APPENDIX IX – Stock Status Report – Pelagic armourhead/Southern boarfish

STATUS REPORT

Pseudopentaceros richardsoni

Common names: Pelagic armourhead, Southern boarfish

FAO-ASFIS Code: EDR

2014

Updated: 9-Oct-14

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15. Description of the fishery

15.1 Description of fishing vessels and fishing gear

The only fishery for pelagic armourhead (southern boarfish) in recent years has been the Korean trawl fishery for southern boarfish that started in 2010. In the period 2010-2013 two fishing vessels participated, F/V Adventure and F/V Dongsan Ho, and there was no fishery this year as of September 2014. The fishery is described as a midwater trawl fishery, but the observer records submitted to SEAFO include a high proportion of hauls recorded as "Demersal" (94% of the observed tows). Whether or not these trawls were bottom trawls remains uncertain, and this is an issue that needs further attention and clarification.

Table 1 and Figs. 1-4 provide the gears specifications for gears available on the stern trawler F/V Adventure.

- The 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.
- The 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%.
- The 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: Specifications of trawls used at F/V Adventure.

Gear Specifications		HAMPIDJAN NET bottom trawl	MANUFACTURED NET bottom trawl	MIDWATER NET
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

F/V Dongsan Ho is a stern trawler operates two types of fishing gear; mid-water trawl net and bottom trawl net. The gear used for the fishing operations in the SEAFO CA was the mid-water KITE gear (Fig.4), that includes ropes in which the upper part has kites and lower part chains. 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 bottom trawl net PE Net is also used in the SEAFO CA. The upper and lower parts of the 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.

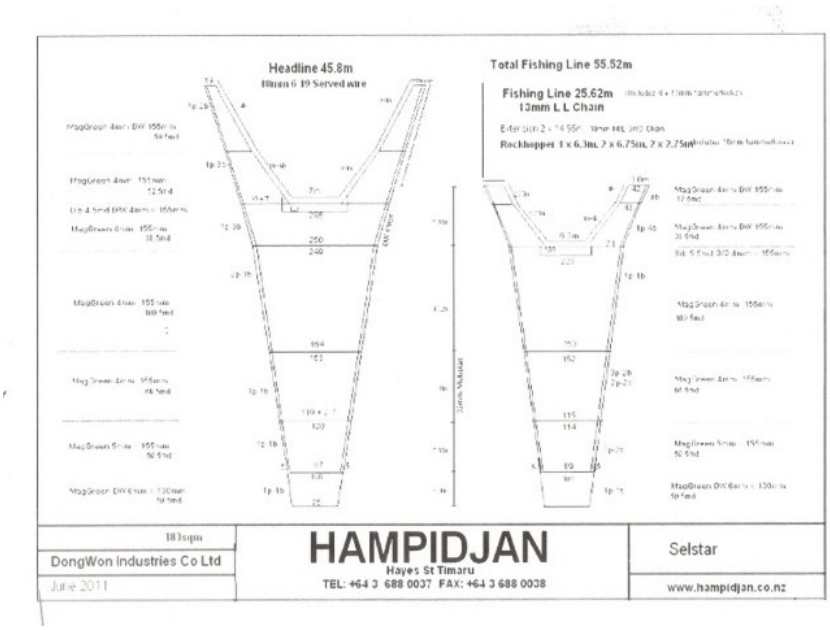


Figure 1: Diagram of HAMPIDJAN NET of F/V Adventure.

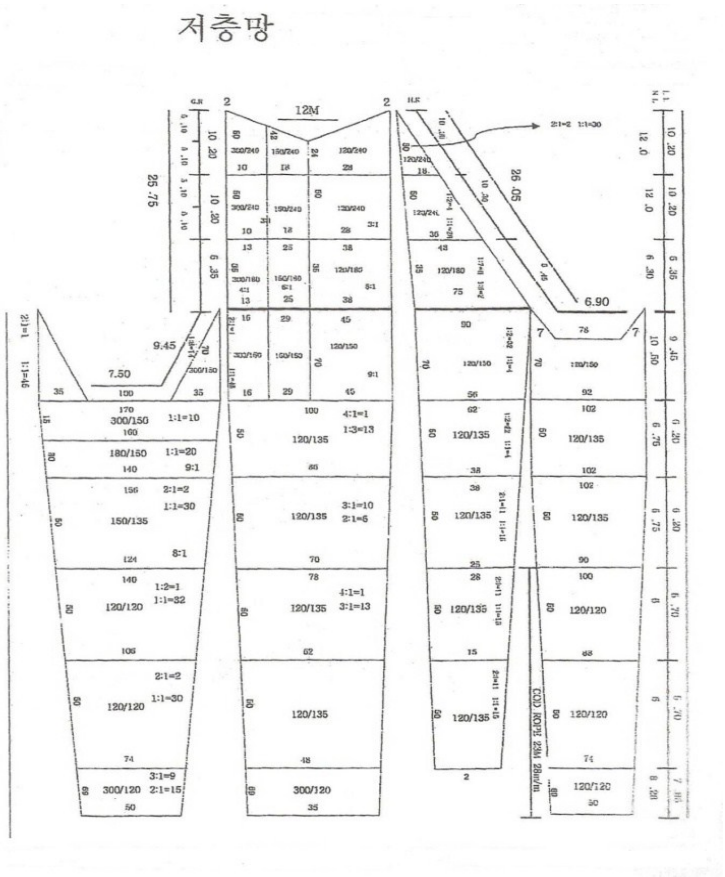


Figure 2: Drawing of the Custom Manufactured Bottom Trawl Net of F/V Adventure.

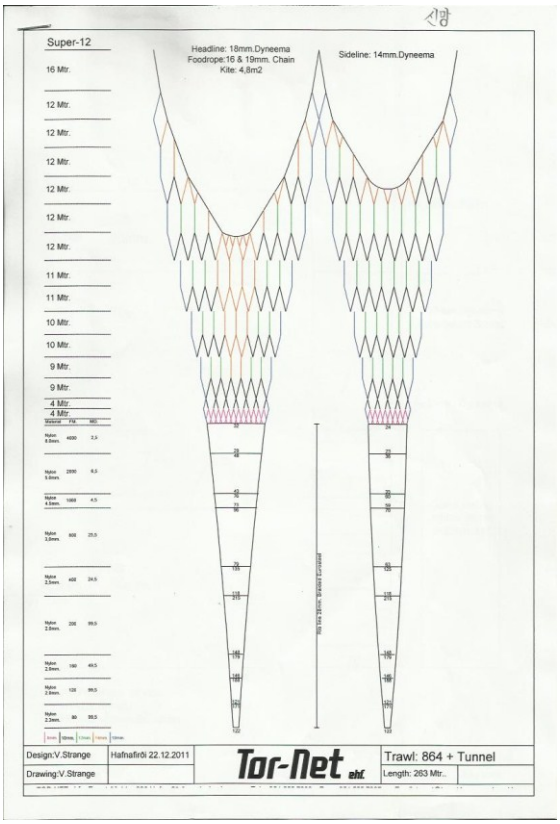


Figure 3: Drawing of mid-water trawl net of F/V Adventure.

