Oceana Sustainability Report 2022

Status and Management of

South African and Namibian Horse Mackerel

The South African horse mackerel

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State of the horse mackerel stock

The Cape horse mackerel (*Trachurus capensis*) is managed through a Total Allowable Catch (TAC). The TAC is determined based on survey (biomass) and commercial (CPUE) data, which is calculated using an Age-Structured Production Model (ASPM), and governed by the Operation Management Procedure (OMP). Current spawning biomass is estimated to be 69% of the pristine (unexploited) stock size. This is well above Maximum Sustainable Yield (MSY) and therefore the resource is in a very healthy position. The recent biomass estimates for the 2021 assessment was larger than those estimated by the previous 2020 assessment, which was likely driven mainly by the more optimistic recent *FV Desert Diamond* catch rates. Further noting that the most recent South Coast Autumn biomass survey result is also appreciably higher than previous surveys (.

Horse mackerel fisheries management

The OMP for horse mackerel is programmed to provide TAC recommendations for three fishing sectors: the midwater trawl fishery, a Precautionary Upper Catch Limit (PUCL) for the small pelagic purse seine fishery, and a fixed bycatch reserve in the demersal trawl fishery (Figure 1). The 2022 TAC for adult horse mackerel was set at 38 453 tonnes - a 6% (2 328 tonnes) increase from 2021. Of this, 27 670 tonnes were allocated to the mid water trawl fishery (same level as 2021), 10 783 tonnes to the bycatch reserve in the demersal hake trawl sector (increased from 2021), and the PUCL for juvenile horse mackerel catches in the purse seine fishery was maintained at the 2021 level of 12 000 tonnes (spread over three years). This means that the amount of horse mackerel bycatch “available” for any given year is 12 000 tonnes less the bycatch taken in the preceding years. This is to allow reasonable flexibility for the small pelagic industry to adapt to years when the high incidence of mixed-species shoals makes it very difficult for the pelagic fleet to avoid juvenile horse mackerel.

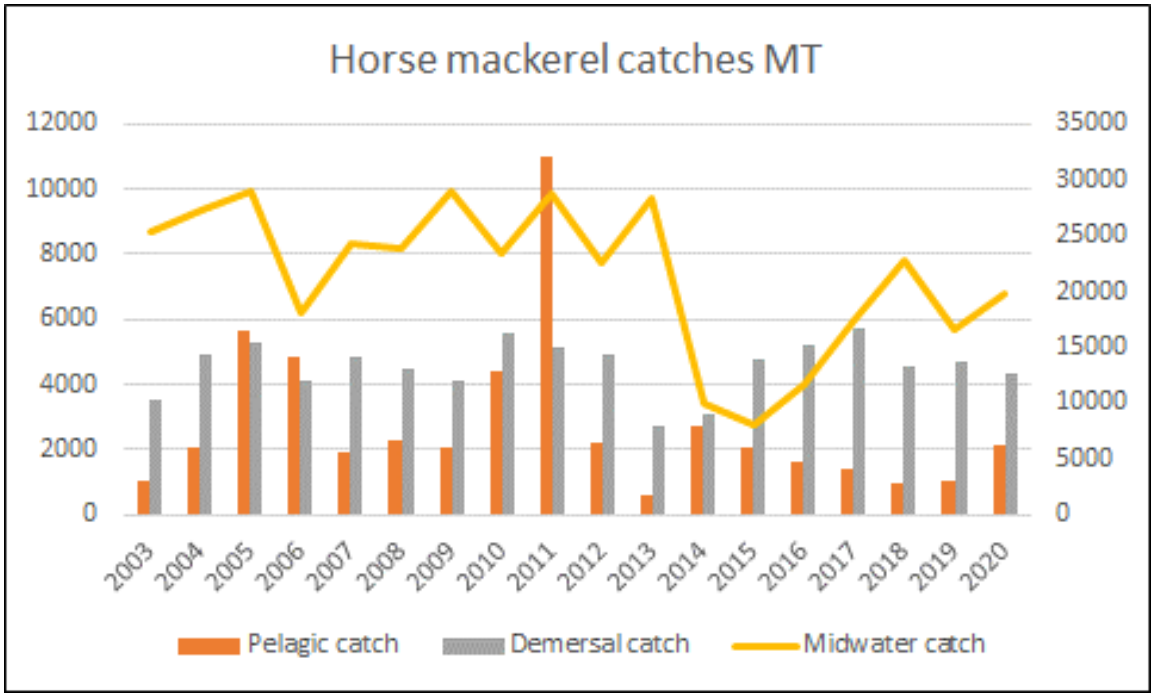

Figure 1 Horse mackerel commercial catches (tonnes) for the pelagic, demersal and midwater trawl fisheries

