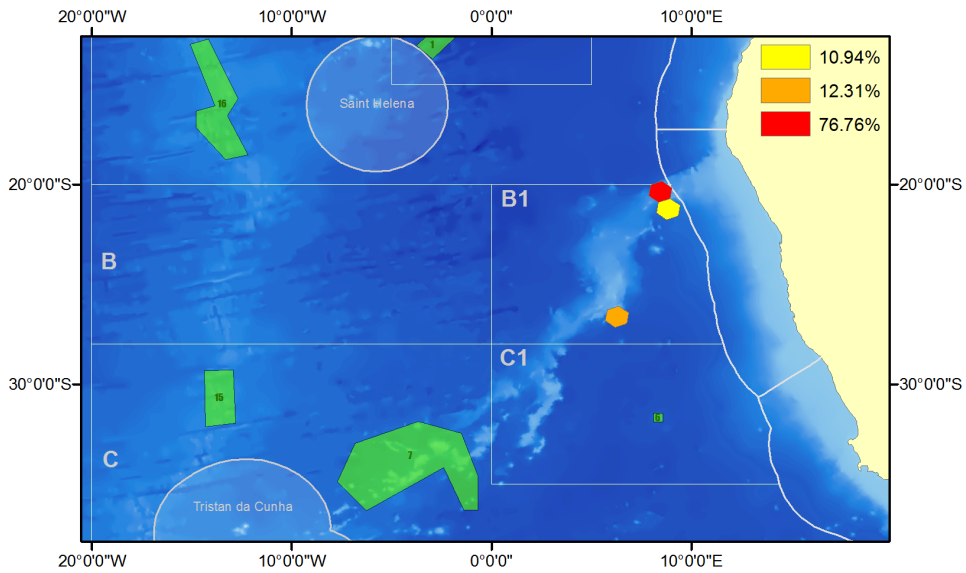




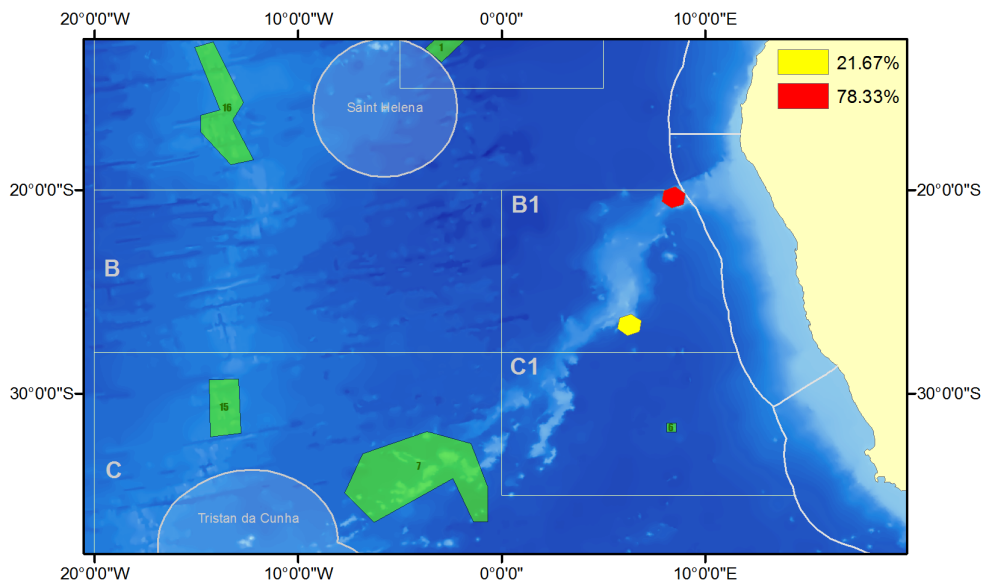
**Figure 5:** Proportion of catch of Alfonsino (*B. splendens*) by zone (2013).



