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STATUS AND MANAGEMENT OF THE SOUTH AFRICAN SMALL PELAGIC FISHERY– 2019

Oceana Sustainability Report 2019

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Small Pelagic Fisheries in the Benguela Marine Ecosystem

In our report this year we expand on the small pelagic fisheries associated with the Benguela Current Large Marine Ecosystem (BCLME) and contextualise the fisheries in the three countries in the region. The BCLME southern boundary includes the Agulhas Bank (Figure 1) and the eastern extent from Port Elizabeth on the South African south east coast (where there is overlap with the Agulhas Somalia Large Marine Ecosystem), then westwards to the Cape of Good Hope and then northwards into Angola. It is a complex region as shown in Figure 1 with mixing of water from two ecosystems (the warm Agulhas Current and the cool Benguela Current). Further north into Namibia and Angola seasonal cold upwelling drives much of the ecosystem until southern Angola where warmer tropical water mixes with the Benguela in what is known as the Angola-Benguela Front (ABF). Fisheries in the region, in particular the small pelagic fisheries, can be highly variable as a result of changing dynamics, not least of which is the effect of climate change and the cyclical *Benguela Nino* (a cousin of the well-known *El Nino* of the Pacific). Combined with the impact of commercial fisheries, uncertainty around different stocks and species dynamics, we have a truly complex fisheries to manage.

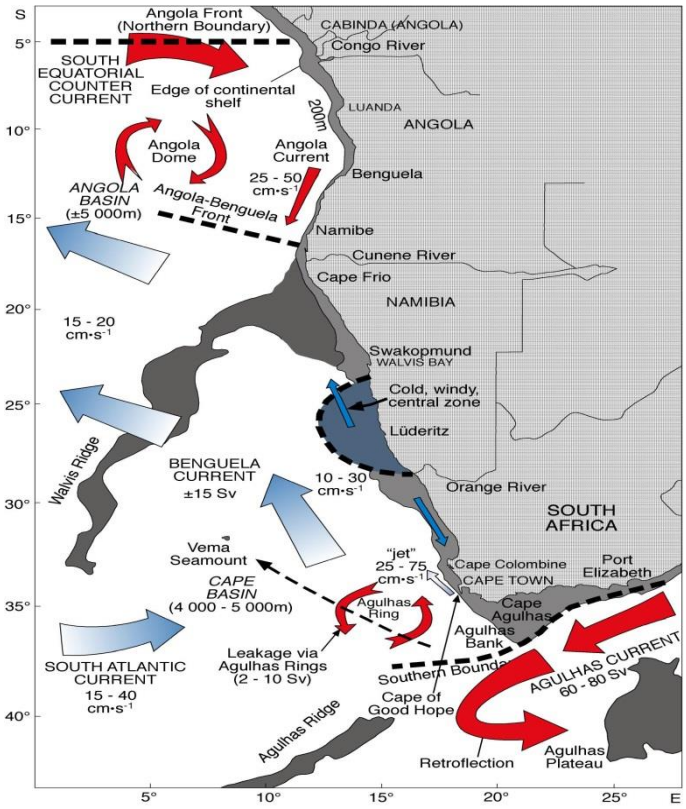

Figure 1. Overview of the main hydrographic features in the Benguela system extending from Angolan to Southern African waters.

Small Pelagic Fisheries are broadly defined as those species that are found either in midwater or near the surface of the sea. In the BCLME they are mostly exploited using purse seine gear. Because of the variable conditions in the region different species predominate. In Angola, two sardinella species occur and, in Namibia, historically sardine predominated and in South Africa a combination of anchovy and sardine. It is helpful to contextualise the small pelagic fishery in the region by showing the historical catches of small pelagic species in the BCLME as reported by the Food and Agricultural Organisation of the United Nations (FAO). In Figure 2 it can be seen that the combined catches of sardinella, sardine and anchovy reached a peak (1.5 million metric tonnes) in the mid to late 1960's, dropped dramatically in early 1980 and thereafter recovered somewhat, but remained at a modest level of no more than 500 000 mt.

