



Oceana Sustainability Report 2021

Status and Management of

South African and Namibian Horse Mackerel



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Horse Mackerel

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The Namibian Horse Mackerel

For this year's report we highlight the ecological, social and economic importance of the Namibian horse mackerel fishery.

The Namibian horse mackerel (*Trachurus capensis*) stock ranges from Southern Angola in the north (016°S), throughout the Namibian coastline to the border with South Africa in the south (Figure 1 Left). The exchange of horse mackerel between the Namibian and South African stocks is not known and for this reason the horse mackerel stocks are managed separately. Juvenile fish are found mainly inshore of the 200 m isobath and adults mainly offshore. The mean size increases southwards with largest fish (>35 cm) caught south of the Lüderitz upwelling cell. The biomass in this area however is low and there is very little fishing on this part of the stock. The main concentration of fish is found in the north from around 17°00'S -20°00'S, which is also where the main fishing pressure is (Figure 1 Right).

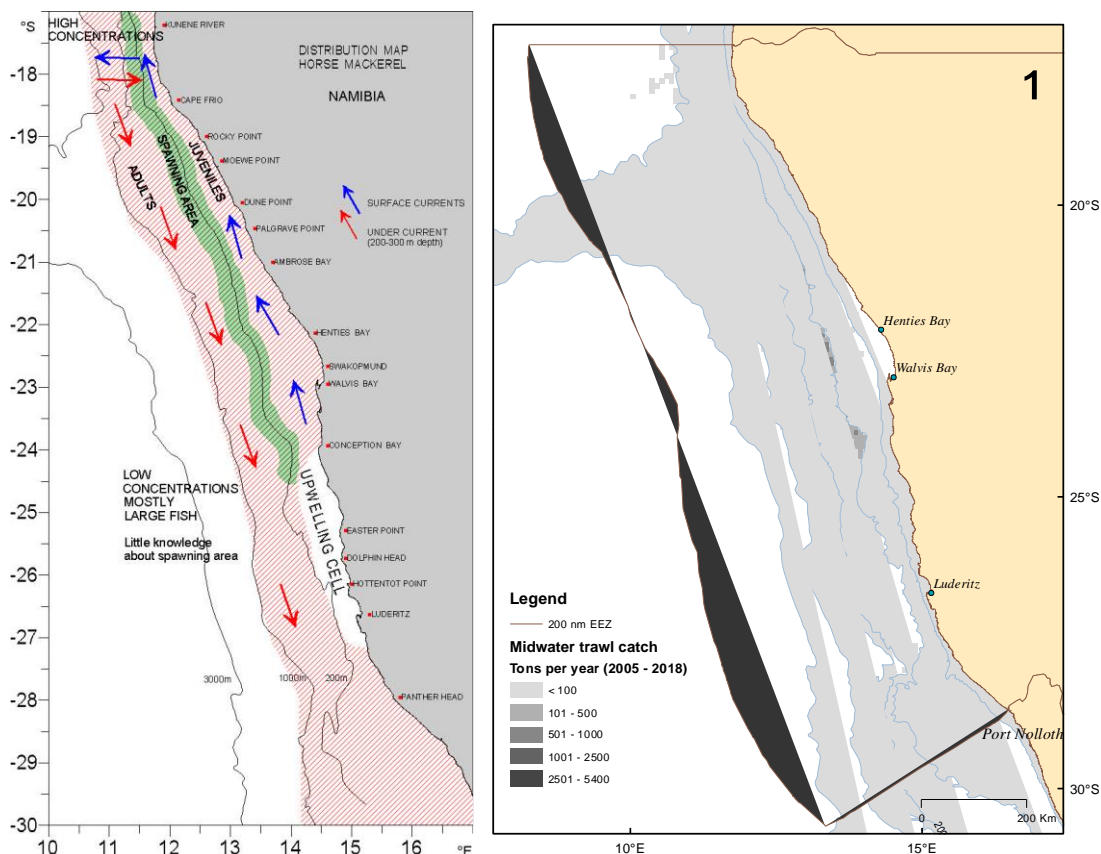


Figure 1 Left. Distribution of horse mackerel in Namibian waters. Location of the upwelling cell, the marine protected area (in white) and the spawning grounds have also been shown. Right. Spatial distribution of midwater trawl catches from 2005 – 2018.