**Figure 6:** Proportion of catch of Alfonsino (*B. splendens*) by zone c (Jan-Nov 2012).

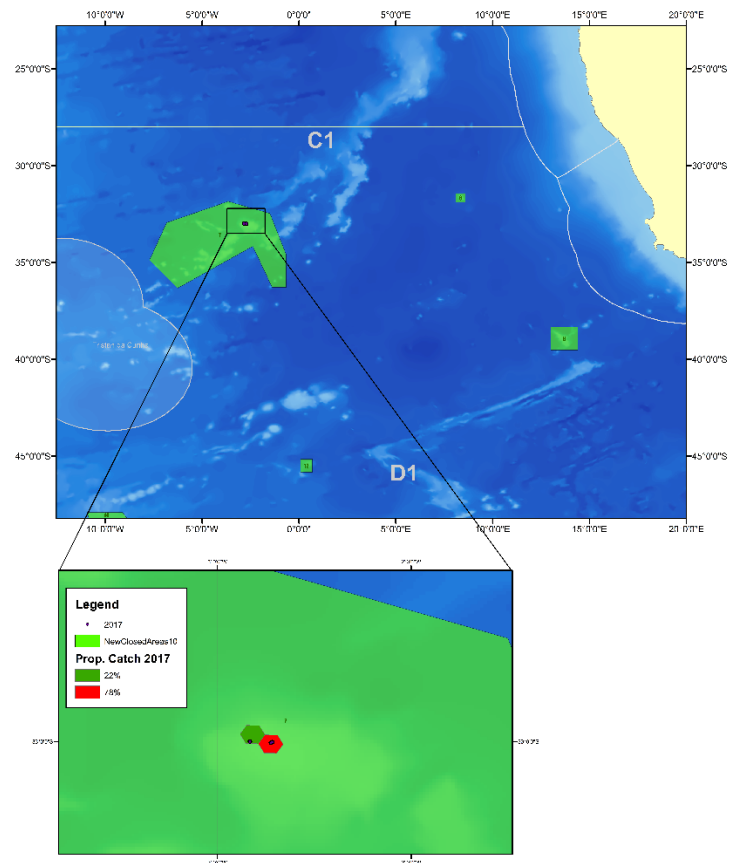


**Figure 7:** Proportion of catch of Alfonsino (*B. splendens*) aggregated to 100km diameter hexagonal cells (2011).



**Figure 8:** Proportion of catch of Alfonsino (*B. splendens*) aggregated to 100km diameter hexagonal cells (2010).

In 2017, only one vessel (trawler) from Namibia has conducted fishing activity in the SEAFO CA, targeting seamount species. Catches of Alfonsino took place in C0 (Fig. 9).



**Figure 9:** Proportion of catch (Namibian vessel) of Alfonsino (*B. splendens*) aggregated to 100km diameter hexagonal cells (2017).

In 2018, no fishing activity targeting this species was conducted in SEAFO CA, up to date.

### 1.3 Reported retained catches and discards

Table 2 presents Alfonsino catches by country, as well as fishing gear and the sub-divisions in which the catch was taken. The main fishing countries worked in the area included Russia (bottom trawl) in the late 1970s, Ukraine in the mid-1990s, Russia (bottom trawl), Norway (bottom trawl), Spain (MWT /BLL), Poland and Namibia (bottom trawl) in the late 1990s, and South Korea (mid-water trawl) for 4 years from 2010 to 2013, respectively, 198 tonnes, 196 tonnes, 172 tonnes and 1.6tonnes. Historically the highest catches of the fish were recorded by Russia with 2,972 and 2,800 tons in 1977 and 1997 respectively, Poland 1,964 tonnes in 1995, and Norway 1,066 tons in 1998 in the SEAFO CA.

**Table 2:** Catches (tonnes) of Alfonsino (*B. splendens*) made by various countries. Values in *italics* are taken from Japp (1999). Values in **bold** are from the FAO.

Flag State	Namibia		Namibia		Namibia		Norway		Russia		Portugal		Ukraine		Korea	
Fishing method	<b>Bottom trawl</b>		<b>Bottom trawl</b>		<b>Bottom trawl</b>		<b>Bottom trawl</b>		<b>Bottom trawl</b>		<b>Bottom trawl</b>		UNK		<b>Mid-water trawl</b>	
Management Area	<b>B1</b>		<b>C0</b>		<b>C1</b>		<b>A1</b>		UNK		UNK		UNK		<b>B1</b>	
Year	Ret	Disc	Ret	Disc	Ret	Disc	Ret	Disc	Ret	Disc	Ret	Disc	Ret	Disc	Ret	Disc



	aine d	arde d	aine d	arde d	aine d	arde d	aine d	arde d	aine d	arde d	aine d	arde d	aine d	arde d	aine d	arde d
1976									252 #							
1977									297 2#							
1978									125 #							
1993													172 §			
1994																
1995	1#						--	--								
1996	368 #						--	--					747 §			
1997	208 #						836		280 0#				392 §			
1998	--	--					106 6		69 <sup>§</sup>							
1999	1						--	--				3 <sup>§</sup>				
2000	<1						242					1 <sup>§</sup>				
2001	1						--	--				7 <sup>§</sup>				
2002	0						--	--				1 <sup>§</sup>				
2003	0						--	--				5 <sup>§</sup>				
2004	6						--	--	210							
2005	1						--	--	54							
2006	--	--					--	--	--	--	<1					
2007	--	--					--	--	--	--	--	--	--	--	--	--
2008	--	--					--	--	--	--	--	--	--	--	--	--
2009	--	--					--	--	--	--	--	--	--	--	--	--
2010	--	--					--	--	--	--	--	--	--	--	159	0
2011	--	--					--	--	--	--	--	--	--	--	165	0
2012	--	--					--	--	--	--	--	--	--	--	172	0
2013	--	--					--	--	--	--	--	--	--	--	13	0
2014	--	--					--	--	--	--	--	--	--	--	--	--
2015	--	--					--	--	--	--	--	--	--	--	--	--
2016	--	--					--	--	--	--	--	--	--	--	--	--
2017	0	0	<1	0	<1	0	--	--	--	--	--	--	--	--	--	--
2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

-- means no fishing. Blank fields mean no data available.