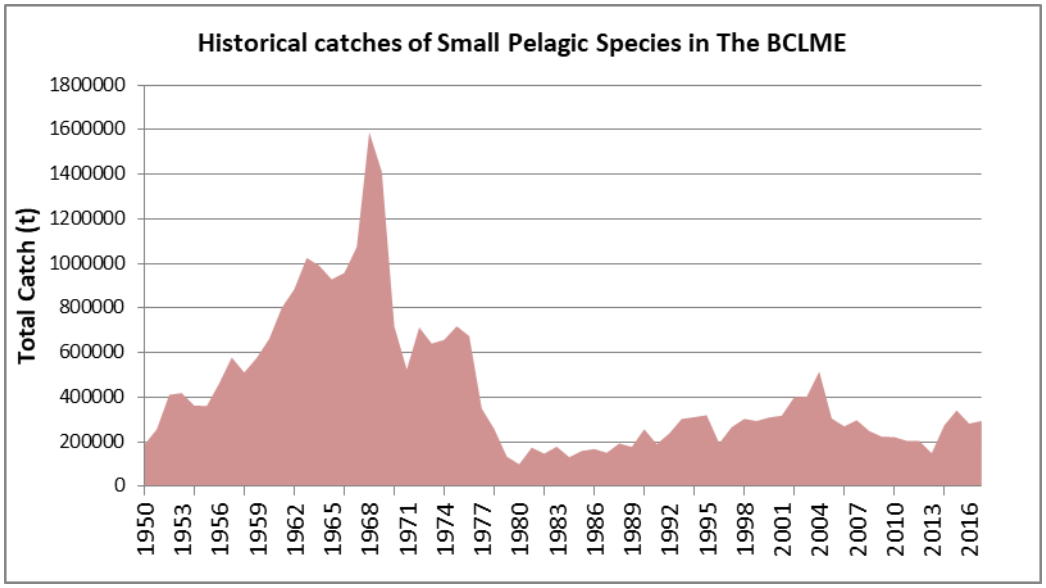

Figure 2. Historical catches of small pelagic fish in the BCLME (FAO, 2019).

The main cause of this dramatic decline was the collapse of the Namibia sardine (pilchard) in the 1960's and 70's. The small pelagic resource catch was largely dominated by South Africa with little or no Namibian catch and very modest catches of sardinella in Angola. From Namibian independence in the 1990, Namibian fishery managers and scientists tackled the recovery of their fisheries, including hake and sardine. Similarly, in Angola, the civil war created many problems, resulting in poor fishery management, over catching and poor data reporting.

Angolan Small Pelagic Fisheries

For the Angola report we include horse mackerel in the species grouping. Horse mackerel catches in Angola is split between two species, the Cunene horse mackerel and Cape horse mackerel with the latter being the species that makes up the South African and Namibian fisheries caught by mid-water trawl. The relative proportions of the main Angolan fisheries suggest that there is a near-equal proportion of commercial catch between the small pelagic fisheries and demersal trawl. With regard to stock status, most fisheries in Angola are considered heavily exploited, although there are signs that the small pelagic fisheries have stabilised in recent years. The Angolan fishery research institute (INIP) undertakes collaborative research with international partners providing biomass estimates such as those shown in Figure 3 below (as reported by the *Minsterio das pescas*, 2017).

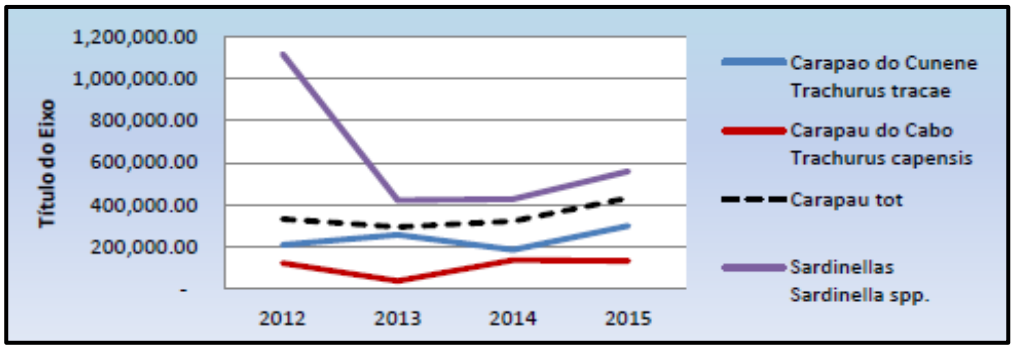

Figure 3. Most recently available biomass estimates provided by the Angolan Ministry of Fisheries (2017) showing the relative biomass estimates of Cunene and Cape horse mackerel as well as sardinella. (after ACOM, 2018. Estudos de marcado sobre o sectordos produtos da pesca na Repblica de Angola)

Artisanal fisheries make up a significant proportion of the small pelagic catches. Coastal communities catching horse mackerel range from south to north of Angola, however the main commercial sector is found in the southern provinces of Namibe and Benguela, where industrial companies operating out of Tombwa (Namibe) and Baie Farte (Benguela) and landing and processing sardinella and horse mackerel primarily for fishmeal and oil. Depending of fish availability the vessels range seasonally northwards to Luanda and the northern fishing zone, or southwards towards the Namibian border (Figure 4). Not all catch data for Angolan fisheries is available for 2018, although for Oceana Boa Pesca (OBP) alone, some 9 695 mt of sardinella was caught by five vessels operating out of Tombwa. This compares with their catches of 31 144 mt and 32 455 mt in 2016 and 2017 respectively. In recent years the industrial companies operating from both Tombua and Baie Farte in Namibe and Benguela provinces reported monthly landings of sardinella averaging 4000 t with a seasonal peak from October to December (Figure 4).