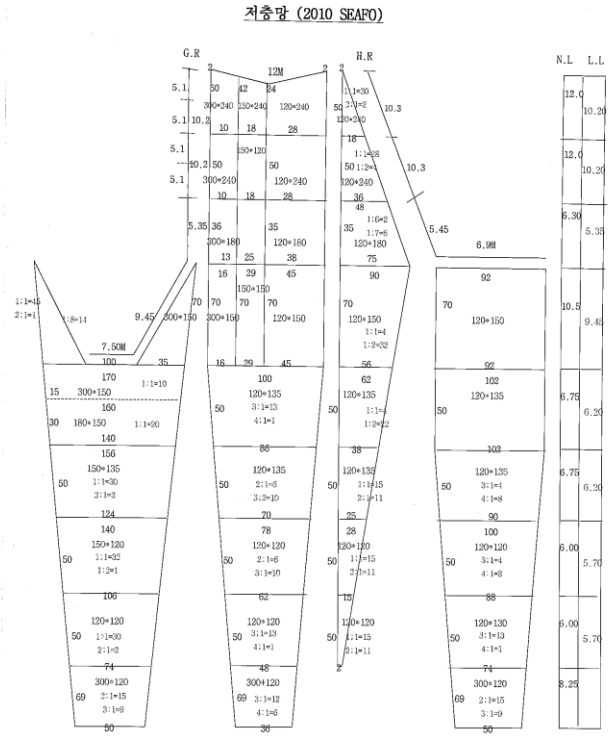
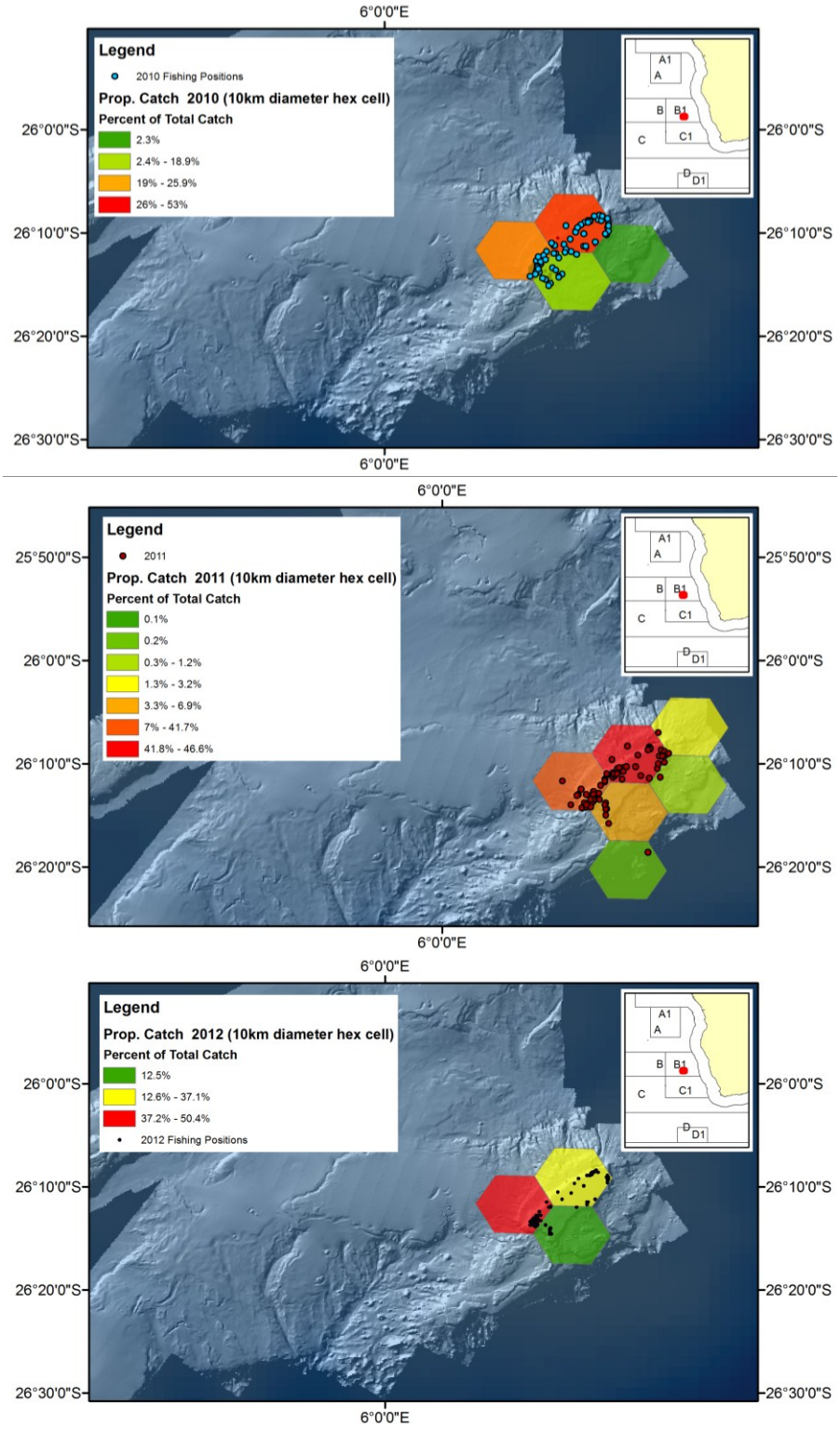


Figure 4: Drawing of mid-water trawl net of F/V Dongsan Ho.

15.2 Spatial and temporal distribution of fishing

During the period from 2010 to 2013 Korean trawler vessels (Dongsan Ho and/or Adventure) conducted a targeted fishery for pelagic armourhead in the southern and northern parts of the Valdivia Bank, in Division B1 of the SEAFO CA (Figure 5). In 2013, a single haul was also conducted at North Walvis Ridge in Division B1 (Table 1, Fig. 5, lower).