Catch rates (Catch Per Unit Effort - CPUE)

Figure 2 shows that the horse mackerel standardised CPUE was high in 2010 before dropping in 2015. Thereafter the catches showed a recovery, increasing again in 2018 with the highest peak in 2020 (Singh 2021). In 2015 the CPUE was very low and at the time, the reason for the continued decline from 2013 was unclear. It could have been either a drop in catchability or a reduction in abundance. Given the potential increased risk to the resource if the underlying reason was indeed a reduction in abundance, the Scientific Demersal Working Group invoked exceptional circumstances and management recommendations from 2016 onwards included an effort limitation in the midwater trawl fishery (Johnston & Butterworth, 2020) and a precautionary reduction in the PUCL to ensure that catches would not be excessive. It's possible that these management responses could have influenced the steady increase and recovery of horse mackerel in recent years, resulting further in the effort limitation being relaxed in 2022.

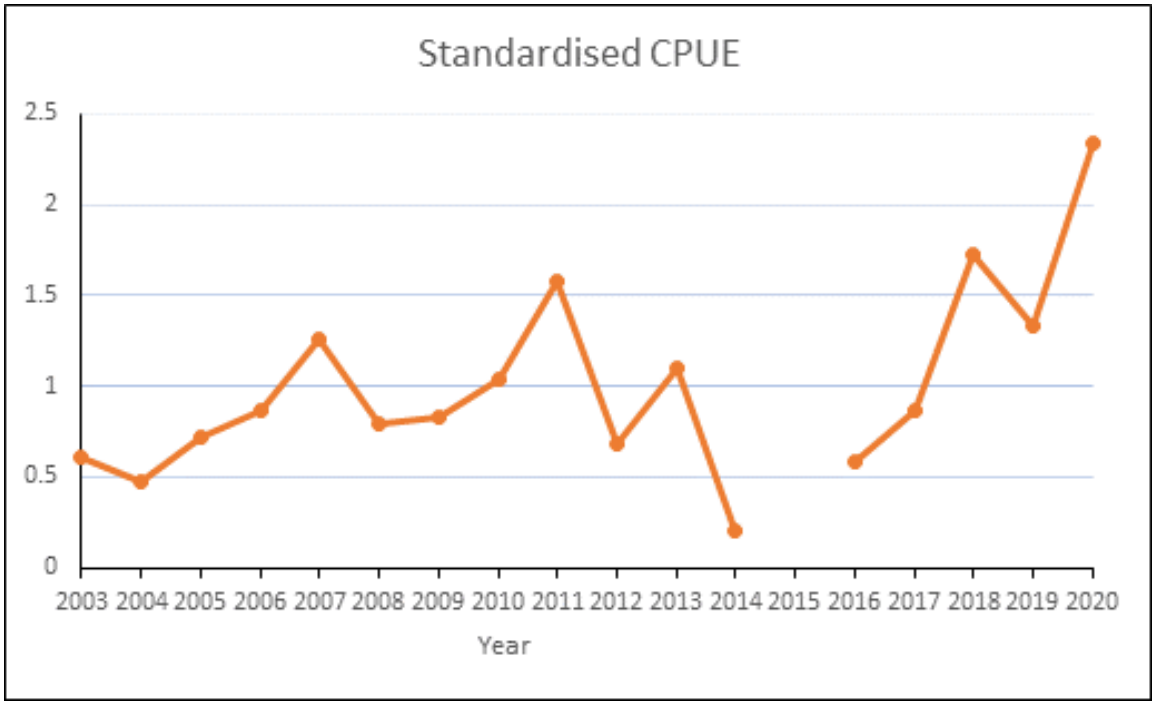

Figure 2. The standardized CPUE for horse mackerel excluding 2015. Catch and effort data for 2015 were not available as the two Desert Diamond trips in 2015 were not observed (Singh 2021).

