B7. SOUTHEAST ATLANTIC

FAO Statistical Area 47

by Kevern Cochrane *

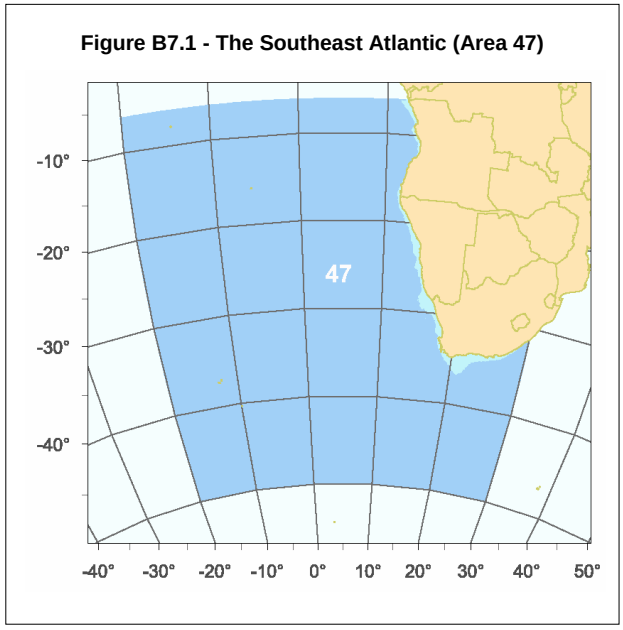

Figure B7.1 - The Southeast Atlantic (Area 47)

INTRODUCTION

This section on the Southeast Atlantic deals with the waters adjacent to the coastlines of Angola, Namibia and South Africa and extends well into the high seas to the south and west (Figure B7.1). The islands of St Helena, Ascension and Tristan da Cuhna also fall within this area. Nominal catches made by South Africa in the western Indian Ocean are included in Area 47. However, except for those from the Agulhas Bank, which is considered a part of the Benguela upwelling system, these catches form a very small part of the total for the region. The rest of the region is dominated by the Benguela upwelling system which supports relatively high production along much of the coastline of these three countries. The northern border of the Benguela upwelling system occurs at the thermal front with the warm Angola Current, normally between about 15°S and 17°S on the coastal shelf in southern Angola. North of the Angolan front, most of the coastal shelf of Angola is dominated by the southward flowing and less productive Angola Current. The Benguela ecosystem is sub-divided into the northern Benguela and the southern Benguela, separated by the partial barrier of a very intense upwelling cell off the town of Lüderitz, some 300 km north of the border between Namibia and South Africa. The region covers a total surface area of about 18.4 million km^2, with less than 0.5 million km^2 being shelf area.

There was substantial environmental variability in the region during the 1990s, and this undoubtedly influenced the dynamics of several important fish stocks. In the northern Benguela, the unusually widespread occurrence of deoxygenated water in 1993 and 1994 was an important environmental event. It resulted in