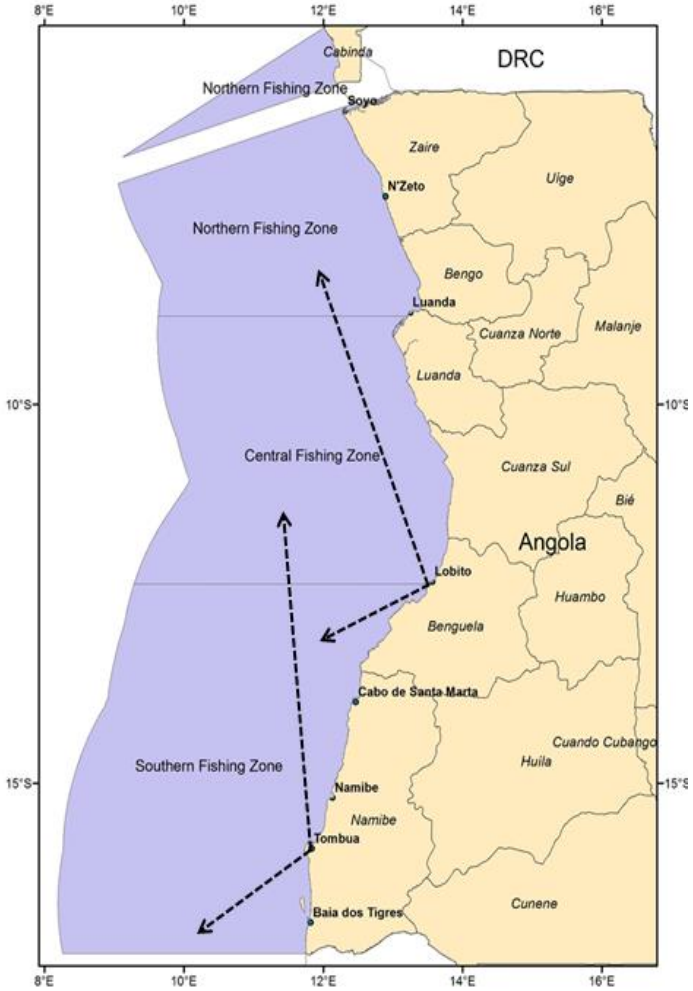

Figure 4. Location of Oceana operations in central and southern Angola showing approximate positions of the small pelagic fishery

The sharp decline in the availability of sardinella close to the Tombwa factory in the last quarter of 2018 that extended into 2019, has regrettably lead to the closing of the factory there. In a recent initiative, a scoping report undertaken of the operations indicated that the fishery was suitable to apply for acceptance into the *IFFO Responsible Supply Fisheries Improvers Programme*. The Ministry of Fisheries sets annual Total Allowable Catches (TACs) limiting commercial effort to a fixed number of semi-industrial and Industrial sized vessels.

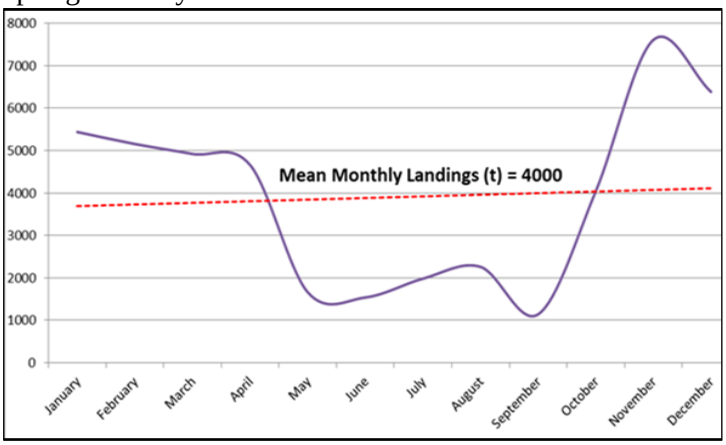

Figure 5. Mean monthly landings by industrial companies in Angola in recent years (pre 2019).

Namibia

The Namibian sardine stock (pilchard) was first targeted by the purse-seine industrial fishery after World War II. The industry grew rapidly during the 1960s, with a peak in 1968, when declared catches were 1.4 million tonnes. Actual catches were probably much higher as much of the sardine caught was used for fishmeal and the stock was also fished in southern Angola. The highest biomass of pilchard ever estimated was approximately 11 million mt in 1964, and during 1968, the industry caught roughly 1,5 million mt of pilchard (MFMR, 2014). Catches drastically declined over the years and the stock finally collapsed in the early 1970s and has never recovered fully. The biology of the sardine in Namibian waters is fairly well understood with spawning grounds off Walvis Bay and Cape Frio in the northern Benguela. The stock is believed to be different to that in the southern Benguela (South African waters mostly) with recruitment and migration occurring within Namibian waters (Figure 6 after Crawford et al. 1987).

