STATUS AND MANAGEMENT OF THE SOUTH AFRICAN AND NAMIBIAN HORSE MACKEREL FISHERY – 2018

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Distribution of catches

The midwater trawl fishery comprises a single large mid-water trawler (the *FV Desert Diamond*) that targets horse mackerel (*Trachurus capensis*) and a number of smaller hake trawlers carrying dual hake and horse mackerel rights (the “dual rights vessels”). The historical catch of horse mackerel is shown in Figure 1 (Fairweather and Singh, 2018). These data only reflect the recent effort in the fishery (since 2010). The *FV Desert Diamond* lands on average about 70% of the horse mackerel Total Allowable Catch, fishing in partnership with other rights holders in the midwater trawl sector. As the TAC is limited and the resource difficult to catch and process, this arrangement facilitates the efficient exploitation of the allowable catch. The use of a single vessel catching a large proportion of the allowable catch has other indirect benefits. It facilitates monitoring, including tracking of operations using satellite (vessel monitoring systems or VMS) and the deployment of scientific observers to record and collect bycatch.

![Figure 1](after Fairweather and Singh, 2018). Comparison of horse mackerel catch (tons) by the demersal fleet (blue) and the midwater fleet (red) to the time series used in 2017 (variously dashed).

Stock Status

The extensive record of the *Desert Diamond* allows for standardisation of fishing effort providing a key index of abundance used to assess the stock status of horse mackerel. An interesting aside to this is that historically, the best data available for the assessment of horse mackerel was provided by a few large Japanese midwater trawlers that were permitted to fish on the Agulhas Bank up to the mid 1980’s before this bilateral arrangement with Japan was terminated.

The 2017 update of the horse mackerel stock assessment incorporated additional data extending to the end of 2016. Uncertainty regarding the reasons for a continued reduction in availability/abundance (or catchability/natural mortality) remains, with the available data being uninformative on this aspect. The analyses consequently adopted the same approach as used previously, with a suite of model variants that incorporated various assumptions regarding the underlying cause of the low CPUE in recent years. With the inclusion of additional CPUE data from the dual rights vessels the model yielded slightly more optimistic estimates of current biomass (Figure 2). However, the results
were broadly similar to those previously reported, with the “Catchability” models estimating current resource status at about 62% of pre-exploitation spawning biomass, whereas the “Mortality” variant yielded an estimate of about 24%.

Figure 1. Spawning biomass trajectories estimated by the 2017 assessment models. Source: Daff 2017

Spatial Management Measures
There are numerous measures in place for the management of the fishery. The operations of the vessel are subjected to strict spatial restrictions, most of which originated from the management of the foreign vessels in the past. This included the restrictions of these vessels to east of 20° E, to fishing no deeper than 110 m and no closer than 20 nm from the coast. In combination this spatial management regime was known as the “Foreign Triangle”. The current spatial measures applied to the midwater fishery have therefore not changed much, although there is now greater emphasis on both the fish bycatch as well as “large bycatch”. An extension of this area has been permitted in recent years to allow fishing further west to a line due west of Cape Point (34° 20’ S) (Figure 3).

The semi-pelagic and shoaling nature of the Cape horse mackerel throughout the water column brings this species into contact with three different fishing sectors; the near surface small pelagic purse seine fishery that catches juveniles as incidental bycatch, the mid-water trawl fishery that targets adult fish predominantly on the south coast, and the demersal hake trawlers that catch adult horse mackerel also as a bycatch on both the west and south coasts (Figure 3). The dynamics of these different fishery sectors that includes different gear types, variable seasonal effects and targeting of species other than horse mackerel, makes management of horse mackerel complex. These dynamics also impact the stock assessment of horse mackerel making the use of reliable independent (research biomass estimates) and dependent (fishery) abundance indices challenging. It is for this reason that stakeholder cooperation and co-management of this valuable resource plays an important role in the overall management of this species.

Scientists believe that the West Coast is the main recruiting area for horse mackerel. The abundance of adult stock on the West Coast is significantly lower than on the South Coast (eastern Agulhas Bank area) where a healthy adult spawning biomass is found. For this reason resource managers only permit targeted exploitation of the adult stock on South Africa’s south coast. It is thought that the juveniles
found on the west coast, some of which are caught in the beginning of the year by the anchovy and pilchard-directed (purse seine) vessels, provide the recruitment for the ‘adult’ fishery on the south coast. Further, the inshore grounds and bays on the south coast are also thought to be nursery areas for the adult stock. Management of the fishery therefore applies a very simple strategy – manage the catching of juvenile horse mackerel on the West Coast by limiting catches in the purse seine fisheries in order to sustain recruitment to the adult population on the South Coast which is the target area of the horse mackerel-directed fisheries.