**Table 2(cont).**

Nation	Spain		Poland		Cook Island		Mauritius		Cyprus		South Africa	
Fishing method	Mid-water trawl and Longlines		UNK		Bottom trawl		Bottom trawl		Bottom trawl		Bottom trawl	
Management Area	UNK		UNK		UNK		UNK		UNK		B1	
Year	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded
1976												
1977												
1978												
1993												
1994												

1995			1964 <sup>§</sup>								60 <sup>#</sup>	
1996											109 <sup>#</sup>	
1997	186 <sup>§</sup>										124 <sup>#</sup>	
1998	402 <sup>§</sup>											
1999												
2000												
2001	2											
2002												
2003	2											
2004	4				142		115		437			
2005	72											
2006	--	--	--	--	--	--	--	--	--	--	--	--
2007	--	--	--	--	--	--	--	--	--	--	--	--
2008	--	--	--	--	--	--	--	--	--	--	--	--
2009	--	--	--	--	--	--	--	--	--	--	--	--
2010	--	--	--	--	--	--	--	--	--	--	--	--
2011	--	--	--	--	--	--	--	--	--	--	--	--
2012	--	--	--	--	--	--	--	--	--	--	--	--
2013	--	--	--	--	--	--	--	--	--	--	--	--
2014	--	--	--	--	--	--	--	--	--	--	--	--
2015	--	--	--	--	--	--	--	--	--	--	--	--
2016	--	--	--	--	--	--	--	--	--	--	--	--
2017	--	--	--	--	--	--	--	--	--	--	--	--
2018	--	--	--	--	--	--	--	--	--	--	--	--

\* Provisional (up to date). -- = No Fishing. Blank fields = No data available. UNK = Unknown. # = Values taken from the Japp (1999). § = Values from FAO.

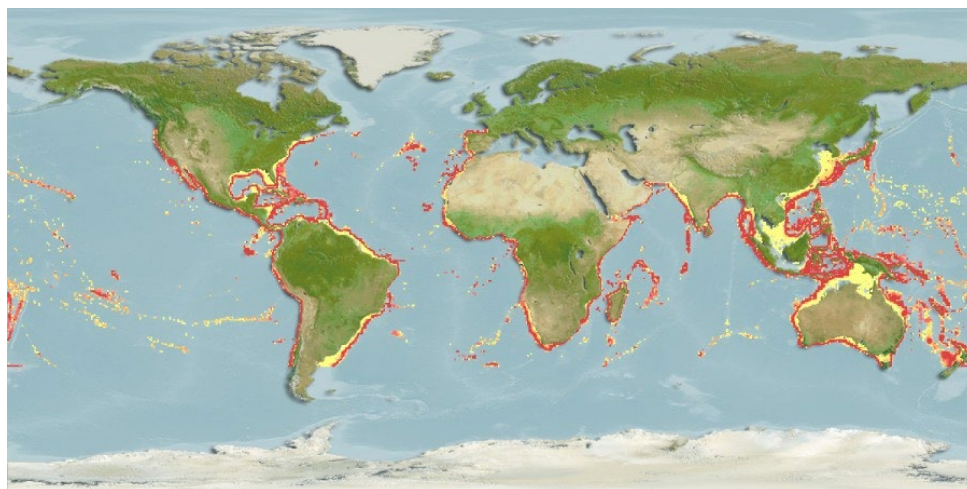
Two species targeted: *Beryx splendens* represents majority of catch.

#### 1.4 IUU catch

Some IUU fishing activity in the SEAFO CA has been reported for a vessel to the Secretariat, but the extent of this is at present unknown.

## 2. Stock distribution and identity

*Alfonsino* has a global distribution and has been reported from all tropical and temperate oceans (excluding from the northeast Pacific and Mediterranean Sea) between latitudes of about 65° N and 43° S. It occurs from depths of about 25 m to at least 1300 m (Busakhin 1982). In the Atlantic Ocean the species occurs at both at western (Gulf of Maine to the Gulf of Mexico) and eastern Atlantic (off south western Europe and the Canary Islands to South Africa) (Fig. 9). This species is benthopelagic: adults inhabit the outer shelf (180 m) and slope to at least 1,300 m depth, probably moving further from the bottom at night but ascending to feed in midwater during the night; often found over seamounts and underwater ridges. There are no estimates of migration behaviour. The species is oviparous; spawning in batches. Eggs, larvae and juveniles are pelagic.