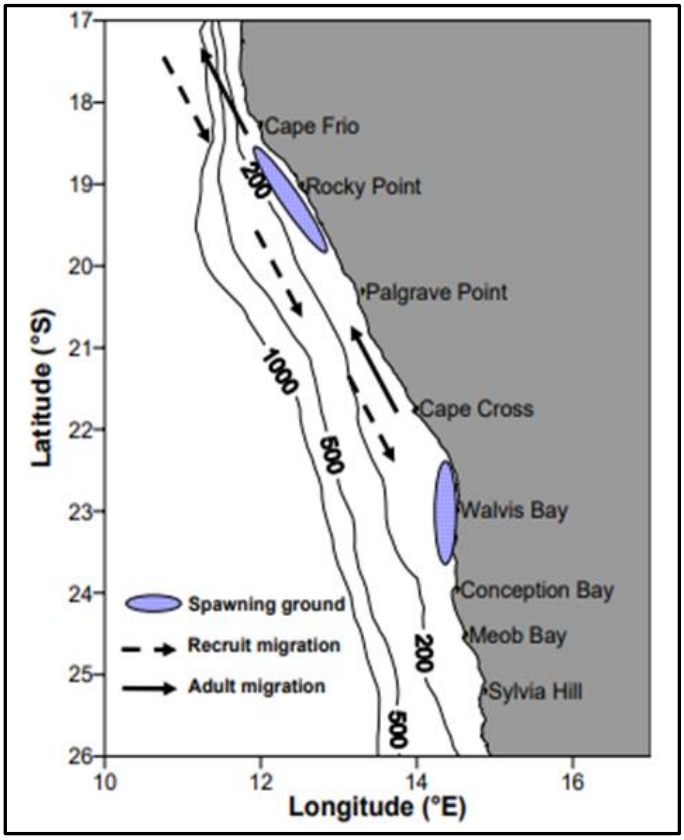

Figure 6. Schematic showing the spawning grounds and migration routes of Namibian sardine (after Crawford, 1987)

Nevertheless the Ministry of Fisheries and Marine Resources (MFMR) continues to monitor the stock on an annual basis and reassesses stock status. With two processing factories in Walvis Bay (one focusing on sardine canning and the other on horse mackerel), the Ministry is conscious of the need to maintain sardine processing as an important economic activity and source of livelihoods. The highest TAC since independence was 120 000mt in 1994, the lowest was 14 000mt in 2016 and has never been set above 40 000 mt annually since 1999. Catches of small pelagic species (purse seine only) in Namibia comprise of several species, including round herring, sardine and small amounts of sardinella (Figure 7). In 2016 however only 3400 mt of sardine was landed against a TAC of 14 000 mt. In 2017, a 14 000 mt TAC was again issued with the total catch of small pelagic species less than 50 000 mt in total, of which sardine was a small portion (see Figure 7 – these are FAO statistics as reported by Namibia).

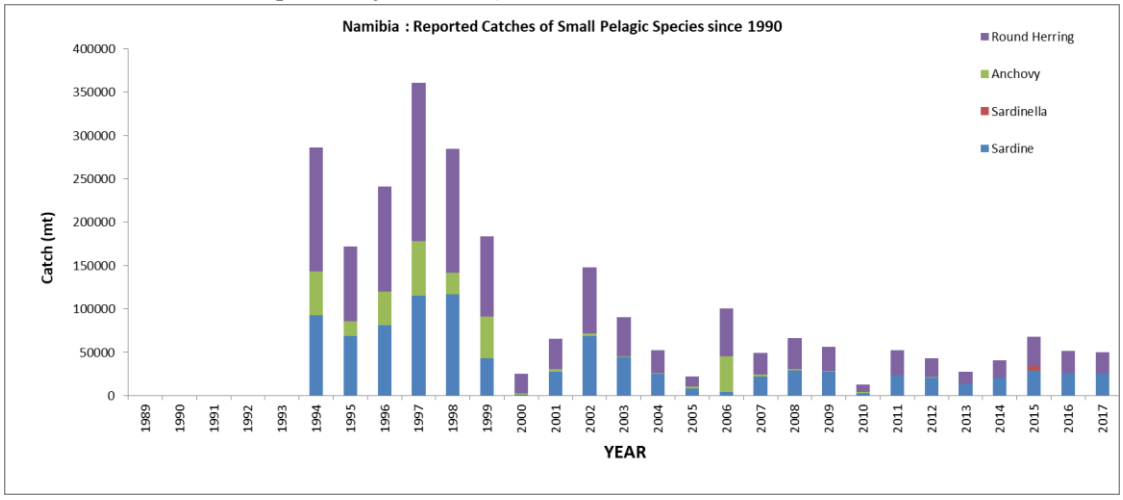

Figure 7. Catches of small pelagic species in the Namibian purse seine fishery (FAO statistics, 2019).