Horse mackerel size structure

In this report, we look at the importance of size structure information in research and fisheries management. Size structure analysis is one of the most commonly used fisheries assessment tools. The size structure of a fish population at any point in time can be considered a snapshot that reflects the interactions of recruitment, growth, and mortality. Thus, length-frequency data (catch-at-length) provides valuable insight into the dynamics of fish populations and helps to identify problems such as inconsistent year-class strength, slow growth, or excessive mortality (. For the South African horse mackerel, the interpretation of size structure data is complemented by other population assessment tools, such as CPUE, age-and-growth analysis, recruitment analysis, and mortality.

Size structure data for the South African horse mackerel is routinely collected by industry when the product is size-graded, box frozen and packaged. Length frequency information is collected at drag level by scientific observers on the *FV Desert Diamond* as well as by researchers during biannual demersal research surveys in Spring and Autumn. These data are inputs in the OMP to help provide answers to questions, such as, does the size structure of horse mackerel populations change over time or differ between the coasts? Does the size structure change in response to a management action? Are the size structures different between two or more sampling gears? What environmental factors influence the size structure?

Figure 3 shows the percentage per size class in the *FV Desert Diamond* catches per year (industry data). Horse mackerel around 25 cm (total length TL) dominated the catches between 2009 and 2013 and again between 2020 - 2022. Larger fish (>30 cm) were more abundant between 2014 and 2019 whereas the smaller size class (18 - 20 cm) were mostly found in the catches in 2012/2013 and again

in 2021. Figure 4 shows the length frequency from the Autumn survey and a complete size structure showing the younger cohorts (<16 cm) (Johnston & Butterworth 2022). What is interesting about this figure is that in 2014 and 2015, the presence of 25+ cm and 30+ cm fish (i.e. the main targeted size class for the *FV Desert Diamond*) was almost non-existent and fish <25 cm dominated the survey catches during this time.

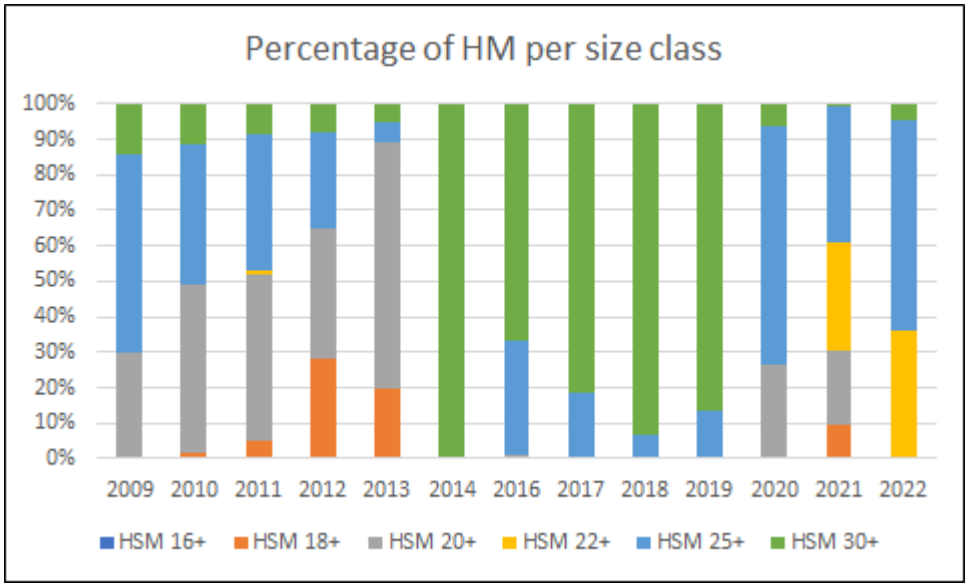

Figure 3. Size graded horse mackerel caught by the Desert Diamond plotted per year. Again 2015 data not available.