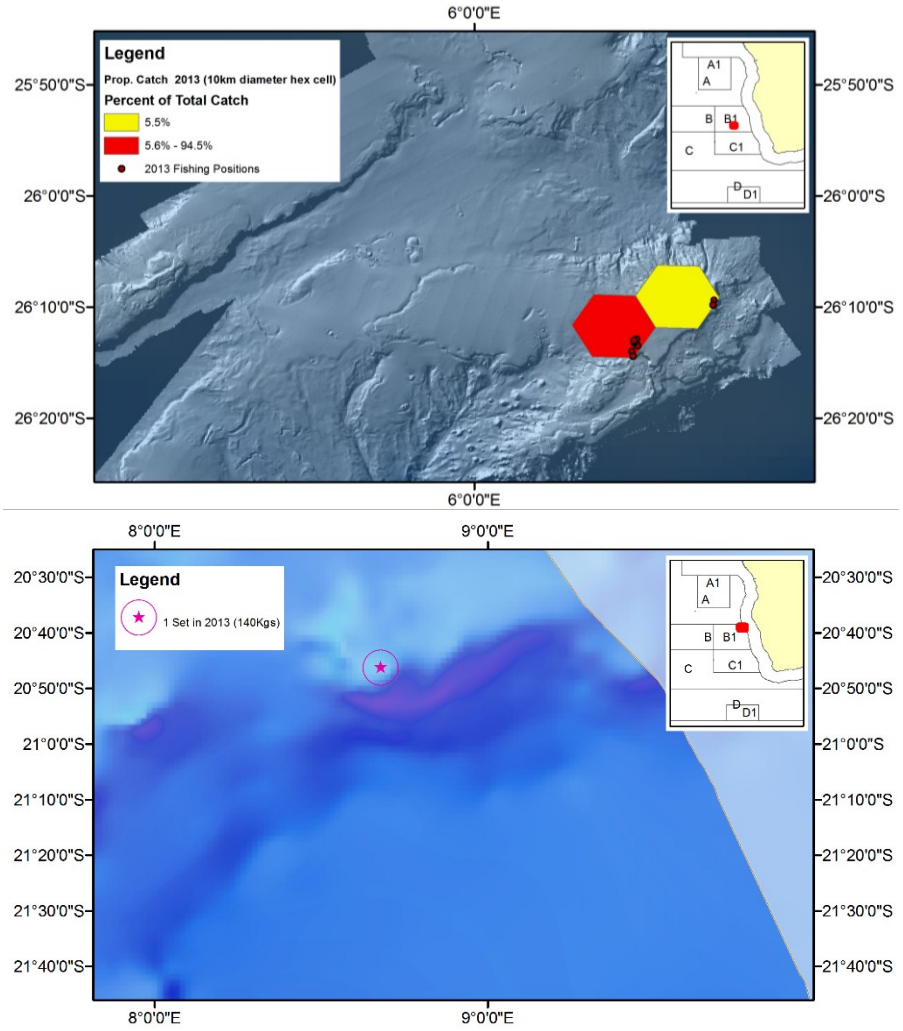


Figure 5: Spatial distribution of fishing positions and reported catches of pelagic armourhead(*P. richardsoni*) aggregated to 10km diameter hexagonal cells, 2010-2013. Lower map shows the single fishing position in the NE seamount of B1 (NE Walvis Ridge) reported in 2013. Data from observer reports submitted to SEAFO until Sept. 2014.

Table 1: Number of trawl hauls by year and location (ref. Fig. 5).

Year	Valdivia Bank	North Walvis Ridge
2010	63	
2011	88	
2012	117	
2013	9	1
2014	N/F	N/F

15.3 Reported retained catches and discards

Starting in 1976, Table 2 presents the historical records of annual catches and bycatches of pelagic armourhead by country, fishing gear and the SEAFO CA sub-divisions. The main fishing countries were:

- Russia that operated with bottom trawlers in the late 1970s and 1993;
- Ukraine (bottom trawl) fishing in the mid-1990s.
- Namibia and South Africa (bottom trawlers) in the mid-1990s;
- South Korea primarily operating with mid-water trawl in the period 2010-2013.

The higher annual catches were recorded by Russia with 1,273 and 1,000 t in 1977 and 1993, respectively, and by Korea with 688 t in 2010. Spain and Cyprus landed small catches in 2 and 1 years, respectively.

Table 2: Reported catches (tonnes) of pelagic armourhead*(Pseudopentaceros richardsoni*) from the SEAFO CA**.** Data reported by SEAFO CPs and other flag states reporting to SEAFO, and from FAO.

Nation	**Namibia**		**Russia**	**Ukraine**	**South Africa**		**Spain**		**Cyprus**	**Rep. of Korea**	
Management Area	B1		B1	UNK	B1		B1		UNK	**B1**	
Fishing method	BT		BT	BT	BT		BT / LL		BT	**MT**	
Catch details	(t)		(t)	(t)	(t)		(t)		(t)	**(t)**	
	Catch	Discard	Catch	Catch	Catch	Discard	Catch	Discard	Catch	Catch	**Discard**
1976			108								
1977			1273								
1978			53								
1993			1000	435 [FAO]							
1994											
1995	8			49	530						
1996	284			281	201						
1997	559			18	12						
1998	N/F										
1999	N/F										
2000	20										
2001	N/F						<1				
2002	N/F										
2003	4						3				
2004							3		22		
2005											
2006											
2007											
2008											
2009	N/F		N/F	N/F	N/F		N/F		N/F	N/F	
2010	N/F		N/F	N/F	N/F		N/F		N/F	688	**0**
2011	N/F		N/F	N/F	N/F		N/F		N/F	135	**0**
2012	N/F		N/F	N/F	N/F		N/F		N/F	152	**<1**
2013	**N/F**		**N/F**	**N/F**	**N/F**		**N/F**		**N/F**	**13**	**0**
2014* **	**N/F**		**N/F**	**N/F**	**N/F**		**N/F**		**N/F**	**N/F**	

N/F = no fishing
UNK = Unknown
Blank fields = No data available.
*** Provisional (July 2014)
[FAO]= values from FAO
TB = Bottom Trawl
TM = Mid-water Trawl
LL = Longline

15.4 IUU catch

IUU fishing activity in the SEAFO CA has been reported to the Secretariat latest in 2012, but the extent of IUU fishing is at present unknown.

16. Stock distribution and identity

The Pentacerotid *Pseudopentaceros richardsoni* (Smith 1844) is a southern circumglobal, benthopelagic species inhabiting outer shelf and upper continental shelves as well as seamounts and underwater ridges (100-1000 m) between 0 and 1 000 m depth (Heemstra, 1986). The species inhabits such habitats at e.g. Tristan de Cunha, on the Walvis Ridge and seamounts off South Africa (Southeast Atlantic); south of Madagascar (Western Indian Ocean) as well as in southern Australia, New Zealand and the Southeast Pacific. The potential distribution area in the SEAFO CA and adjacent waters is shown in Figure 6. It is unlikely that the species is abundant south of about 40^{O}S, i.e. in Sub-Area D.

It is known from adjacent areas that adults inhabit the steep and flat hard bottoms down to 800 m on the seamounts and underwater ridges in the open ocean. Eggs, larvae and juveniles are pelagic. Pelagic armourhead recruit to the summit of the seamounts after approximately 4 years of pelagic life and thereafter aggregates.