Aggregates statistics show that the small pelagic fishery ranges mostly around Walvis Bay and northwards (Figure 8) and is within 200 m depth contour. In Namibia, other forms of commercial fishing such as trawling are not permitted within the shore line and the 200 m depth contour and this forms part of the strategy to protect recruitment to the small pelagic fishery. Currently there is a moratorium on the issuing of small pelagic TACs in Namibia[1].

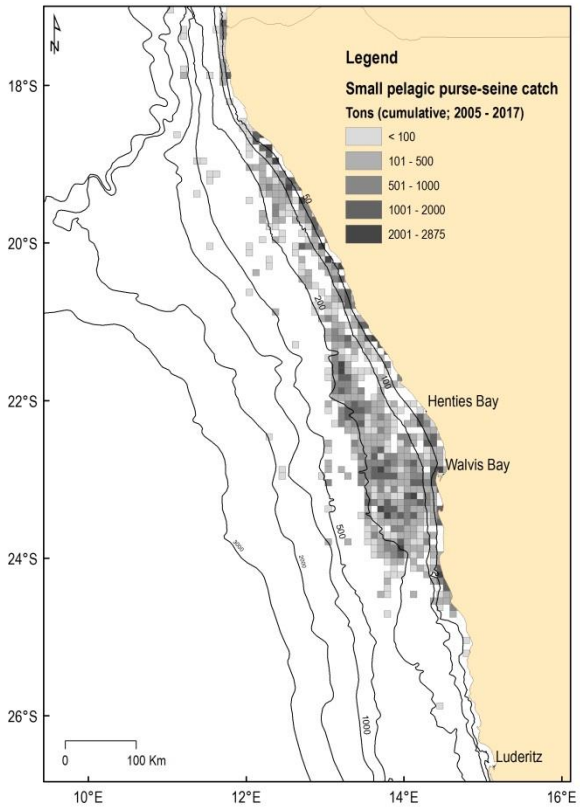

Figure 8. Spatial distribution of aggregated catches of the small pelagic fishery in Namibia between 2005-2017) (data provided by MFMR).

South African Small Pelagic Fisheries

Stock Status and Management

Research on small pelagic resources in South African waters persists under the ambit of the Department of Environment, Forestry and Fisheries (now "DEFF" formerly DAFF). There is ongoing concern regarding the poor status of the sardine stocks which has, since the high recruitment in 2002-2004 declined (Figure 9). The most recent biomass and recruitment surveys suggest that sardine biomass is now at levels comparative to the low levels seen in the 1980's.

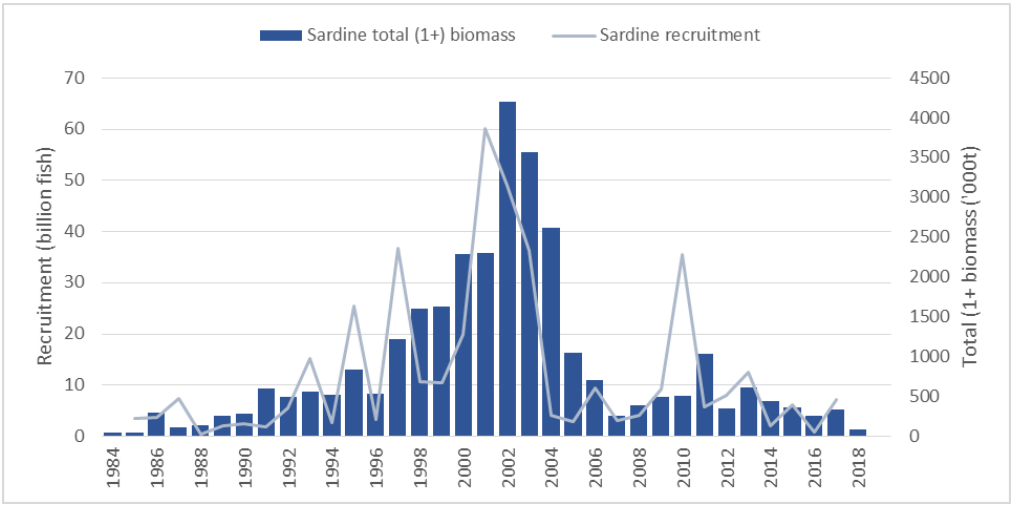

Figure 9: Time-series of acoustic survey estimates of total sardine biomass in October/November (bars) and recruitment in May/June (lines) since the start of the acoustic survey program. Note. December 2018 biomass = 91 000 t and August 2019 recruitment 3.54 billion fish (Coetzee pers comm.).