Ecological Importance and Food Security

Namibia's marine ecosystem falls within the Benguela system, an eastern boundary current upwelling system in the south-eastern Atlantic Ocean between 34°S and 15°S, from the South African-Namibian boundary northwards to the Namibia-Angola boundary. The principal upwelling centre is situated offshore of the Lüderitz area in southern Namibia and the marine protected area along the southern Namibian coast and adjacent islands is associated with this upwelling area (Figure 1 Left). The upwelling of cold, nutrient rich waters from around 200–300 m depth results in high rates of phytoplankton growth that sustains the Benguela ecosystem. The system supports a rich fish stock of horse mackerel, which in turn supports a large biomass of larger fish, sharks, sea birds and marine mammals. Low trophic level species play a critical role in their wider ecosystem. For example, when sardine populations collapsed (due to a combination of overfishing, ecosystem change and variability in the Benguela upwelling system) the multitude of predators that previously depended on sardine switched to feed on the horse mackerel.

Marine fishes are high in protein and omega-3 fatty acids and contributes significantly to a nutritious diet and healthy human lifestyle. Low trophic level species such as horse mackerel also play a significant role in food security, particularly in developing world countries, and are harvested by some of the world's largest fisheries.

Importance of the Namibian Horse Mackerel Fishery

The horse mackerel fishery is the largest contributor by volume (tonnes) and second highest contributor by value (dollars) to the Namibian fishing industry. Horse mackerel is either converted to fishmeal or sold as frozen, whole product. The processing of horse mackerel has fast become an emerging employment creator, as value added products through on-shore fish processing are a key strategy for revenue and increased job creation.

Two fisheries exploit the horse mackerel stock; the mid-water trawl fishery (targeting adult horse mackerel) and pelagic purse-seine fishery (smaller quantities of juvenile horse mackerel), and the Total Allowable Catch (TAC) for both fisheries was set at 350 000 tons in 2020.

The midwater trawl fishery started in 1961. The catches increased during the 1970s and reached a peak in 1982 with more than 600 000 tonnes landed. Since Independence in 1990, annual landings averaged 300 000 tons, of which the midwater fishery landed approximately 80%. Approximately, 67 rights-holders were registered in the mid-water trawl fishery, with the duration of rights ranging from seven to 15 years. However, with the reallocation of fishing rights earlier this year this has probably changed. Due to the decline in the availability of sardine in the early 1970s, the purse seine fishery began to target horse mackerel in 1971. In 1990 the fleet consisted of 38 boats but has declined drastically since then. This is mainly due to the low biomass of sardine the last few years.

Monitoring of the Stock

The stock is monitored using catch data from both the purse seine and midwater trawl sectors. Both sectors record in official logbooks the catch and effort per haul and together with the species composition and length frequency data recorded by the shore side monitoring (purse seine) and the onboard scientific observers (midwater trawl) managers are provided with real time information. The mean length of fish has on average been 16cm for the purse seines and 24cm for the midwater trawlers the last few years.

Added to this, biomass acoustic assessment surveys are conducted in January-February each year by NATMIRC. The survey area is from around 24°00'S - 17°15'S and comprises of an offshore coverage starting in the south and an inshore coverage. The offshore coverage covers the area from 200m isobath to end of fish distribution, or at least more than 500m bottom depth. The inshore coverage covers the area from 200m to 20m bottom depth. The survey area is divided into strata with parallel transects to reduce the variance inside each strata. Acoustic data, biological data, length frequencies are also collected routinely during these surveys.

Assessment and Management

The catch statistics and the abundance data from the acoustic biomass surveys go in to two assessment models. An age-based population model and an acoustic biomass estimate model. Both of which have their problems, but in general correspond well with each other and gives a representative picture of the state of the horse mackerel stock.

A number of restrictions apply to the fleets. Both fleets are allowed to fish all year round but are restricted to fishing waters outside of the 200 isobath. A minimum cod end mesh of 60mm is allowed for the midwater fleet (50% retention rate of around 23.5cm) and 12.5mm for the purse seine fleet. Additional restrictions for the midwater trawl fleet are a bycatch restriction for hake and sardine and managed by applying move on rules if a catch comprise of more than 5% hake or sardine per haul. Both fleets have size restrictions, the vessels are to leave the area if a catch comprise of more than 5% horse mackerel less than 17cm per haul (midwater fleet), or 5% horse mackerel less than 12.5cm per haul (purse seine fleet).