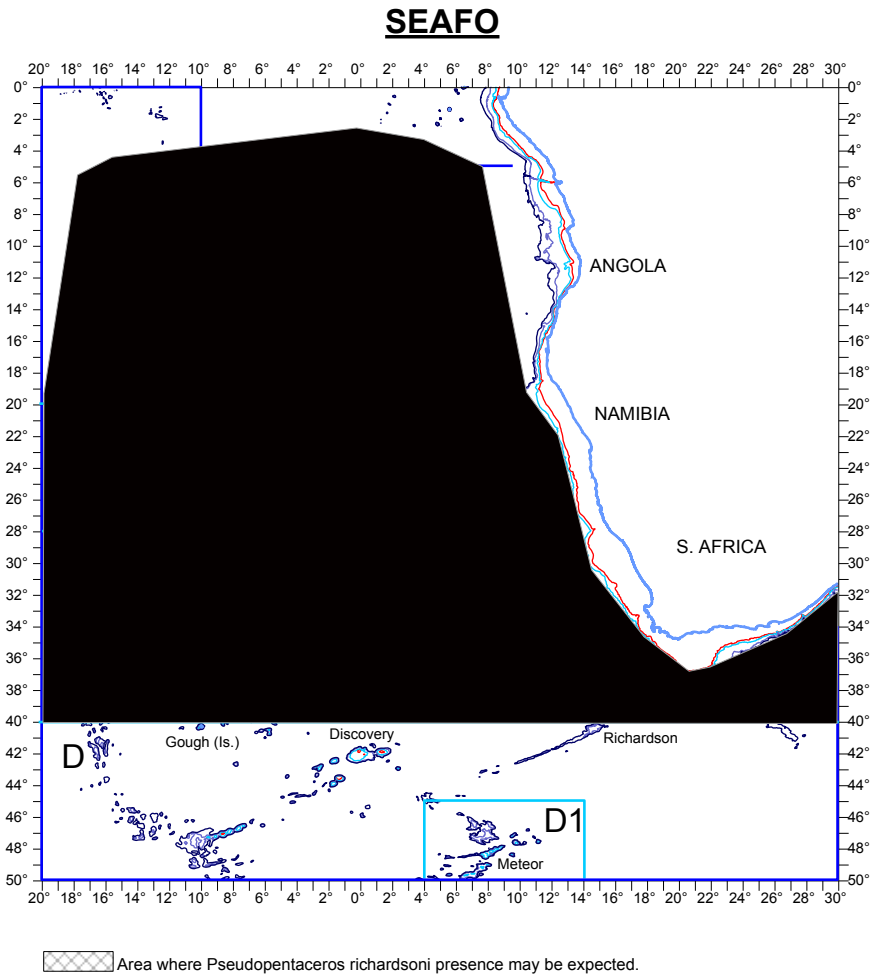


Figure 6: Potential geographical distribution of *P. richardsoni* in the SEAFO CA and adjacent waters (source: Species profile on the SEAFO website referring to several sources).

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

17.1 Fisheries and survey data

Geo-referenced data on catch and effort were available from haul-by-hauls observer reports for the entire time-series of the recent Korean fishery (2010-2013). Logbooks were not available.

No survey data from the period of the fishery was available from the area fished commercially or any other area of the SEAFO CA.

17.2 Length data and length frequency distributions

In 2014 the SC reviewed length data collected by observers on Korean fishing vessels mainly operating in Valdivia Bank (Subdivision B1) in the period 2010-2013. No fishery has been conducted as of September 2014.

Due to insufficient sampling, it was impossible to derive reliable length compositions of the catches (see below). Length frequency distributions and length data (e.g. ranges and mean lengths) presented in 2013 or earlier SC reports are considered invalid.

Data on sampling levels are provided in Figure 7 and Table 3. The majority of trawl tows were sampled by observers, but in all years the sampling level in terms of total number of fish sampled, and number of individual sampled/tow (and per tonne) was inadequate. The sampling level even declined during the period 2010-2013.

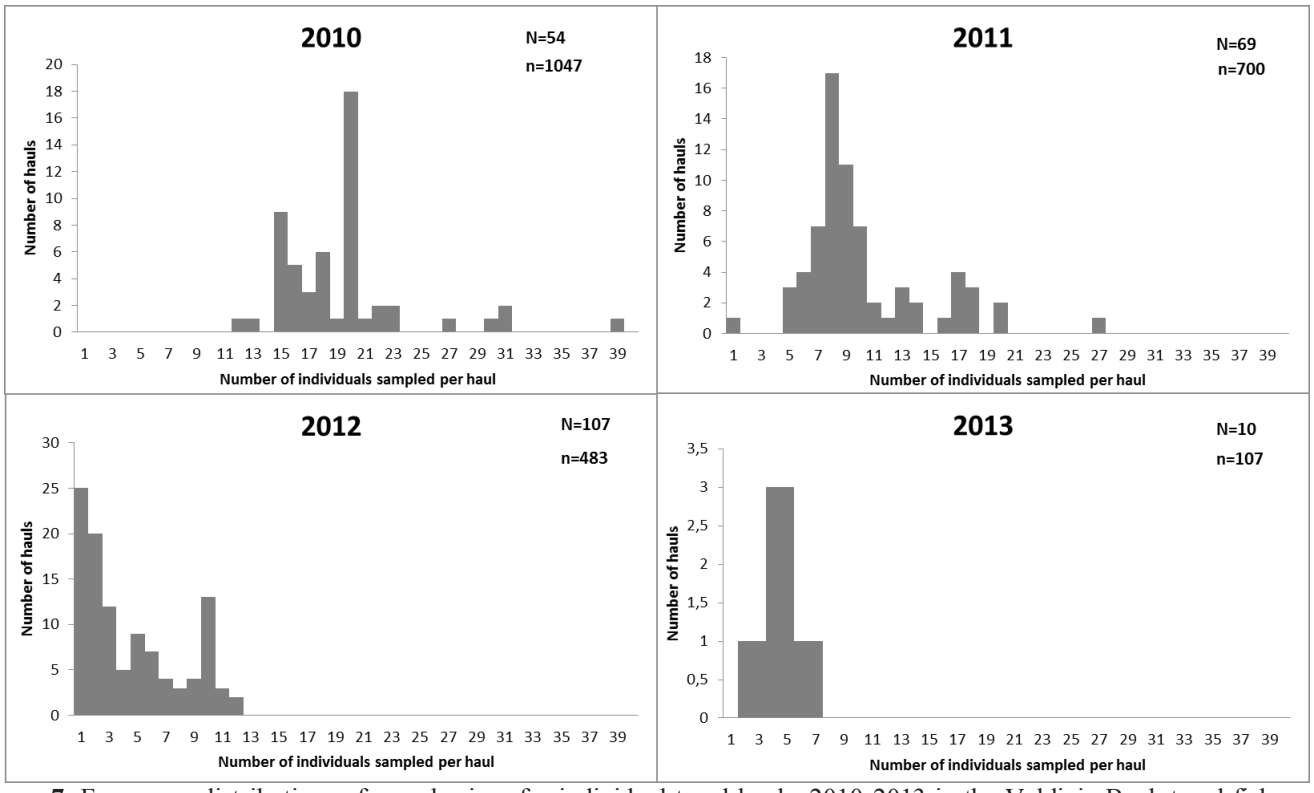


Figure 7: Frequency distributions of sample sizes for individual trawl hauls, 2010-2013 in the Valdivia Bank trawl fishery for pelagic armourhead. The source is observer reports submitted to SEAFO until September 2014. N = total number of hauls sampled; n= total number of boarfish sampled.