[1] References : (1) Pinku, N. 2016. Bioeconomic model for the pilchard (*Sardinops sagax*) species in Namibia. (MFMR). (2) Tjizoo, B.M. 2008. Characterising and comparing the spawning habitat of sardine *Sardinops sagax,* and anchovy *Engraulis encrasicolus*, in the northen Benguela region (MSc Thesis, UCT)

Scientific debate around the extent and number of sardine stocks continues, although the current understanding is that the South African sardine stock comprises a single "stock". This understanding assumes a reproductively isolated biological unit but with spatial structure within this stock comprising of multiple components i.e. a western component distributed off the West Coast, a southern component distributed off the South Coast from Cape Agulhas to Port Alfred, and an eastern component distributed off the South Coast (and which migrates eastwards annually).

Sardine stock assessments and management was a priority issue addressed by the International Workshop held annually at UCT by MARAM in November 2018. In their review for this workshop, Coetzee *et al.* (2018)[2] explain that "*shifts between predominantly West Coast-based and South Coast-based spawning have occurred frequently in the past"*. This inter annual variability is further reflected in the gradual expansion in the distribution of sardine towards the east that coincided with a period of rapid growth in the size of the sardine population from the mid-1990s to the early 2000s. This has of course had severe cost and logistical implications for the fishery and management as "*there is frequently a mismatch between the location of sardine availability and fish processing facilities as well as between fish abundance and fishing effort which is linked to some extent to the location of processing facilities*".

While there is obvious concern at the status of the sardine stocks, the most recent biomass surveys suggest anchovy is doing considerably better and is currently the primary species exploited by the fishery. This is reflected in Figure 10 showing the relative proportions the different species contribute to the fishery.

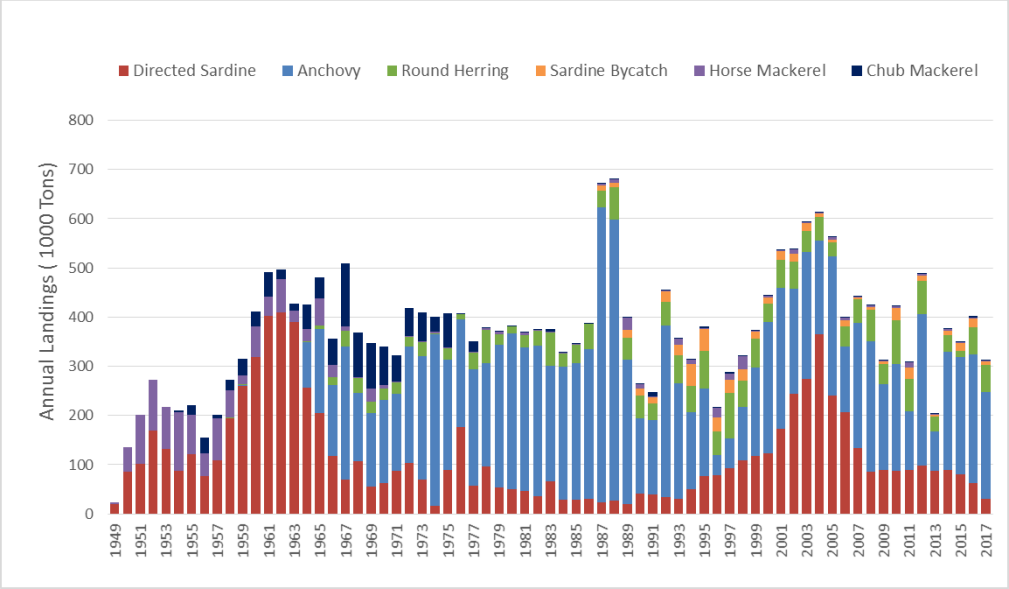

Figure 10. Historical time series of catches by species in the small pelagic fishery in South Africa.

Management Strategy

Management of the small pelagic fishery remains set on an agreed *Operational Management Procedure,* or OMP. In our previous report we described OMP-14 and that DEFF was in process of revising this to OMP-18. Decision-making on the fishery is a delicate balance of different factors, focused primarily on stock biomass and the results of two annual surveys (one for biomass and the second for recruitment). The options currently applied using OMP-18 are best shown in the Figure 11 below (referred to as a *Harvest Control Rule or HCR).*

[2] Coetzee, J.C. , C.L. de Moor and D.S. Butterworth, 2018. A summary of the South African sardine (and anchovy) fishery

The setting of a TAC is related to the biomass (for sardine in this example) which at three different points influences the allowable catch. At the high end, a biomass of 1.6 million tonnes or more results in a TAC of no more than 200 000 t, while at the opposite extreme, an extremely low biomass of < 200 000 t, triggers the setting of an *absolute minimum* allowed catch of 10 000 t.