**Figure 10:** The distribution of Alfonsino (*B. splendens*) (source: FishBase).

## 3. Data available for assessments, life history parameters and other population information

### 3.1 Fisheries and surveys data

Non-availability of the historical data and fishing trends for fishing activities in the SEAFO CA prevent application of standard assessment methods. However, only catch and effort (per haul) data for a period of three years (2010-2012) are available for quantitative stock assessment.

### 3.2 *Length data and frequency distribution*

Using the data collected by Korean trawl fisheries between 2010 and 2013, the length frequency distributions were analysed (Table 3 and Fig. 10). The catch landing data in 2013 were not enough to represent the situation of the southern area of Division B1. The length of Alfonsino in the southern area of Division B1 was the largest with average 26.5 cm and 28.0 cm at the 3<sup>rd</sup> quartile, with two modes at 22 cm and 27 cm in 2011. In the southern area of Division B1 the length of the fish was also the largest in 2011 and reached about 50 cm fork length. No trend appeared in 2012 (May-June) due to paucity of samples (23 samples). Overall length trends between the areas during 2012-2013 were asymmetric. The length of the species in the northern part was larger than that of southern part in 2012 and 2013.

**Table 3:** Results of length composition of Alfonsino collected by Korean vessels in the SEAFO CA (B1) (2010-2013)

	2010		2011		2012 (5~6)		2012(11)		2013	
	South	North	South	North	South	North	South	North	South	North
No. of samples	200	841	174	593	514	23	77	-	97	5
Minimum length	19.0	17.0	20.0	15.0	17.0	26.0	24.0	-	17.0	25.0
Maximum length	42.0	47.0	50.0	48.0	34.0	35.0	39.0	-	31.0	34.0
Average length	25.8	24.8	26.5	27.8	24.8	31.0	31.5	-	23.7	27.4
Median length	25.0	24.0	25.0	28.0	25.0	32.0	32.0	-	22.0	26.0
1 <sup>st</sup> quartile length	23.0	22.0	23.0	25.0	23.0	30.0	29.0	-	21.0	25.0
3 <sup>rd</sup> quartile length	27.0	26.0	28.0	31.0	26.0	32.5	34.0	-	27.0	27.0