State of the Horse Mackerel Stock in 2020

The total biomass in 2020 was calculated to be 1.4 million tonnes. The recruitment is known to be variable and a proper recruitment index is still to be developed. The long-term exploitation level is calculated to be 35%, and the stock is considered to be in a robust state. The 2019 assessment estimated an 11% decrease in the total biomass relative to the last assessment in September 2018 (Figure 2). In Figure 2 the biomass trend (solid black line) shows a steady decline in biomass from 1961 to 1971 but the 95% confidence interval (grey shading) is wider. In contrast, between 1982 and the present, the biomass is lower but the confidence interval is much narrower.

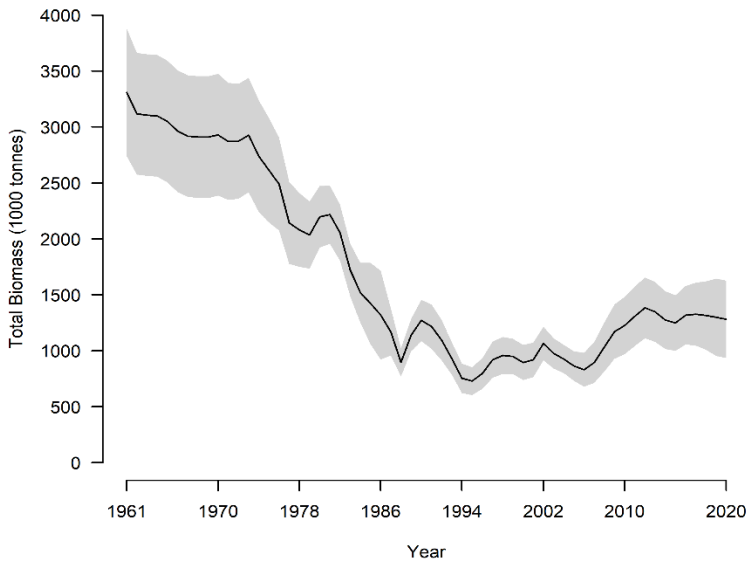


Figure 2. Total biomass estimates from 1961 – 2020 for the Namibian horse mackerel

Status of the Stock

When assessing the state of the horse mackerel stocks in Namibia, scientists must contend with the current year on year variability in biomass estimates as well as the current and historical performance of the fishery. The current model used in Namibia is based on reference points and limits levels which management responds to as the fishery is monitored. The Maximum Sustainable Yield (MSY) of the spawner biomass is the benchmark reference point used and is demonstrated in Figure 3 where the current spawner biomass as a proportion of the spawner biomass at MSY level is calibrated against the potential yield (this information is taken from the 2020 state of stocks review for the fishery). The 2020 level shown in Figure 4 suggests that the stock is in the “sustainable” zone.

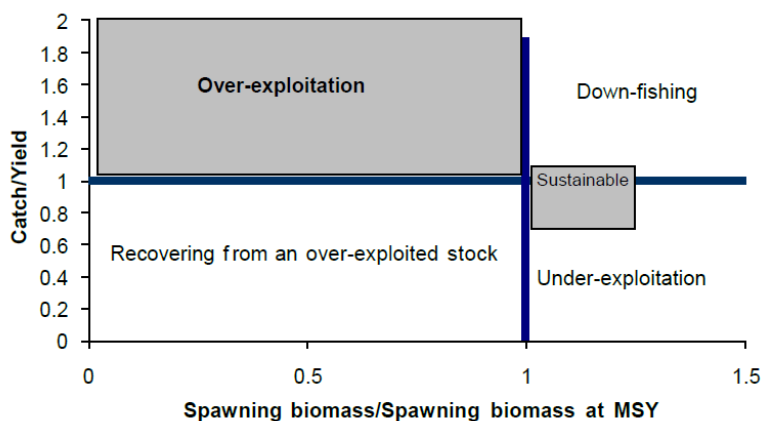


Figure 3. Management monitor graph, indicating the various stock status and management zones.