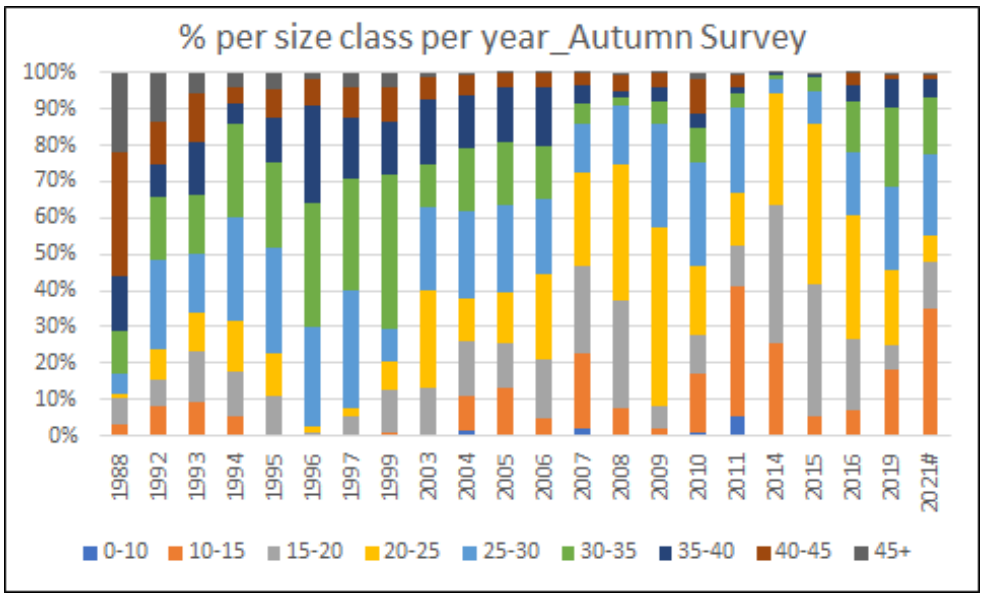

Figure 4. Autumn demersal survey catch-at-length for South African horse mackerel (shown as percentage of numbers each year). Johnston SJ and Butterworth DS (2022).

References

Johnston SJ and Butterworth DS (2022). Required horse mackerel data for the 2022 updated assessment and assessment plans. FISHERIES/2022/APR/SWG-DEM/.

Johnston SJ and Butterworth DS (2020). Recommendation of a TAE for the directed midwater trawl horse mackerel fishery for 2021. FISHERIES/2020/OCT/SWG-DEM/30

Singh L (2021). The 2021 updated horse mackerel standardized CPUE. FISHERIES/2021/OCT/SWG-DEM/13

The Namibian horse mackerel

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Spatial distribution

Off Namibia, horse mackerel *Trachurus capensis* are mostly found north of 24°S straddling the 200m depth contour (Figure 1). Adults generally occur in the north and juveniles closer inshore. Horse mackerel shoal in large numbers with a distinct diurnal vertical migration. They stay close to the seabed during the day (when they incidentally caught by bottom trawlers targeting hake and monk) and rise off the seabed at night where they disperse to feed mostly on zooplankton in the midwater. It is at these times that the adults are targeted by midwater trawlers.