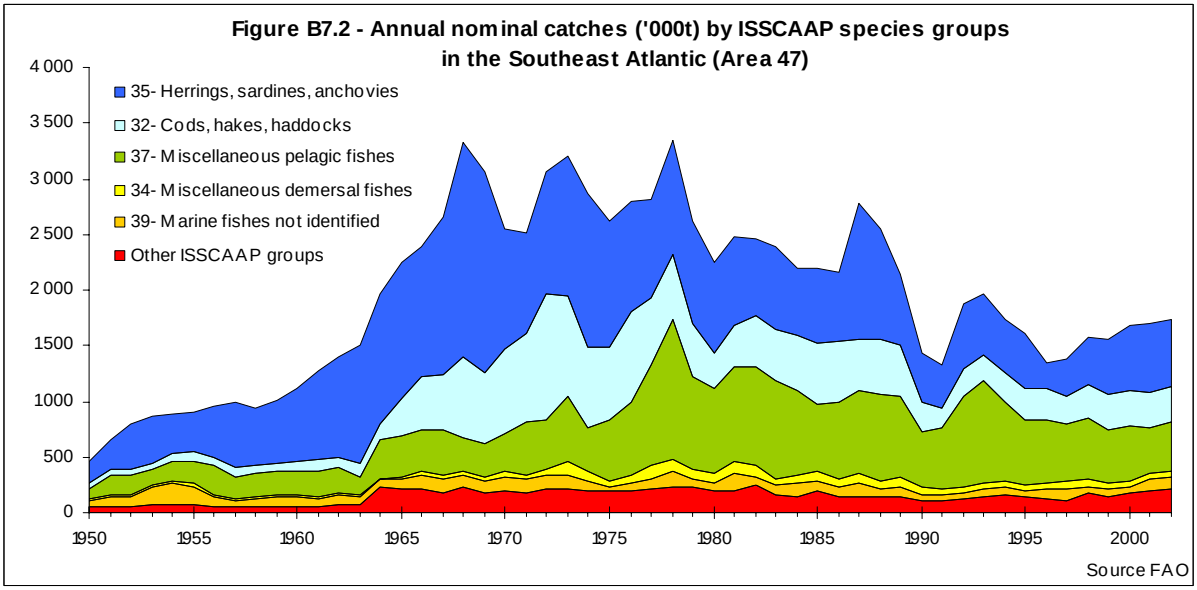

Figure B7.2 - Annual nominal catches ('000t) by ISSCAAP species groups in the Southeast Atlantic (Area 47)

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oxygen concentrations as low as 0.25 ml per litre over much of the northern half of the Namibian shelf, extending beyond 50 nautical miles offshore. In normal years, such low oxygen concentrations occur only over about one third of this area. In addition, in the first half of 1995, unusually warm conditions with reduced upwelling, a Benguela Niño, occurred over northern and central Namibia as well as in southern and central Angola. By the end of 1995 conditions had cooled to more normal temperatures (Namibia Foundation, 1998). The southern Benguela system experienced an unusual sequence of a short period of intense warming in December 1999, followed rapidly by a period of strong cooling early in 2000. This sequence was associated with record recruitment to the local anchovy stock, although any causal link is not well understood.

PROFILE OF CATCHES

Total nominal catches from the Southeast Atlantic increased from less than 0.5 million tonnes in 1950 to slightly over 3 million tonnes in 1968 (Figure B7.2 and Table D7). Catches remained high, although irregular and declining, until the late 1980s and then decreased abruptly from 2.8 million tonnes in 1987 to 1.3 million tonnes in 1991, driven partly by a large decline in anchovy catches and policy changes in Namibia after it gained independence in 1990. They have remained under 2 million tonnes since then, with an average catch of approximately 1.65 million tonnes between 2000 and 2002. Catches from the region are dominated by ISSCAAP Groups 35 – herring, sardine and anchovies, 37 – miscellaneous pelagic fishes (including horse mackerel), and 32 – cods, hakes and haddocks (Figure B7.2). The most important stocks within these groups were all subjected to heavy fishing pressure at different periods between the 1960s and the 1980s, leading in some cases to quite severe declines in abundance that were reflected in declining catches. The position was stabilized in many of these cases by imposition of more rigorous management regimes.

The small pelagic fisheries of the region, which together account for the highest proportion by mass of the catches, are dominated by six taxonomic groups: South African pilchard (*Sardinops sagax*) (also still referred to as *S. ocellatus*), South African anchovy (*Engraulis capensis*), sardinellas (round *Sardinella aurita* and madeiran or flat *S. maderensis*), Whitehead's round herring (*Etrumeus whiteheadi*), Cape horse mackerel (*Trachurus capensis*) and Cunene horse mackerel (*T. trecae*). In 2001, Cape horse mackerel accounted for the largest catches of small pelagics, followed by South African pilchard and anchovy and then, substantially lower, the sardinellas and Whitehead's round herring (Figures B7.3 and B7.4).

Cape horse mackerel is caught mainly in Namibia, and in Angola it is gradually replaced in catches by the Cunene horse mackerel as one moves further north. Catches of the two horse mackerel species have declined since the late 1970s and mid-1980s. In the case of the Cape horse mackerel this was probably caused by the effects of heavy exploitation, particularly in Namibia in the late 1970s and early 1980s. In both species, heavy exploitation in the late 1970s and 1980s was followed by a large reduction in fishing mortality when the then USSR fleet was drastically reduced after 1989, and the lower

Figure B7.3 - Annual nominal catches ('000t) of selected species in ISSCAAP Group 35, Southeast Atlantic (Area 47)