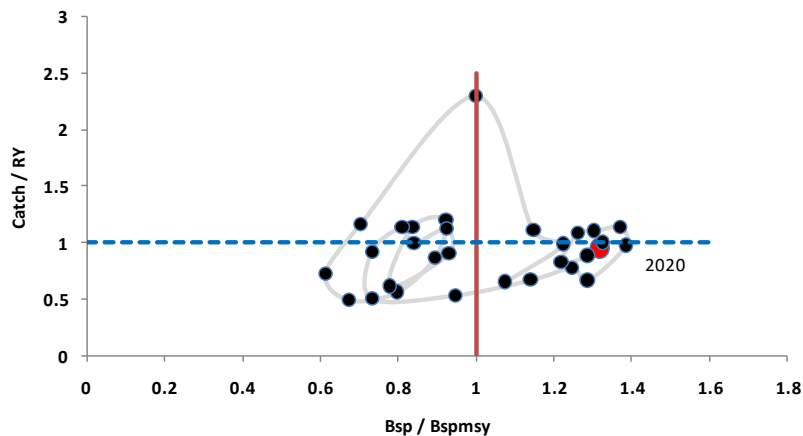


Figure 4. Management and status of resource for base case model from 1990 to 2020.

Cape Horse Mackerel in South Africa

Stock Distribution and Biology

Horse mackerel (*Trachurus capensis*) is a semi-pelagic shoaling species that extends from the continental shelf along the South African Wild Coast in the east and into the Benguela ecosystem as far as southern Angola. In South Africa the adult fish (>17 cm) aggregate on the Agulhas Bank, near the continental shelf edge, where they are targeted by the main commercial fisheries, whereas juveniles (< 17cm) occur inshore. Horse mackerel shoal in large numbers with a distinct diurnal vertical migration. They stay close to the seabed during the day (when they are targeted by bottom trawlers) and rise off the seabed at night where they disperse to feed mostly on plankton in the midwater. It is at these times that the adults are targeted by midwater trawlers.

Status of the Stock

Cape horse mackerel are managed through a Total Allowable Catch (TAC). The TAC is determined based on survey (biomass) and commercial (catch-per-unit-effort) data, which is calculated using an Age-Structured Production Model (ASPM). The biomass estimate was approximately 250 000 tonnes in 2019, and horse mackerel are considered to be above Maximum Sustainable Yield (MSY) – a trend that is likely to sustain for the next few years. Note, the demersal survey did not take place in 2020 due to mechanical issues with the vessel, and therefore no estimate has been calculated for last year. The survey however did take place earlier this year and the abundance estimate for 2021 will be used to extrapolate the missing data point.

The 2021 TAC was set at 36 125 tonnes (the same level as 2020), with 27 670 tonnes allocated to directed midwater trawling and 8 455 tonnes set aside as a bycatch reserve in the hake trawl sector (the same levels as 2020). An 80:20 ratio is used to apportion this bycatch reserve between the deepsea and inshore hake trawl sectors. Juvenile horse mackerel form bycatch in the small pelagic purse seine fishery on the West Coast of South Africa and a Precautionary Upper Catch Limit (PUCL)

of 12 000 tonnes was set in 2021 in this fishery to control the bycatch of juvenile horse mackerel (the same level as 2020).

Catches in South Africa were high in 2010 before dropping in 2015 (Figure 5). Thereafter the catches seemed to have recovered, peaking again in 2018 before dropping again in 2019 (Figure: Catches for midwater, demersal and *FV Desert Diamond*). Scientists (Johnston & Butterworth 2020) hypothesised that the rapid decline in catches in 2015 were due to either an overall decrease in abundance on the Agulhas Bank (associated with poor catch rates), overfishing of the adult stock and/or a change to the marine environment on the Agulhas Bank that might have led to an anomalous spike in the natural mortality of horse mackerel in 2014. After the recent assessment (Johnston & Butterworth 2020) it would appear that there is now little support for the hypothesis of an extra natural mortality event having been responsible for the drop in catches in 2015.