Table 3: Samples and sampling levels resulting from observer observations of the trawl on Valdivia Bank. Data on pelagic armourhead only, as officially submitted to SEAFO until Sept. 2014.

Year	No. of trawl tows sampled	Mean #ind. sampled/tow	Min. #ind. sampled/tow	Max. #ind. sampled/tow	Mean #ind. sampled/tonne
2010	54	19.3	12	39	0.03
2011	69	10.1	1	27	0.09
2012	107	4.5	1	12	0.03
2013	10	4.5	2	7	0.35

17.3 Length-weight relationships

The weight-length relationship of pelagic armourhead (for the two sexes combined) derived from samples collected by observers in 2010-2012 was: $W = 0.016\ L^{3.048}$ ($r^2 = 0.96$).

17.4 Age data and growth parameters

There is no available information for SEAFO CA.

17.5 Reproductive parameters

The frequencies of pelagic armourhead by maturity stage and sampling month for the period 2010 – 2012 are shown in Table 4.

The fishing activity in SEAFO CA 2010-2012 was restricted to May and June, and the observer data suggest high proportions of pre-spawning and spawning stages (Fig. 8) and that spawning occurs after May but probably before September. This period is different from that observed in the Southwest Indian Ocean, i.e. between October and December (López-Abellán et al. 2007). However, in neither area were the entire year sampled.

A maturity ogive based on the above data suggests 44.1 cm FL as the likely size at 50% maturity (Fig. 9).

Table 4: Annual number of fish by maturity stage of Pelagic armourhead (*Pseudopentaceros richardsoni*) in the SEAFO CA for 2010-2012. Source: observer samples from Korean fishery.

Year	Month \ Maturity stage	Immature	Developing	Pre-spawning	Spawning	Spent
2010	Sep	0	504	159	0	0
	Oct	0	437	107	0	0
	Nov	0	84	26	0	0
2011	Jan	14	78	27	0	0
	Sep	59	75	4	0	0
	Oct	30	26	13	0	0
	Nov	0	16	27	2	0
2012	May	0	0	38	96	0
	Jun	0	0	69	352	0

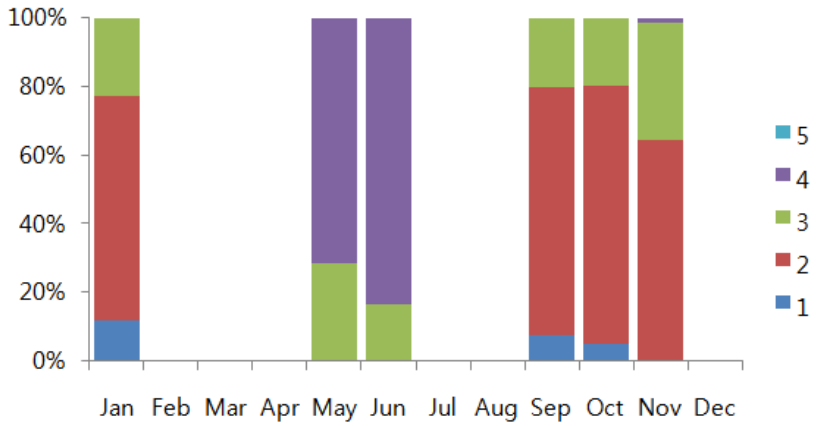


Figure 8: The proportion of maturity stage by month of Pelagic armourhead (*Pseudopentaceros richardsoni*) in the SEAFO CA for 2010-2012 (1: immature, 2: developing, 3: pre-spawning, 4: spawning and 5: spent).

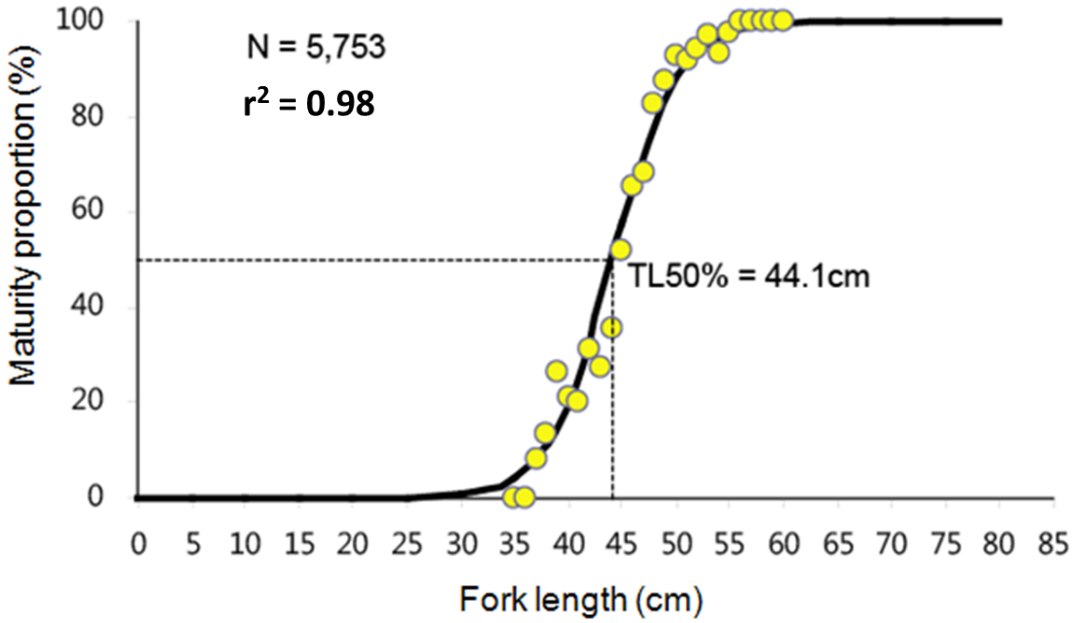


Figure 9: The maturity proportion by length of pelagic armourhead (*Pseudopentaceros richardsoni*) on the Valdivia Bank in the SEAFO CA (Sub-Area B1).

17.6 Natural mortality

Empirical natural mortality estimates for pelagic armourhead were calculated by different methods and using the estimates of growth parameters derived from growth studies on the same species from the Southwest Indian Ocean (López-Abellán et al. 2008a) and on Valdivia Bank during the Spanish-Namibian research surveys reported on earlier (López-Abellán et al. 2008b).