Figure 3. Distribution of horse mackerel catches taken by the different fishery sectors: directed midwater trawl fishery, demersal trawl fishery and small pelagic purse seine fishery.

Management recommendations
As with other commercial fisheries in South Africa, the management of horse mackerel is based on an Operational Management Procedure (Furman, 2016) in conjunction with the updated catch rate time series (CPUE). The Horse Mackerel TAC recommendation for the midwater sector is therefore derived from this procedure, which for the 2018 season was set at 31 477 tonnes (a 13% reduction from 2017). A portion of this (25 500 t) was allocated to directed mid-water trawling and the balance (5 977 t) set aside as a by-catch reserve in the hake trawl sectors. The Precautionary Upper Catch Limit (PUCL) applied to juvenile horse mackerel catches in the purse seine fishery for small pelagic species was maintained at the 2017 level of 12 000 tonnes (spread over three years) (Figure 3).
Namibian Horse Mackerel
Compared to South Africa, the Namibian midwater fishery for horse mackerel is significantly larger. While in South Africa horse mackerel comprises of a single species extending from the southern Benguela ecosystem into the Agulhas ecosystem on the south coast of South Africa, the Namibian fishery is found only in the northern Benguela extending from about Walvis Bay northwards into to Angola. The dominant species caught in Namibian waters is also *T. capensis*, with occasional intrusions of a second species (*T. trecea*) from southern Angola (associated with a warm water frontal system known as the Angola Benguela Front or ABF).

The TAC in Namibia is significantly larger than in South Africa, and along with Hake, is one of the most important fisheries for Namibia, contributing significantly economically. According to the 2017 State of Stocks report submitted to the Ministry of Fisheries and Marine Resources (MFMR) the horse mackerel biomass in 2017 was 1.45 million tonnes, a level considered above Maximum Sustainable Yield (MSY). Put in perspective, the biomass was at its highest in 1961 (3.2 million tonnes), declining to about 1 million tonnes at independence and increasing slowly under Namibian management since independence to the current level (Figure 4).

![Figure 4. Historical estimates of horse mackerel biomass in Namibian waters since 1961 (State of Stocks report, 2017).](image)

Like the hake fishery, these biomass estimates have had to be carefully constructed from historical catches pre-independence, at a time when many international countries were fishing in Namibian waters (the old South West Africa).

Namibian Research on Horse Mackerel
Because horse mackerel is such an important fishery, Namibia undertakes dedicated surveys of horse mackerel using well known scientific methodology. Annual surveys undertaken using the research vessel RV Mirabilis, include acoustic estimates of the stock, length frequency analysis and many other biological characteristics such as age and growth and sex ratios. The distribution and estimated abundance of horse mackerel from the 2017 survey is shown in Figure 5 below. (after Uanivi et. al. 2017). Although the stock extends almost as far as 25°S, the main biomass is found in the north near the Angolan border, and it is here where commercial, operations are concentrated.

![Figure 5. Distribution and abundance of horse mackerel in Namibian waters as determined by the 2017 biomass survey undertaken by MFMR scientists.](image)

**Management and TACs**

Namibia strictly controls fishing effort in the mid-water trawl sector, limiting the number of industrial trawlers permitted to fish horse mackerel. Based on the catch rates of the fleet and the independently-determined spawning biomass ratios, a simple graph demonstrates the stock status. Currently, the stock is estimated to be in the “sustainable” zone, above MSY and safely in the zone of “under-exploited” (Figure 6). The current TAC level of 350 000 t is therefore expected to be sustained in 2019.
Figure 6. Schematic showing the management indicators used to determine stock status of horse mackerel in Namibia. The resource is currently considered to be in the “sustainable” zone.

References

Daff 2017. Recommendations of the demersal scientific working group for the sustainable management of horse mackerel for the 2018 season.

Fairweather, T and L. Singh. 2018. Total horse mackerel catch by various fleets and dual-rights nominal horse mackerel CPUE – updated time series. FISHERIES/2018/OCT/SWG-DEM/52 (Note. This figure is taken from the ongoing assessments of horse mackerel and is presented here as indicative only of the proportions taken by each fishery sector).

Furman Furman OMP for 2017 – see FISHERIES/2016/OCT/SWG-DEM/66)

MFMR, 2017. Horse Mackerel state of stocks report.