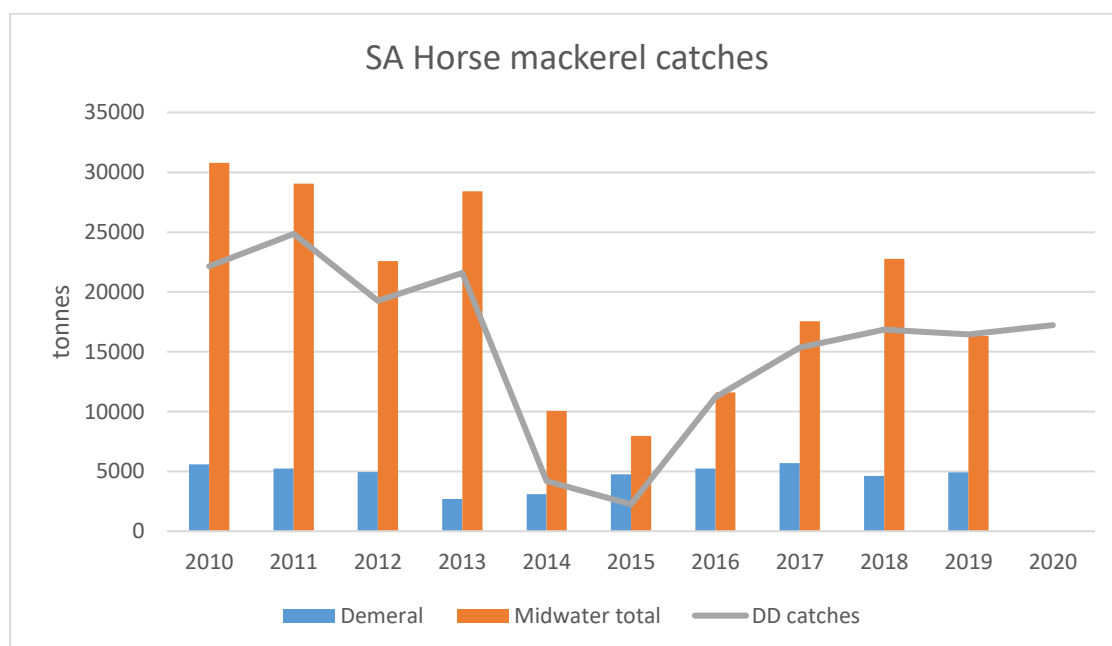


Figure 5. Catches (tonnes) from the midwater trawl (DD + dual vessels), demersal fleet and the *Desert Diamond* from 2010 – 2020. Note, catch data from the dual and demersal vessels are not yet available for 2020.

Commercial Fisheries

Adult horse mackerel catches in South Africa are dominated by a single, large midwater trawler the *FV Desert Diamond*, landing approximately 75% of the allowable catch allocated to trawl. Cape horse mackerel are either processed in whole form and block frozen or converted to fishmeal onboard the vessel. A number of small dual rights owners in the demersal hake-directed trawl sector also target adult fish.

Owing to concerns regarding bycatch, the *FV Desert Diamond* was historically restricted to fishing on the Agulhas Bank in the area east of 20°E (Figure 6). After requests by rights holders to allow fishing

off the West Coast of South Africa, the spatial restriction was relaxed in 2016 to allow trial trawls in the area south and east of a line drawn due westwards of Cape Point (34°20'S) (Figure 6). In February 2020 a spatial extension was granted to the *FV Desert Diamond* to allow fishing off the West Coast of South Africa, and included an inshore boundary in the area west of 20°E (Figure 6), annual catch limits, and move-on rules (MORs) for certain bycatch species and groups, such as seabirds, turtles, sharks and fish targeted in other fisheries.

It is unlikely that the vessel will make a permanent move to the West Coast area of operations as the adult biomass is generally more dispersed there and there is a higher likelihood of triggering the bycatch move-on rule for certain species such as snoek, a staple of the traditional linefish fishery. In 2020 the majority of trawls (99%) were made on the South-East Coast where horse mackerel have historically been abundant, and in the first quarter of 2021 all trawls were made on the eastern part of the Agulhas Bank on the South-East Coast (Figure 6).