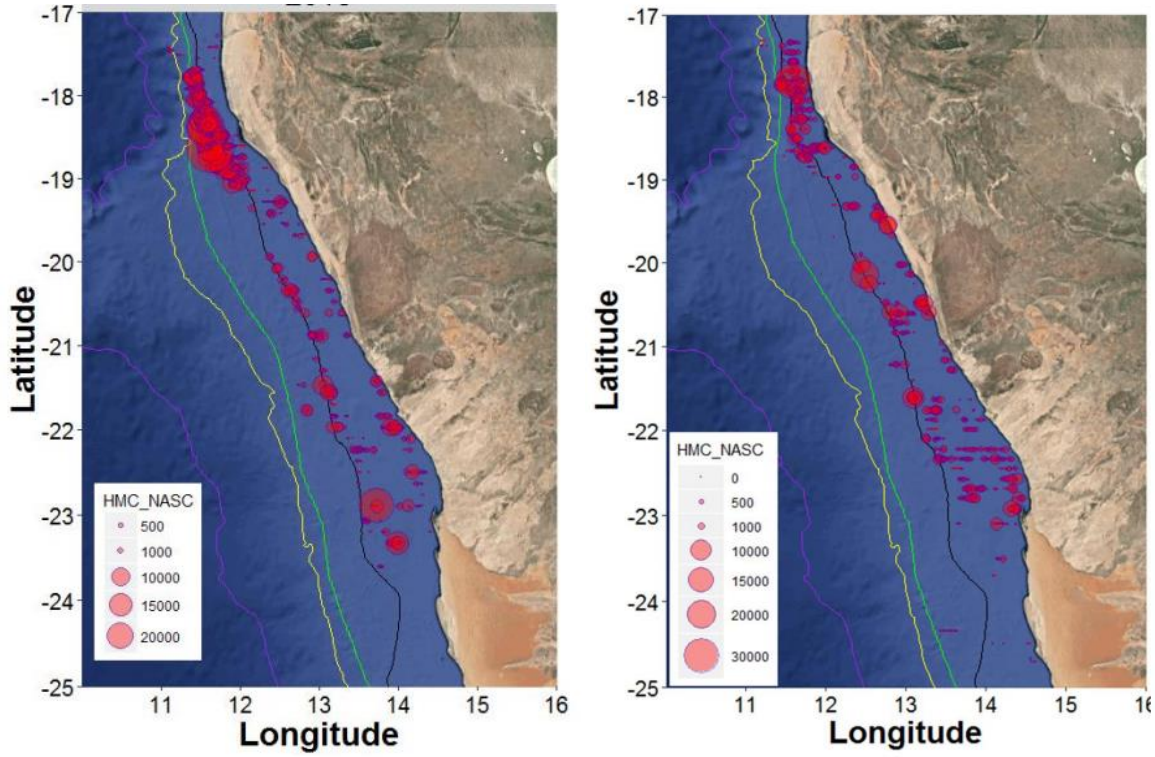

Figure 1. Spatial distribution of Namibia horse mackerel *Trachurus capensis* taken from acoustic surveys in 2018 (left) and 2019 (right).

The Namibian horse mackerel fishery

The horse mackerel fishery is the largest contributor by volume and second highest contributor by value to the Namibian fishing industry. The catch is either converted to fishmeal or sold as frozen, whole product with landings for the year 2006 valued at N$800 million. The stock is caught mainly by the mid-water trawl fishery (targeting adult horse mackerel), and more recently by a directed pelagic purse-seine fishery. The midwater fishery operates at night using trawl nets within the water column

above the sea floor to catch large schools of adult horse mackerel (Figure 2). The spatial distribution of the midwater trawl fishery is largely operational north of 21°S (Figure 3).

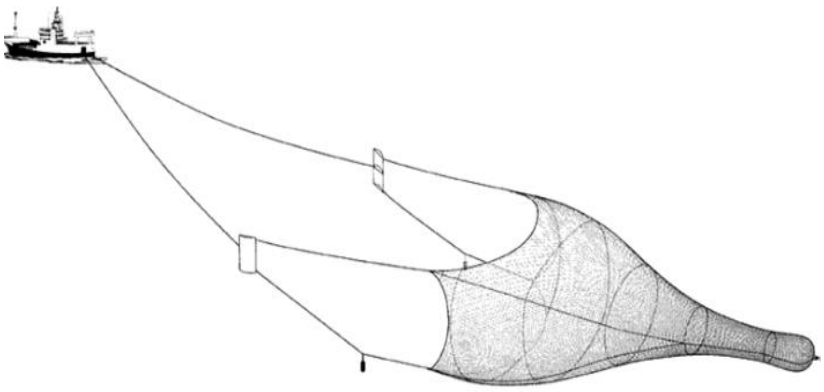

Figure 2. Typical midwater trawl configuration used by Namibian vessels targeting horse mackerel