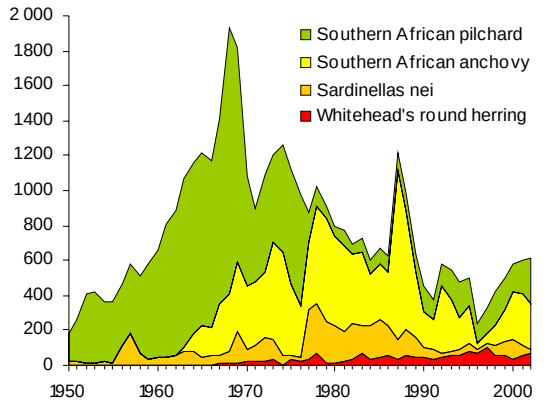
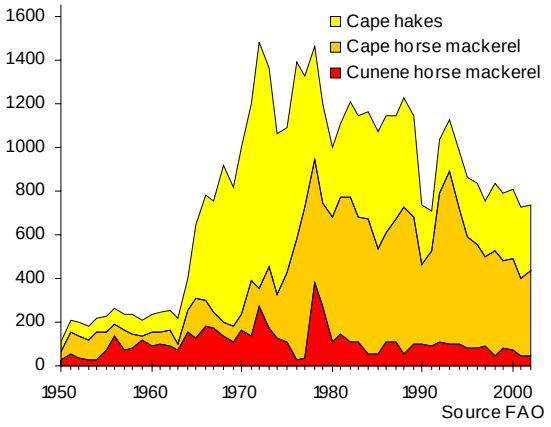


Figure B7.4 - Annual nominal catches ('000t) of selected species in ISSCAAP groups 32 & 37, Southeast Atlantic (Area 47)



catches also reflect this reduced effort. Recorded catches of Cape horse mackerel were 354 000t in 2001, the lowest since the mid-1970s, and increased slightly to 386 000t in 2002. Catches of Cunene horse mackerel were under 47 000t in 2001 and 2002, also low in relation to typical catches of the last two decades.

South African anchovy and pilchard are both managed in South Africa through total allowable catches (TACs) set each year on the basis of estimated biomasses of the stocks. Catches of South African anchovy have increased steadily since falling to a minimum of 42 000t in 1996, reaching 289 000t in 2001 and decreasing to 255 000t in 2002 (Figure B7.3). Catches of South African pilchard were 265 000t in 2002, the highest recorded since 1976. Catches of Whitehead's round herring fluctuated without meaningful trend from the early 1980s, with a small peak in the mid-1990s and the maximum of 97 000t recorded in 1997. Since then, catches have been between 56 000 and 64 000t, apart from in 2000 when they fell below 40 000t (Figure B7.3). The higher catches in 1995 (79 000t) and 1997 (97 000t) were probably, at least in part, a result of fishing effort being diverted to round herring from the struggling anchovy fishery, as the former is not regulated by a TAC in South Africa at present.

North of the Benguela front, primarily in Angolan waters, sardinellas become the dominant clupeoid in catches. In recent years there has been a shift in relative abundance of the two sardinella species and since 1994 the flat sardinella has tended to dominate in surveys (Bianchi, 1999). Catches of the two species combined peaked at 286 000t in 1977. After 1989, following a substantial reduction in fishing effort in the region as a result of political changes in the then USSR, catches declined and were well under 100 000t during the 1990s (Figure B7.3). They increased to 114 000t in 2000 but fell again to under 30 000t in 2002.

The taxonomic groups most important in the demersal fisheries of the region include the shallow water (*Merluccius capensis*) and deepwater (*M. paradoxus*) Cape hakes, Devil anglerfish or Cape monkfish (*Lophius vomerinus*), snoek (*Thyrsites atun*), which is also taken by handline, and also dentex, including Angolan (*Dentex angolensis*) and especially large-eyed dentex (*D. macrophthalmus*), which is important in Angola (Figures B7.4, B7.5 and B7.6). Of these, the Cape hakes accounted for the highest catches, remaining fairly constant under TAC management at between 260 000 and 323 000t since 1995. Catches of snoek have been under 20 000t since 1992, with some evidence of a possible decline over this period. Catches of unidentified dentex remained fairly consistently above 10 000t from the early 1950s through to 1968 when they started to decline. They fell below 1 000t in 1980, and remained below this mass until 1993, which year marked the start of a recovery leading to catches of over 16 000t in 2001 and of 9 000t in 2002. Significant dentex catches are also recorded under the heading of large-eyed dentex, and these have ranged from 40t in 1994 to a maximum of 43 200t in 1976. Catches of 237t of large-eyed dentex were recorded in 2002.