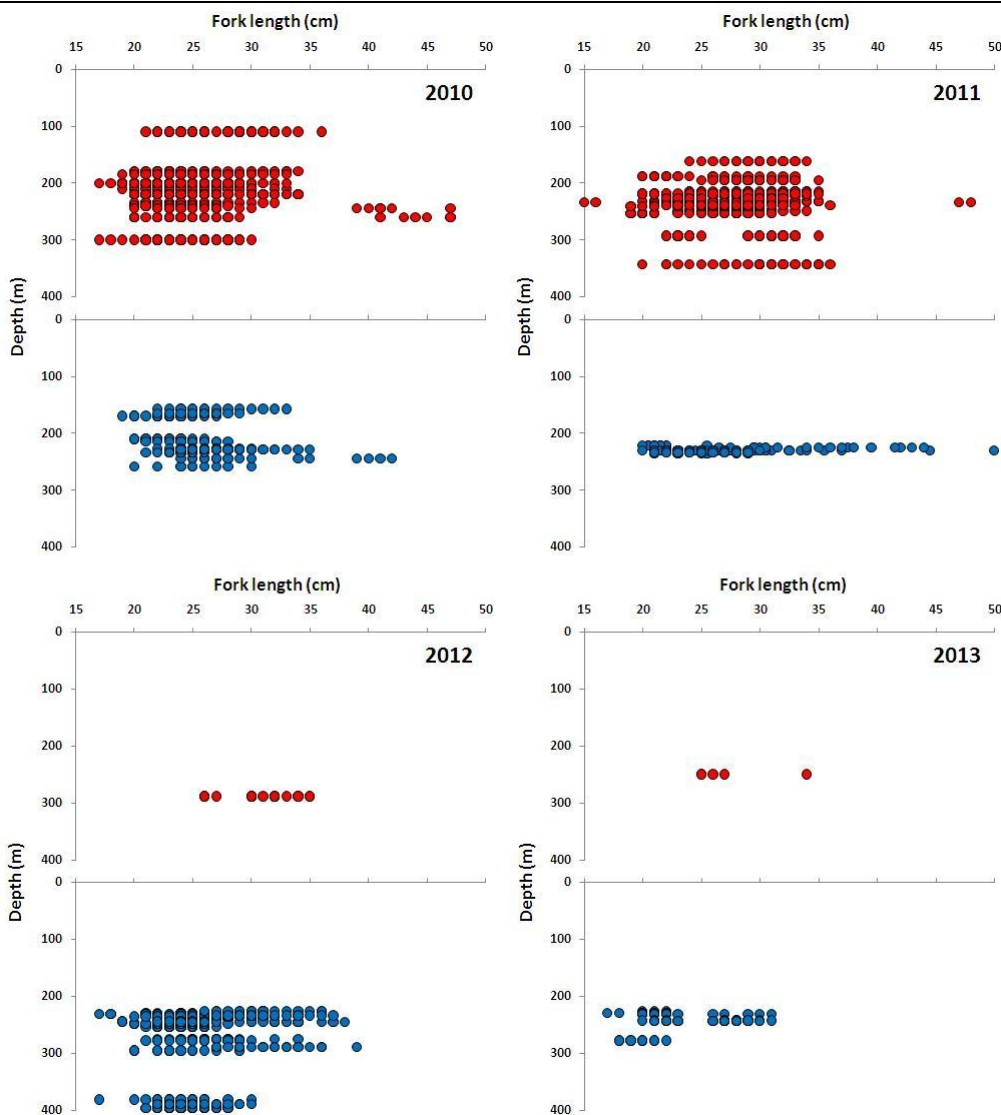


Figure 12: Fork length distribution of Alfonsino (*Beryx splendens*) by depth for 2010-2013.

Table 4: Summary of fork length distribution of Alfonsino (*Beryx splendens*) by depth for 2010-2013.

	2010		2011		2012(5-6)		2012(11)		2013	
	South	North	South	North	South	North	South	North	South	North
No. of Samples	841	200	174	593	514	23	77	-	5	97
Average Depth (m)	210.9	211.1	229.6	238.4	323.8	288.5	248.2	-	250.0	265.1
Average FL (cm)	25.8	24.8	26.5	27.8	24.8	31.0	31.5	-	27.4	23.7