The growth parameters fitted were: K=0.27 year-1; L_{inf}=65.1 cm; and t_0=-0.34 year-1. The maximum observed age of the pelagic armourhead in the Southwest Indian Ocean was 14 years.

The values of empirical natural mortality obtained using different methods were determined using the Fishmethods R package:

Method	M
Pauly (1980) - Length Equation	0.457
Hoenig (1983) - Joint Equation	0.316
Hoenig (1983) - Fish Equation	**0.300**
Alverson and Carney (1975)	0.253
Roff (1984)	0.417
Gunderson and Dygert (1988)	0.089

The natural mortality M=0.3 for the pelagic armourhead calculated using the Hoenig´s method was considered acceptable and used in the analyses below. The effect of using M=0.2 was illustrated. The average longevity for stocks in the data set used by Hoenig (1983) is the age at which about 1.5% of the stock remains alive (Hewitt and Hoenig, 2005).

17.7 Feeding and trophic relationships (including species interaction)

There is no available information for SEAFO CA.

17.8 Tagging and migration

There is no available information SEAFO CA.

18. Stock assessment status

Populations of *P. richardsoni*, particularly the adult exploited fraction, have patchy distributions. The species occurs in a restricted depth stratum on the summit of seamounts and oceanic banks. Simple analyses of catch per unit of effort (CPUE) in the recent fisheries may be used as an indicator of biomass and may reveal temporal abundance trends. However, provided that sufficient input data are available, the pattern of distribution makes the use of local depletion analysis a potentially useful tool to evaluate the status of the population in specific areas. In the case of the SEAFO CA the actual fishing grounds in the recent fishery were primarily located in a small area of about 200 km2 on Valdivia Bank (see Ch. 1.2). If sufficient length data are available, cohort analyses based on length may be possible.

Processes and discussions in previous SC sessions are available in the Scientific Committee reports (SEAFO SC Report 2012 (Pages 21-23); SEAFO SC Report 2013 (Pages 17-18). In 2014 the exploration of different approaches continued. Depletion estimators were recalculated and the Gulland approach adopted to estimate maximum sustainable yield (MSY) based on the estimate if initial biomass derived from the depletion model. Also, the SC considered length-based analyses as potentially complementary approaches to evaluate exploitation status, but due to the shortage of length data (Ch. 3.2.), that exploration was abandoned.

Depletion estimators are widely used in fish and wildlife studies to estimate population abundance (Seber, 2002; Hilborn and Walters, 1992). These estimators assume a simple linear relationship between CPUE and cumulative effort (DeLury, 1947) or cumulative catch (Leslie and Davis, 1939). Data available suggest that prior to 2010 the stock was unexploited and consequently the Gulland (1971) method may be an approach to estimate MSY.

18.1 Available abundance indices and estimates of biomass

Catch & effort data was available for the years 2010-2013 and used to calculate CPUE, as an indicator of stock biomass.

18.2 Data used

The data used above were derived from fishing hauls in which the total catch of *P. richardsoni* represented more than 80% of the total catch of *P. richardsoni* plus Beryx splendens. This criterion was adopted because catches of these two species are highly negatively correlated, i.e. when one of these two species occurs in the haul the other is usually very low (Fig. 11).

In each haul the estimate of CPUE of *P. richardsoni* is represented as the ratio of total catch of the species by the haul duration.

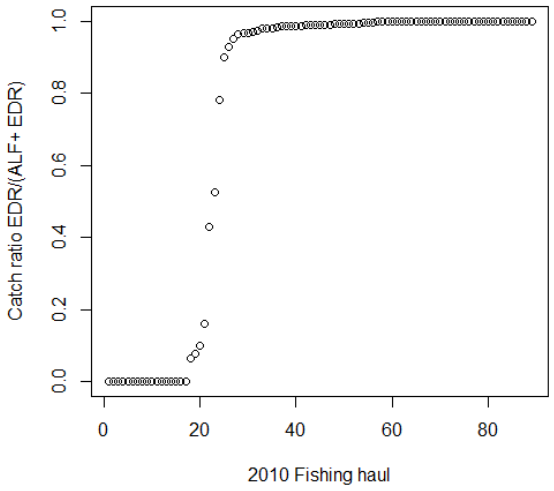


Figure 10: The 2010 estimates of ratio of total catch *Pseudopentaceros richardsoni* by the total catch of *Pseudopentaceros richardsoni* and *Beryx splendens* by haul by Korean trawl vessels.

18.3 Methods used

In addition to simple evaluations of CPUE trends, the local depletion model was run (see above) for further exploration. This model assumes that no recruitment and emigration/immigration to the fishing area occur during a particular season of fishing. Under these assumptions, catch rates will decline with continued fishing until all the fish have been removed. A linear regression model is adjusted to CPUE and the corresponding temporal cumulative catches. Through this model the total biomass available at the beginning of the season will thus correspond to the total catch that corresponds to local extinction, i.e. point that intersects the x-axis.

The uncertainties of the estimates were determined by bootstrapping method. A total of 2000 bootstrap samples were derived from the input data and based on bootstrap estimates of the parameter and through this confidence interval for each parameter was derived accordingly.

The Gulland approach to estimating MSY was adopted to generate provisional estimates of MSY (Gulland, 1971; Garcia et al. 1989): MSY = 0.5*B*M, where B is unexploited (virgin) biomass and M the estimate of instantaneous natural mortality rate.

18.4 Results

The time-series showed that the CPUE declined sharply from 2010 to 2011 and remained low during 2011, 2012, and 2013 (Fig. 10). In 2014 there was no fishery, hence no data on CPUE.

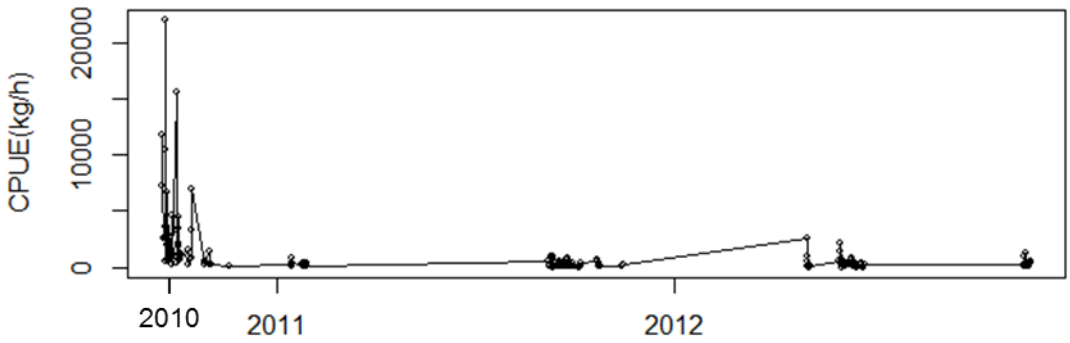
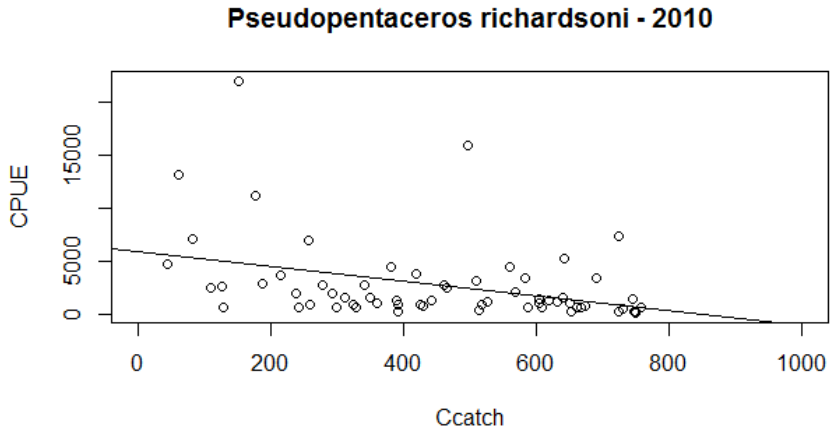