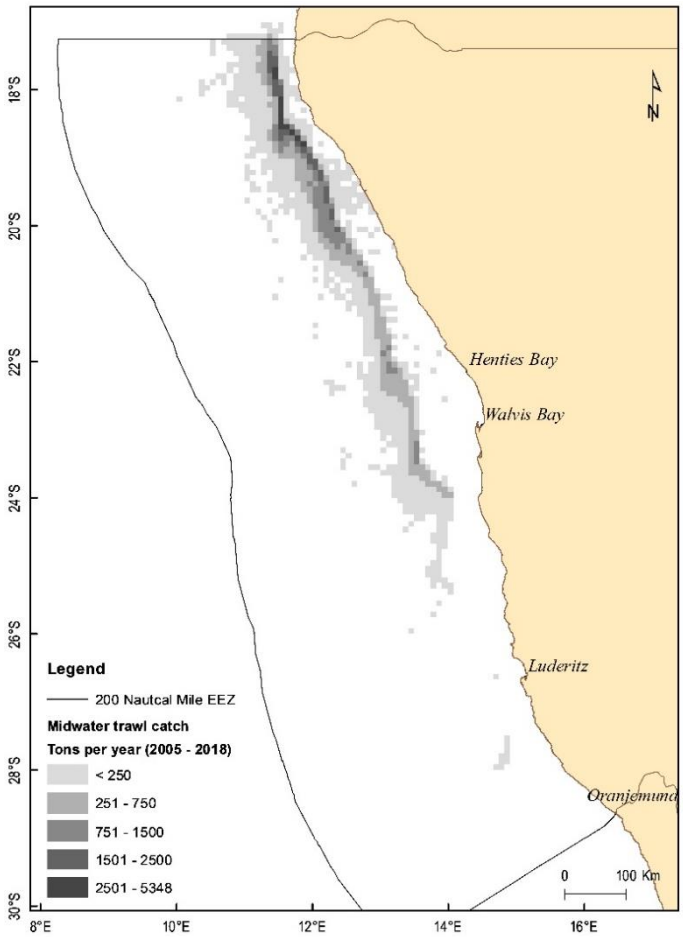

Figure 3. Distribution of midwater trawl catches in 2005 – 2018 in Namibia.

In 2019, a directed fishery for “wet”or fresh horse mackerel using purse seine gear was initiated. There is no long-term historical performance records for the fishery and therefore nothing to present in this report but the fishery currently consists of six active vessels. The targeted species are surface-shoaling and once a shoal has been located, the vessel will steam around it and encircle it with a large net, extending to depths of 60 to 90 m. Netting walls surround the aggregated fish, preventing them from

escaping by diving downwards. Once the shoal has been encircled the net is pursed and the fish pumped on board (Figure 4).

There also used to be a purse seine fishery that was based on the Namibian stock of Benguela sardine (*Sardinops sagax*), and small quantities of juvenile horse mackerel for fish meal production, but this fishery was discontinued in 2014.

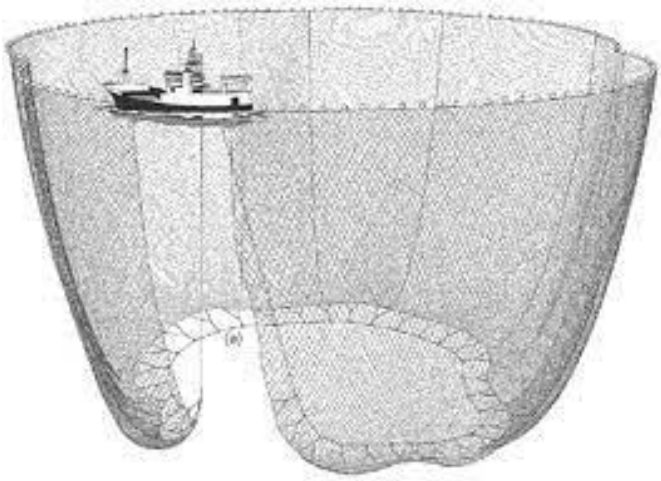

Figure 4. Configuration of a typical purse seine net used in Namibia

Environmental impacts

The environmental concerns associated with the Namibian horse mackerel fishery are mostly centred on the impacts on catches of large bycatch (seals, sharks, skates and rays etc.) and the impacts of reduced abundance of the target species. The midwater trawl nets are towed at a relatively high speed, which regularly entangle large marine fauna. Purse-seine fishing operations are however more selective, and this fishery tends to have a lower bycatch catch rate. As such, direct impacts on non-target species are not significant. Instead, concerns relating to this fishing sector are linked to the reduction in levels of the target species. Generally, small fish are an important link in marine food webs and reductions in their abundance can have negative impacts on ecosystem structure and functioning. Thus stringent management of both target and non-targeted species is imperative.