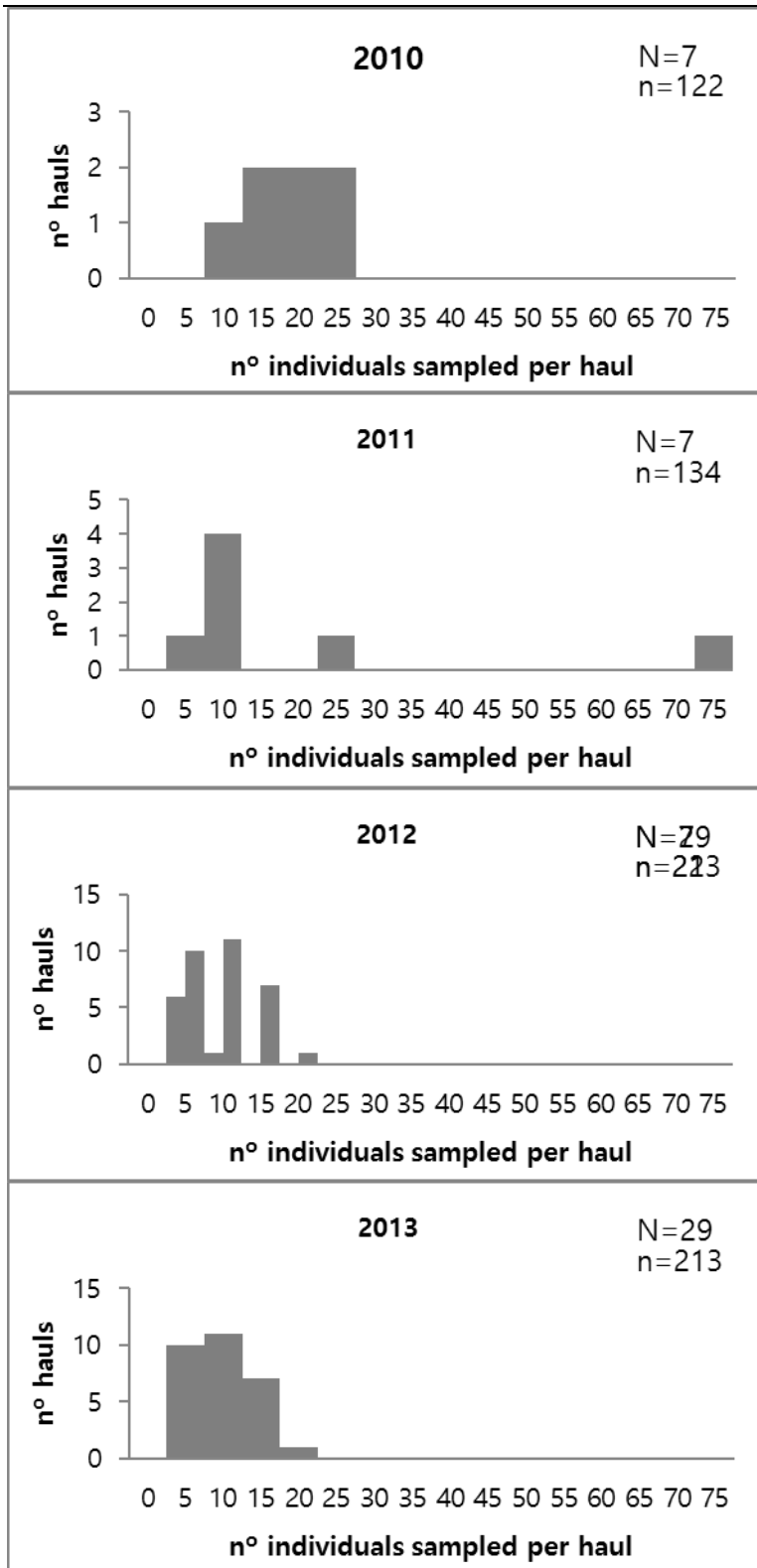


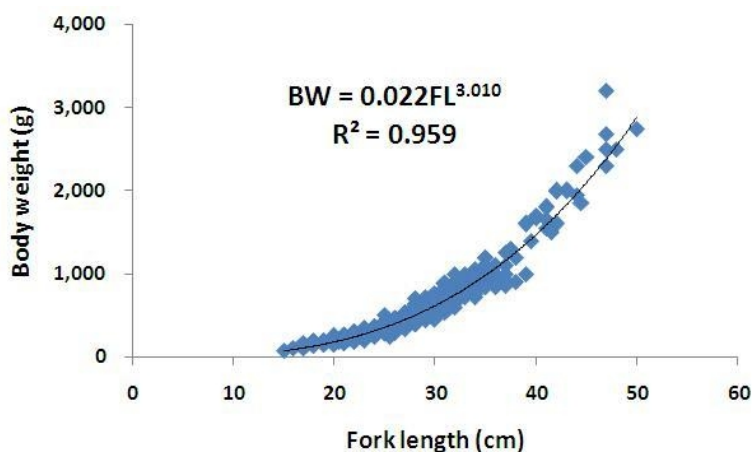
Figure 13: The number of individuals of Alfonsino per haul over a period of four year from 2010 to 2013 in the SEAFO CA.

**Table 5:** Number of sets by year, minimum and maximum number of individuals per set and the number of individuals sampled between 2010 to 2013 in the SEAFO CA.

Year	No. of Sets Observed	Mean Individuals	Min. Individuals	Max. Individuals	Mean sample size/tonnes
2010	7	17.429	10	25	0.92
2011	7	19.143	5	75	1.36
2012	29	7.345	1	16	0.06
2013	7	3.143	1	7	1.94

### 3.3 Length-weight relationships

Figure 13 shows the length and weight relationship of Alfonsino for 2010-2013. Two parameters of the length-weight relationship were 0.022 for  $\alpha$  and 3.010 for  $\beta$  of combined sex of Alfonsino.



**Figure 14:** Relationship between length and weight of Alfonsino (*B. splendens*) in the SEAFO CA for 2010 - 2013.

### 3.4 Age data and growth parameters

The maximum observed age of Alfonsino in the Guinean Gulf was 20 years. The growth parameters of Alfonsino were estimated as  $K=0.097 \text{ year}^{-1}$ ,  $L_{inf}=48 \text{ cm}$ , and  $t_0=-3.08 \text{ year}^{-1}$  using the specimens from Guinean Gulf (López-Abellán *et al.* 2008).

### 3.5 Reproductive parameter

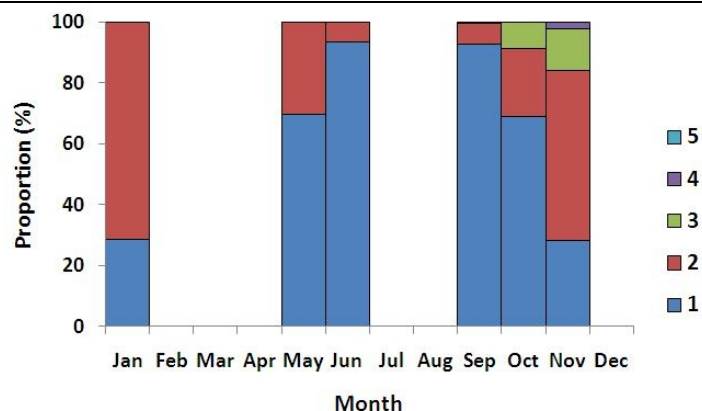
The reproductive parameters of Alfonsino were analysed as follows. Spawning season was evaluated as the period from November to February (Nova Caledonia). Length at 1<sup>st</sup> maturity was estimated as fork length 39.67 cm for females (95% c.i.=39.34, 40.02 cm) and 36.88 cm for males (95% c.i.=36.45, 37.36 cm) (Flores *et al.* 2012). Fecundity was calculated as 270,000 – 650,000 eggs (source: FishBase).