The fishery in 2019 (for sardine) is currently at this point.

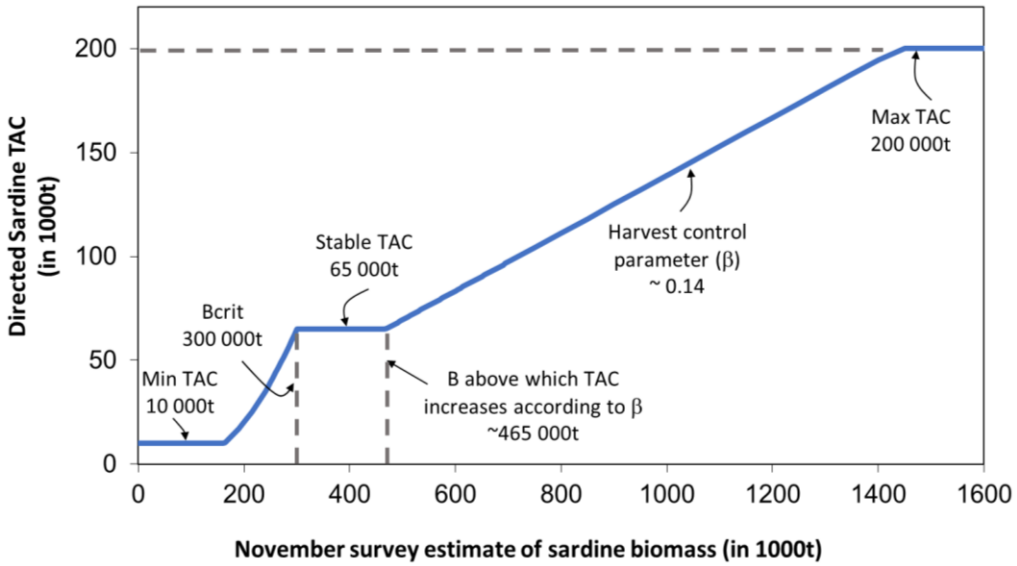

Figure 11. (after Coetzee *et al. 2018).* A schematic of the proposed OMP-18 sardine HCR. .

Fishery Performance and Allowable Catches in 2019

The recommended TAC and TABs are issued at the start of the fishing season in January each year. These are shown in Table 1. The end of year hydro acoustic biomass survey (December 2018) provided a critical basis for the TAC and TAB determination for 2019 (see the table below). The determined biomass for sardine (91 x 1000 t) was the lowest figure since 1985. The August 2019 sardine recruitment estimate was 3.54 billion fish. This is a continuation of particularly low recruitment figures since 2005 (Figure 9).

Table 1. Allocation of allowable catches issued by the Department of Agriculture Forestry and Fisheries for 2019 with mid-year revisions compared to 2018 catches.

	2019		2018
Species and Category Allocated	Recommended TAC's (t)	Revised TAC's (t)	Catch (t)
Directed >14cm sardine TAC:	0	12 250	35 609
Initial ≤14cm sardine TAB for directed >14cm sardine fishing:	500	250	156
Initial directed anchovy TAC:	347 860	350 000	253 046
Initial ≤14cm sardine TAB with directed anchovy fishing:	1 500	9 400	1 500
>14cm sardine TAB with directed redeye round herring and anchovy fishing:	1 000	1 000	1086
≤14cm sardine TAB with directed redeye round herring fishing:	100	100	74
Anchovy TAB for sardine only right holders:	500	500	3,3
Redeye round herring PUCL	100 000	100 000	47 922
Horse mackerel TAB	9 572	9 572	967
Lantern and Lightfish (Combined)	50 000	50 000	5 830

Current performance of the fishery, up to September 2019 is that the directed anchovy catches are on track to catch the 350 000 t allowable catch. For sardine, the extremely low allowable directed catch set at 12 250 t and permitted bycatch in anchovy directed fishing (9 400 t) is unlikely to be caught in full (Figure 12). Current performance of the fishery, up to September 2019 is that the directed anchovy catches have been slow and that the allocated TAC is unlikely to be caught. The main reason for this is the patchy availability of the fish. This mirrors the difficulty that the industry is experiencing in the anchovy fishery and we look forward to the November spawner biomass survey to possibly providing some answers.