Management

The Namibian horse mackerel stock is managed through a Total Allowable Catch (TAC). Since 2002, the stock is assessed using a fleet-disaggregated Age-Structured Production Model (ASPM). This model incorporates biomass estimates from acoustic surveys, as well as commercial landings data (CPUE) for the different fleets. Horse mackerel biomass surveys are carried out annually, except in 2020 and 2021 when no surveys took place due to vessel problems. For these years the horse mackerel survey biomass estimate input into the model was replaced by four scenarios. The model that produced the best fit in three of the four scenarios, was used in further analysis. The current TAC for horse mackerel is 330 000 tons for 2021/22.

State of the stock

The Namibian horse mackerel stock continues to sit above the Maximum Sustainable Yield (MSY) and therefore maintains its "sustainable" status. Catch rates (CPUE) remain high, which means there is no evidence of any variability in stock dynamics and/or changes in the physical environment. The model estimated a 13% increase in the total biomass to 1,493,190 tons since the last assessment in September 2020 (MFMR, 2021). Current spawning biomass also increased by 13%. Recruitment decreased by about 19%, and it is below the long-term average. However, the recent harvest level is still below the replacement yield and hence considered sustainable (MFMR, 2021).

Size structure

Despite the apparent positive state of the stock, the size of fish landed by the midwater fishery has been declining over the last four decades and is currently at a mean of 24 cm (TL) indicating that fish are either maturing or just matured. This has been the trend for the past 5 years as compared to the years before the 1990's when mean lengths of over 29 cm were observed (Figure 5).

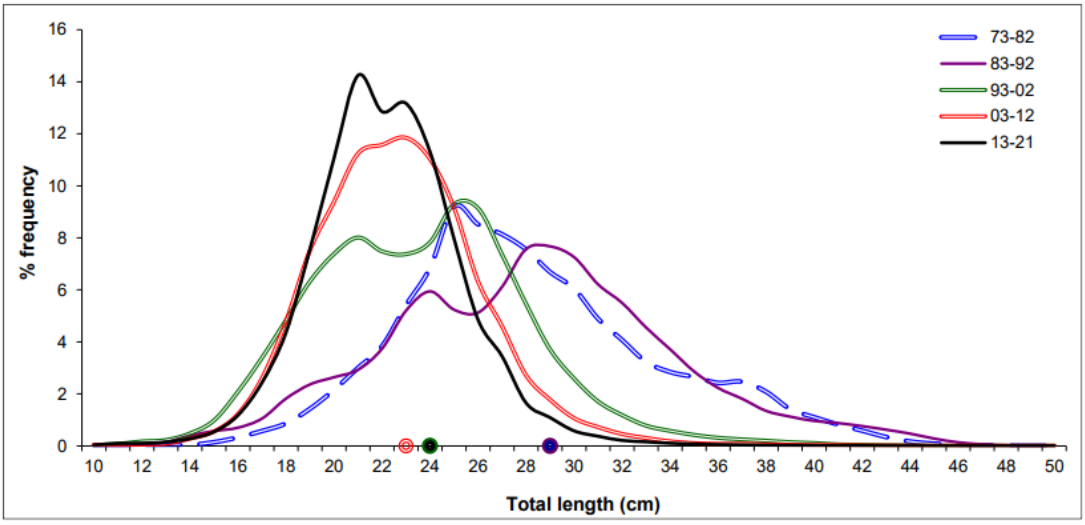

Figure 5. Length frequency distribution of horse mackerel in midwater catches made during the last four decades. The dots on the x-axis indicates the mean length for each series according to colour. MFMR, 2021

The size distribution of horse mackerel is generally made up of two prominent size groups, one of exclusively juvenile fish and the other consisting of a merger between juvenile and adult fish (Figure 6). The size group of exclusively juvenile fish constitutes the 0- and 1-year olds, while the merged size group is made up mainly of 2- and 3-year old fish, with the older fish waning off and becoming less and less prevalent during the surveys (MFMR, 2021).