The biological productivity of *B. splendens* is likely to be moderate to low in general (Anonymous, 2007). Alfonsinos are serial spawners and reproduce in the areas that they normally inhabit. Average size at sexual maturity appears to be about 30–34cm (4–6 years old), and can vary between localities (González et al. 2003). The annual numbers and proportion of the fish by gonad maturity stage by Korean trawl fisheries during the period of 2010 - 2013 are presented in Table 6 and Figure 14. Time of spawning also varies markedly between seasons. The proportion of immature fishes was 99.4%, 91.4%, 98.6% and 97.1% in 2010, 2011, 2012 and 2013, respectively. The fish, which is in pre-spawning and spawning gonad stages, appeared from October indicating that the spawning season may start from sometime after October. To get more accurate reproduction results of Alfonsino in the SEAFO Area, there is a need to collect data for a few more years.

**Table 6:** Annual number of fish by maturity stages of Alfonsino (*B. splendens*) in the SEAFO CA for 2010 to 2013.

Year	Month	Maturity stage				
		Immature	Developing	Pre-spawning	Spawning	Spent
2010	Sep	882	66	6	0	0
	Oct	33	6	0	0	0
	Nov	0	20	0	0	0
2011	Jan	95	239	0	0	0
	Sep	37	1	0	0	0
	Oct	18	20	12	0	0
	Nov	26	77	34	2	0
2012	May	16	7	0	0	0
	Jun	452	32	0	0	0
	Nov	29	40	3	5	0
2013	Oct	42	4	0	0	0
	Nov	28	25	3	0	0





**Figure 15:** The proportion of maturity stage of Alfonsino in the SEAFO CA for 2010-2013. (1: immature, 2: developing, 3: pre-spawning, 4: spawning, and 5: spent).

### 3.6 *Natural mortality*

There is no available information and data in the SEAFO CA.

### 3.7 *Feeding and trophic relationships (including species interaction)*

There is no available information and data in the SEAFO CA.

### 3.8 *Tagging and migration*

No tagging and migration studies on Alfonsino have been done in the SEAFO Area.

## 4. Stock assessment

### 4.1 *Available abundance indices and estimates of biomass*

There is no available information and data in the SEAFO CA.

### 4.2 *Data used*

The data used are derived from fishing hauls in which total catch of *Beryx splendens* represented more than 80% of the total catch of *P. richardsoni* and *Beryx splendens* caught by Korean trawls around the Valdivia Bank. This criterion is used since the catches of these two species are negatively correlated, i.e., when one of these two species occurs in the haul the other does not.

In each haul the estimate of CPUE of *Beryx splendens* is represented as the ratio of total catch of the species by the haul duration time.

### 4.3 *Methods used*

Nominal CPUE was used to derive a perception of the development of the fishery in the period 2010-2012.

4.4 Results

The progression in CPUE over time showed marked variability and no clear trend.

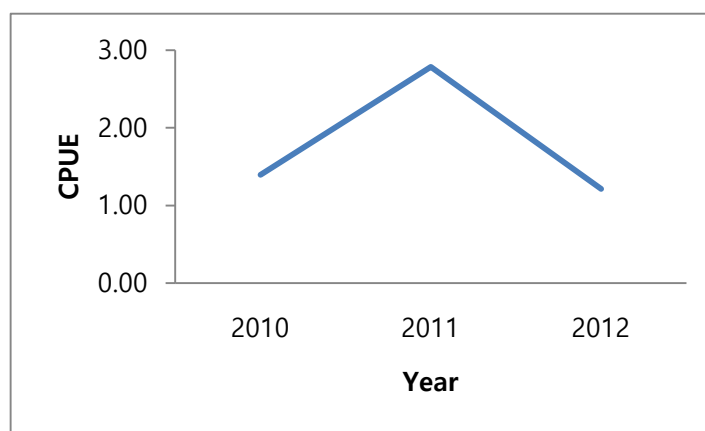


Figure 16: Plot of nominal CPUE (Catch per hour) for 2010-2012.

4.5 Discussion

It should be recognized that the data available for assessment is extremely sparse and represents a short time series. The perception of the stock as described is based on only 3 years of catch and effort data. Length frequency distributions could not be derived based on the insufficient length samples submitted to the Secretariat.