Figure 11: Time-series of catch per unit of effort (CPUE, kg/trawl hour), i.e. set-by-set data, for pelagic armourhead from 2010 to 2013. Source: observer reports submitted to SEAFO.

Figure 12 presents the CPUE against cumulative catch and the adjusted regression lines for 2010 and 2011. The 2010 biomass estimate at the beginning of the fishing season (851 t) was considered a proxy of the unexploited biomass. Table 6 shows estimates of the biomass at the beginning of the fishing seasons in 2010 and 2011, as well as the 25% and 75% percentiles.



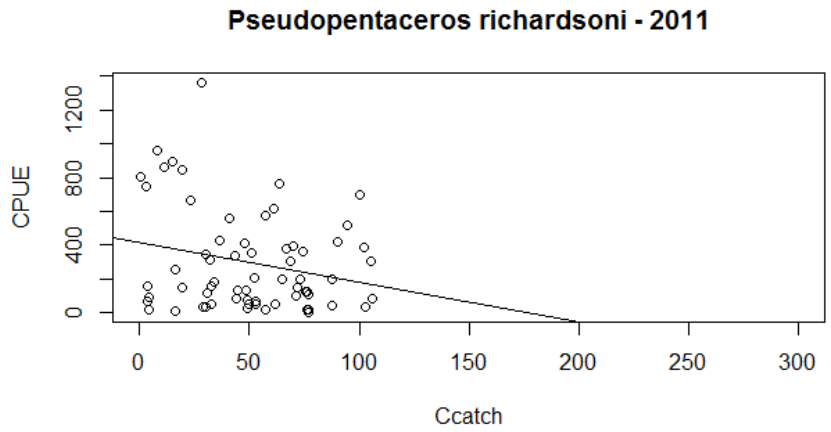


Figure 12: The CPUE against cumulative catch (catch, tonne) of *Pseudopentaceros richardsoni* and the adjusted regression lines for 2010 and 2011. Note the different scales on the CPUE axes.

Table 6: Summary statistics of the biomass (t) at the beginning of the fishing season derived from 2000 bootstrap re-sampling estimates.

Year	25 Percentile	Estimate	75 Percentile
2010	751	851	1096
2011	137	176	229

Applying the Gulland formula, and assuming a virgin biomass of 851t and M = 0.3, resulted in an estimate of MSY = 128 t. The corresponding estimate using M = 0.2 is MSY = 85 t.

18.5 Discussion

The results obtained show strongly decreasing biomass indices (CPUE) from the years 2010 and 2011 (in 2011 the CPUE was approximately 16% of that in 2010). The CPUE continued at similar levels through the time-series until and including 2013.

The data available for the fishery on the Valdivia Bank were only sufficient to apply exploratory relatively simple assessment methods to study stock trends and status and derive provisional estimates of MSY. The exploratory model run for 2010 showed a significant negative regression slope and the regression explained near 40% of the variance. These exploratory runs provided a similar perception of the stock development as depicted by the CPUE series.

18.6 Conclusion

The catches of *P. richardsoni* were from a directed fishery on Valdivia Bank, in a very small area, where the species concentrate as adults. These two aspects make the species highly vulnerable to overfishing. The SC did not have valid size or age distributions allowing evaluation of trends in size-age structure of the stock through the time-series. No data on recruitment was available. Under the assumption of a 4-year recruitment age, it is expected that until 2015 the entries in the population come from year classes born prior to 2010, i.e. before the fishery started.

The current perception of the stock fished primarily on the Valdivia Bank is that it is reduced to a low level.
There is no information on recruitment processes and dynamics, and it is not known whether the concentrations of the species constitute a self-sustaining population or are sustained by immigration/influx

of larvae and juveniles from other areas. The abundance of recruiting year classes is unknown due to lack of age data and pre-recruit data. It is therefore unknown if the present abundance level on Valdivia Bank is above or below a level at which recruitment is impaired.

Recovery of the stock and fishery on Valdivia will require that the fishing intensity is controlled and kept at a much reduced level to facilitate recruitment and a reversion of the negative CPUE trend. A recovery plan may be required (see Ch 4.7).

The 2010-2013 fishery for armourhead was mainly conducted on the Valdivia Bank. A single catch was, however, also reported from a seamount in the NE corner of B1. In Figure 6 the generalized distribution area of the species was provided. However, the species is restricted to depths less than 800m and mostly less than 600m. The actual areas of suitable character and depth, i.e. shallower than 600m and north of 40oN, are few and widely dispersed (Figure 13). Fisheries expanding into other areas also have to be closely monitored and regulated (Ch 4.7).