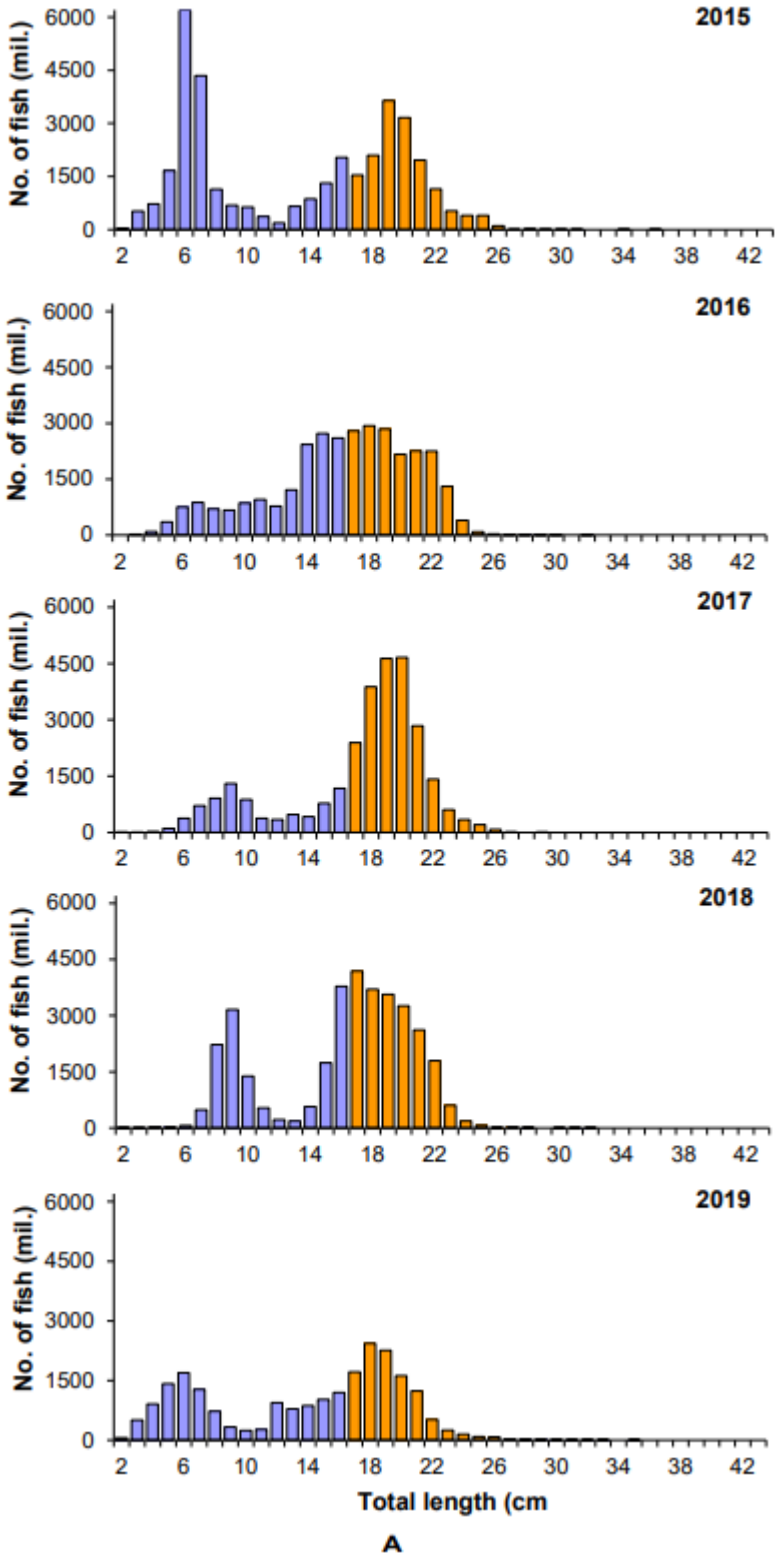

Figure 6. Length frequency distributions of horse mackerel caught during the R.V. Mirabilis surveys. Fish that are <17 cm and >17 cm are shown by colour. MFMR, 2021

MFMR, 2021. Annual State of Stocks report for Horse Mackerel for 2021 (information kindly provided by MFMR).