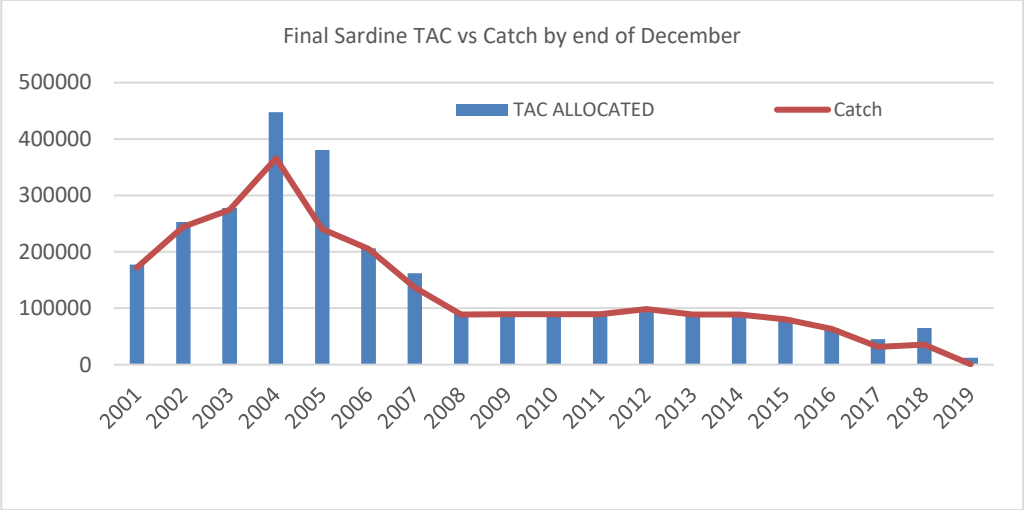

Figure 12. Historical catch performance of sardine relative to the TAC.

South African Small Pelagic Industry Association (SAPFIA)

SAPFIA continues to work closely with DEFF providing a positive interface between the fishing industry and DEFF. Due consideration is also given to the seriousness of the current state on the sardine, strengthening the need for a dedicated observer programme. The implementing agency, CapMarine works closely with SAPFIA and DEFF to monitor directed catches of anchovy and sardine, as well as other bycatch species providing valuable information on not only operational patterns, but also on catch size distributions, bycatch and other biological data that is used by DEFF scientists in the day to day management of the fishery (see Figure 13 showing some of the information from the observer programme as reported by CapMarine up to August 2019)[3].

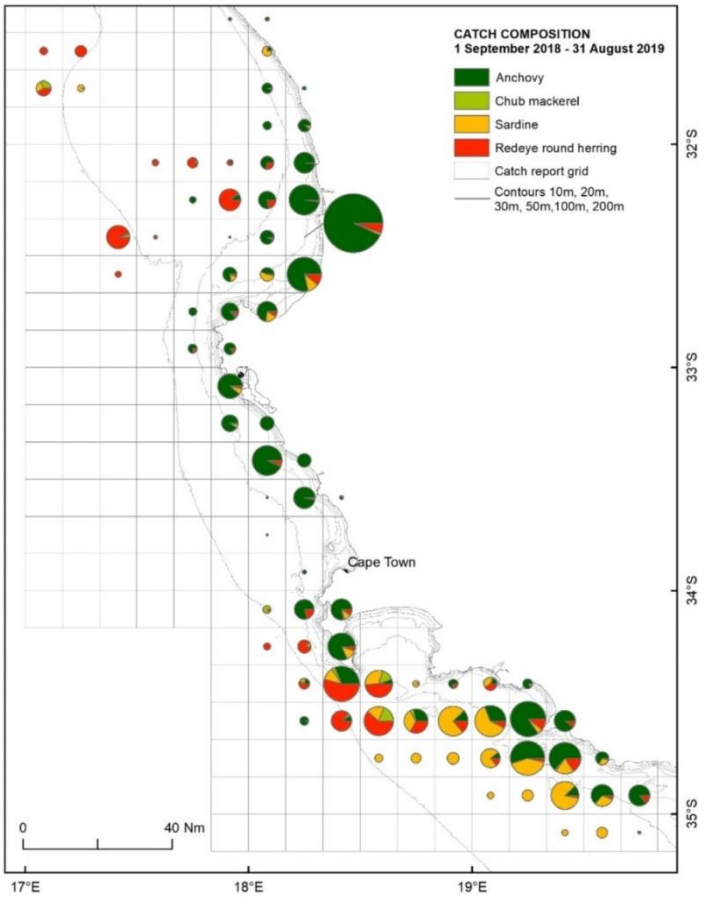

Figure 13. Spatial distribution (summarised by grid block) of species composition of observer samples raised to the estimated bag weight for 12 months (01 September 2018 to 31 August 2019.) (Augustyn, 2019).

[3] Augustyn, P. (2019). SAPFIA Scientific observer programme progress report, August 2018.