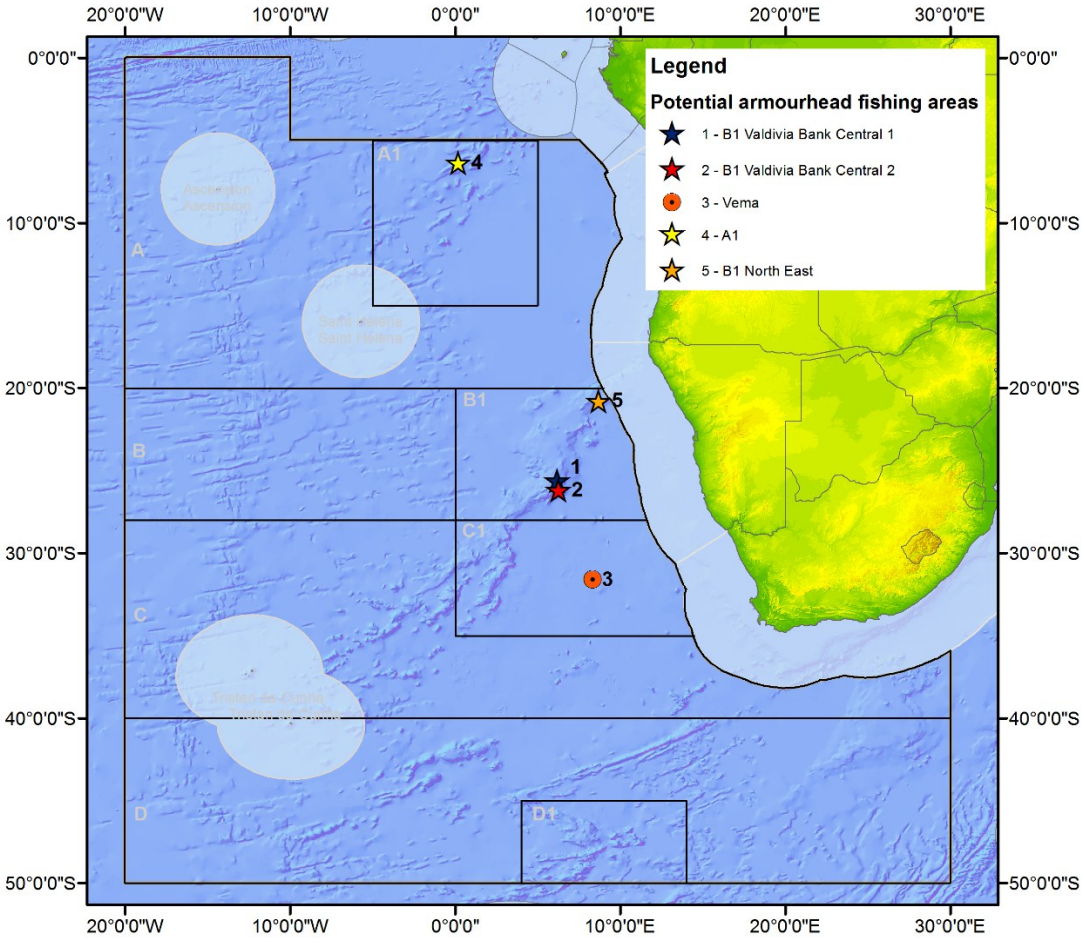


Figure 13: Bathymetry of the SEAFO CA and locations with bottom depths of 600m or less.

18.7 Biological reference points and harvest control rules

Apart from the provisional estimate of MSY=128 t (Ch. 4.4), no reference points have been estimated and found to be valid. The main reason is the shortage of basic data to carry out assessments. Harvest control rules have not been implemented, but a suggestion is provided by the SC in 2014.

In view of the current perception of the stock as being at a low level, the SC recommends that a harvest control rule is implemented and suggests as a candidate HCR the following:

$$TAC_{y+1} = \begin{cases} TAC_y \times (1 + \lambda_u \times slope) & if \quad slope \geq 0 \\ TAC_y \times (1 + \lambda_d \times slope) & if \quad slope < 0 \end{cases}$$

Where 'Slope' = average slope of the Biomass Indicator (CPUE) in the recent 5 years; and
λu :TAC control coefficient if slope > 0 (Stock seems to be growing) : λu=1
λd :TAC control coefficient if slope < 0 (Stock seems to be decreasing) : λd=2

The TAC generated by this HCR is constrained to ± 5% of the TAC in the preceding year.

The application of the proposed HCR in the future requires a base level of catch in 2015.

19. Incidental mortality and bycatch of fish and invertebrates

19.1 Incidental mortality (seabirds, mammals and turtles)

There are no reports of incidental bycatches of birds, mammals and turtles in the armourhead fishery.

19.2 Fish bycatch

Observer reports document that bycatch species in the pelagic armourhead fishery on Valdivia Bank were blackbelly rosefish, imperial blackfish, oilfish, Cape bonnetmouth, and silver scabbardfish. Among these alfonsino, blackbelly rosefish, imperial blackfish, and oilfish were the most abundant species (Table 7).

Minor catches of Japanese mackerel (*Scomber japonicas*) (50 t in 2010), Cape horse mackerel (*Trachurus capensis*), and the longspine bellowfish (*Notopogon xenosoma*) were also recorded in the Korean observer reports, but it is uncertain whether these species occurred in the armourhead fishery. The identification of the latter species is also uncertain.

Table 7:Bycatch from pelagic armourhead / southern boarfish (*Pseudopentaceros richardsoni*) fishery.

	2010	**2011**	**2012**	**2013**
Species (FAO code)	**B1**	**B1**	**B1**	**B1**
BRF	161	42	35	4
HDV	24	35	24	<1
OIL	5	13	7	<1
EMM	11	2	<1	0
GEM	0	0	<1	0

SVS	30	15	2	0

BRF: Blackbelly rosefish (*Helicolenus mouchezi*); HDV: Imperial blackfish (*Schedophilus ovalis*); OIL: Oilfish (*Ruvettus pretiosus*); EMM: Cape bonnetmooth (*Emmelichthys nitidus*) and PRP: Roudi escolar (*Promethichthys prometheus*)??, SVS: silver scabbardfish (*Lepidotus caudatus*).

19.3 VME indicator incidental catch

Korean observers recorded 0.4 kg of VME indicator species in 2013 and less than 1 kg in previous years of the 2010-2013 armourhead fishery on Valdivia Bank. Apparently, catches never exceeded the agreed SEAFO threshold levels.

19.4 Incidental and bycatch mitigation methods

There are no relevant technical mitigation measures implemented specifically for the armourhead fishery.

19.5 Lost and abandoned gear

There were no reported lost and abandoned gear resulting from the armourhead fishery

19.6 Ecosystem implications and effects

There is no formal evaluation available for this fishery.

20. Current conservation measures and management advice.

In 2013 the Commission could not reach consensus on a TAC for southern boarfish/pelagic armourhead, consequently, the fisheries is open in 2014. The only CP fishing armourhead in the 2010-2013 fishery, i.e. Korea, declared that the precautionary approach would be respected and that a total catch of 300 tonnes in Division B1 would not be exceeded.

The Commission furthermore requested that the Scientific Committee assess the southern boarfish/pelagic armourhead and present a TAC in 2014.

The SC recommends that a TAC corresponding to the output level resulting from the HCR using the average catch in 2011 and 2012, i.e. 143 t.

Table 8: 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 By-catch of Seabirds in the SEAFO Convention Area
Conservation Measure 18/10	on the Management of Vulnerable Deep Water Habitats and Ecosystems in the SEAFO Convention Area
Conservation Measure 27/13	on Total Allowable Catches and related conditions for Patagonian Toothfish, Orange Roughy, Alfonsino and Deep-Sea Red Crab in the SEAFO Convention Area in 2011 and 2012

Conservation Measure 26/13	on Bottom Fishing Activities in the SEAFO Convention Area

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