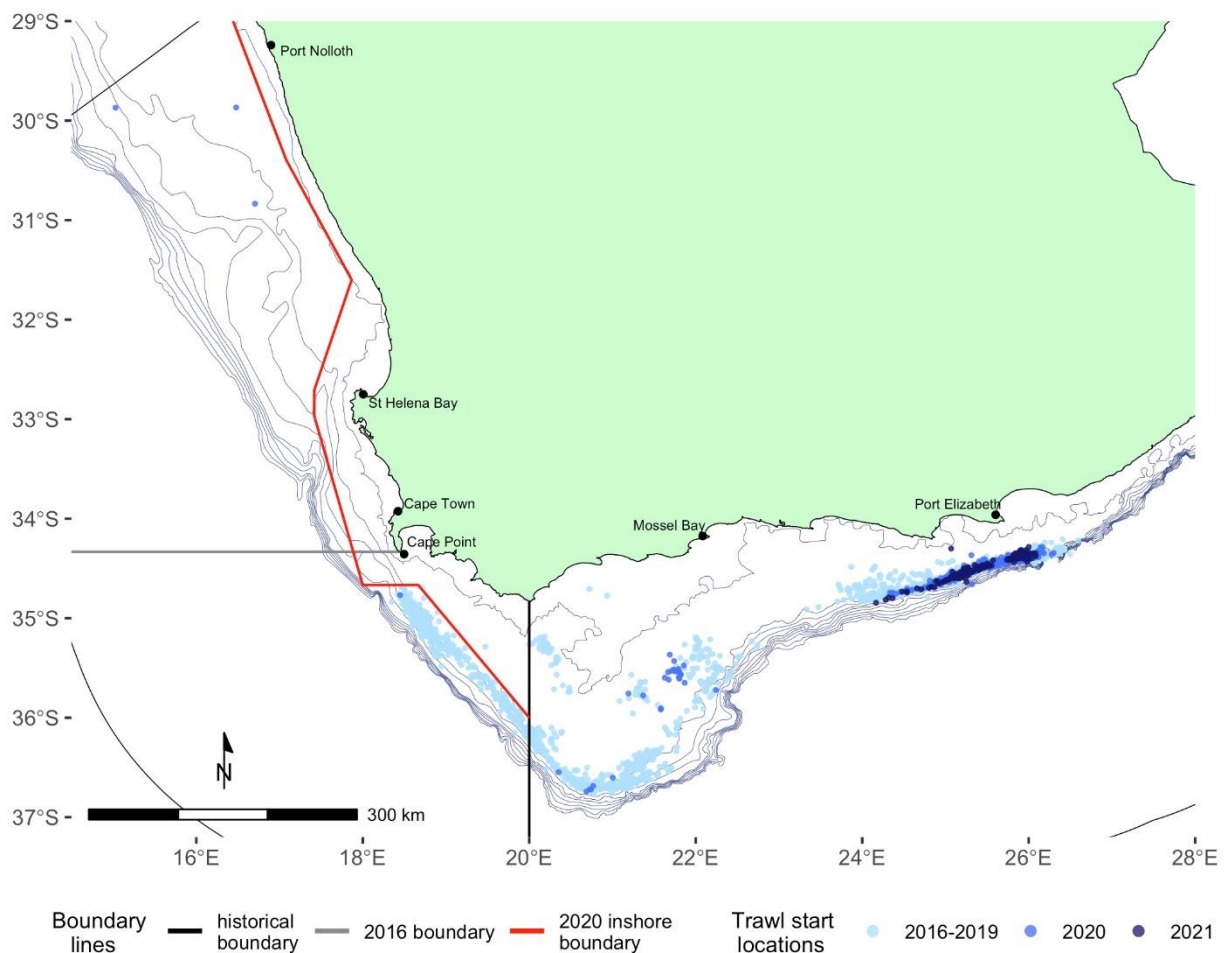


Figure 6. Map showing the location of trawls made by the FV Desert Diamond from April 2016 to April 2021, as well as spatial boundaries.

Observer Programme

The *FV Desert Diamond* is required to carry two independent scientific fishery observers at all times; one to sample the catch in the factory whilst the other monitors any large bycatch on the deck. Observers are now required to report in real-time their estimations of bycatch to the skipper and as previously, they submit a catch report to DEFF daily. The bycatch MORs apply to both the West and South-East Coast of South Africa and have been lauded by some as a step in the right direction towards a sustainable fishery.

References

MFMR 2020. Horse mackerel *Trachurus capensis* State of the stocks report.

Johnston and Butterworth (2020). Updated 2020 horse mackerel assessments and projections. FISHERIES/2020/OCT/SWG-DEM/19