4.6 Conclusion

Catch and effort data per haul on Alfonsino were collected by Korean vessels for only 3 years from 2010 to 2012. These data, although short in series, can be used to get a perception of the trend in nominal CPUE.

4.7 Biological reference points and harvest control rules

No biological reference points could be determined and the SC suggests using an empirical Harvest Control Rule (HCR) to regulate the fishery until the data situation is improved. A candidate HCR consists of the average catch of the last three years to which a 20% uncertainty cap is applied.

ICES Harvest Control Rules, category 5: Data poor stocks (only landings data). Calculation of average catch for three years (2010- 2012) as  $C_{Y-1}$

$$C_{Y-1} = \frac{\sum_{y-3}^{y-1} C_i}{3}$$

$$= (159 + 165 + 172) / 3$$

$$= 165$$

And calculation of the catch advise as

$$C_{Y+1} = 0.8 \times C_{Y-1}$$

$$= 0.8 * 165$$

$$= 132t$$

## 5. Incidental mortality and by-catch of fish and invertebrates

### 5.1 *Incidental mortality (seabirds, mammals and turtles)*

No by-catch of seabirds, mammals and turtles were reported.

### 5.2 *Fish by-catch*

In the case of Southeastern Atlantic fisheries, Alfonsino is often found in association with other fish species as, for example, in 2011 the following species (per ton) were caught; Boarfish (*Capros aper*) 14 tonnes, Blackbelly rosefish (*Helicolenus actylopterus*) 3 tonnes, Imperial blackfish (*Schedophilus ovalis*) 6 tonnes, Oilfish (*Ruvettus pretiosus*) 8 tonnes, and Silver scabbardfish (*Lepidopus caudatus*) 4 tonnes.

### 5.3 *Invertebrate by-catch including VME taxa*

The main method used to catch Alfonsino is with bottom trawling. Trawling for this species on seamounts impacts habitat (Clark and O'Driscoll, 2003, Koslow et al., 2001), but the precise impact of this on invertebrate populations on the seamounts is unknown.

### 5.4 *Incidental mortality and by-catch mitigation methods*

By-catch mitigation measures to reduce incidental mortality for seabirds, mammals and turtles are in place (see current conservation measures in section 6).

### 5.5 *Lost and abandoned gear*

There was no reported lost and abandoned gear from the trawl fisheries for Alfonsino in the SEAFO CA.

### 5.6 *Ecosystem implications and effects*

The main method to catch Alfonsino is bottom trawling and repeated trawl disturbances will alter the benthic community on a seamount. However, the precise impact of such trawling on the ecosystem as a whole is unknown. (see Conservation Measure 18-10).

## 6. Current conservation measures and management advice

Alfonsino is a seamount-associated species that form aggregations, and the experience worldwide is that serial depletion of aggregations at different seamounts can happen. In the recent fisheries for the species in SEAFO the fishery was concentrated on a single seamount summit, the Valdivia Bank, where it was mainly a bycatch in the target fishery for pelagic armourhead. The only information available from 2015 is the limited observations from the RV Dr Fridtjof Nansen survey noting that only scattered specimens of the species occurred in the main fishing area.

It is also recognized that the last three year's interruption in the exploitation has provided potential for recovery of the resource in the main fishing area on Valdivia Bank. There is however not enough information from any source to determine with certainty whether recovery has happened or not happened.

The SC however recognised that without future fishery data nor survey information the basis for providing scientific advice will deteriorate. The SC therefore discussed what advisory option would be most appropriate while maintaining the potential for data provision from a fishery. It must also be taken into account that the alfonsino is mainly a bycatch and that the catches will depend on the activity level in the target fishery for armourhead.

The SC considered the TAC level advised in 2013 as precautionary at that time. Considering no fishing pressures last 5 years and development of the resource, The SC recommends a TAC of 200 tonnes (status quo) for the SEAFO CA, of which a maximum of 132 tonnes may be taken in Division B1.

Other Conservation Measures that are applicable to this fishery can be seen in Table 7.

**Table 7:** Other Conservation Measures that are applicable to this fishery.

Conservation Measure 04/06	On the Conservation of Sharks Caught in Association with Fisheries Managed by SEAFO
Conservation Measure 14/09	To Reduce Sea Turtle Mortality in SEAFO Fishing Operations.
Conservation Measure 25/12	On Reducing Incidental Bycatch of Seabirds in the SEAFO Convention Area
Conservation Measure 30/15	On the Management of Vulnerable Deep Water Habitats and Ecosystems in the SEAFO Convention Area
Conservation Measure 32/16	Total Allowable Catches and related conditions for Patagonian Toothfish, Deep-Sea Red Crab, Alfonsino, Orange Roughy and Pelagic Armourhead for 2017 and 2018 in the SEAFO Convention Area.

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