In addition to the fish species of particular commercial importance described above, a number of members of ISSCAAP Group 33 Miscellaneous coastal fishes contribute to

Figure B7.5 - Annual nominal catches ('000t) of selected species in ISSCAAP group 34, Southeast Atlantic (Area 47)

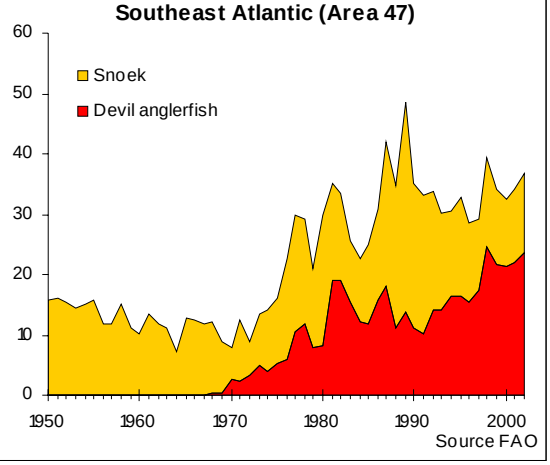
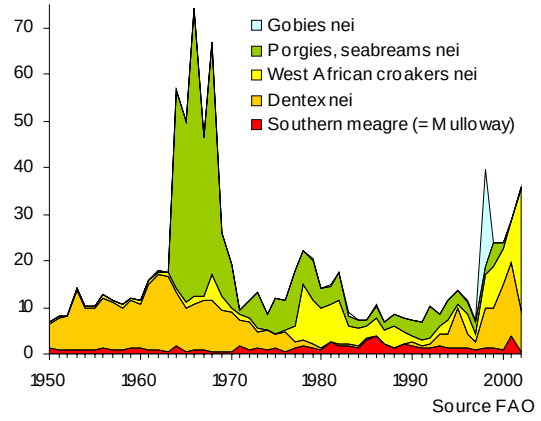


Figure B7.6 - Annual nominal catches ('000t) of selected species in ISSCAAP Group 33, Southeast Atlantic (Area 47)



important fisheries in the region (Figure B7.6). The largest catches within this group, apart from dentex which also falls within Group 33, were of West African croakers nei (*Pseudotolithus* spp.), which are caught mainly by Angola. Catches in 2002 were approximately 26 000t, the highest on record, continuing a period of relatively high catches that started in 1998 when they increased from under 2 000t the previous year to over 7 000t. From 1990 to 2002, the following groups generated catches that averaged more than 1 000t per year: Croakers, drums nei (Sciaenidae*:* average 3 285t); Porgies, seabreams nei (Sparidae*:* average 2 937t); Panga seabream (*Pterogymnus laniarius*: average 2 513t); Gobies nei (Gobiidae*:* average 2 460t); Mild (Southern) meagre, known locally as kabeljou or kob (*Argysomus inodorus* previously *A. hololepidotus:* average 1 430t); Groupers, seabasses nei (Serranidae: 1 245t); Pargo seabreams nei (*Pagrus* spp.: 1 167t); and Canary drum (Baardman, *Umbrina canariensis*: average 1 017t). Bigeye grunt (*Brachydeuterus auritus:* average: 959t); Sand (locally "white") steenbras (*Lithognathus mormyrus:* 923t); Mullets nei (Mugilidae: average: 887t); Threadfins, tasselfishes nei (Polynemidae: 806t); Grunts sweetlips nei (Haemulidae: 707t); Sea catfishes nei (Ariidae: 552t); and Red Pandora (*Pagellus bellottii*: 535t) yielded averages between 500 and 1 000t over the same period.

Namibia currently accounts for most of the catches of the Porgies and seabreams nei (Sparidae). Catches of this group peaked at over 61 000t in 1966 but soon dropped and have not been above 12 000t since 1970. Catches have been under 1 000t since 2000. Southern meagre is landed mainly by Angola. The 2001 catches of over 3 700t were the highest on record. On the other hand, the 2002 catches of 611t were the lowest on record since 1976. Angola is also the major coastal state landing Croakers, drums nei while the Republic of Korea takes the largest portion of catches of the group. Catches of this group have fluctuated between over 750t and a maximum of 6 300t since 1950. The relatively high average catches of Gobies is misleading and, apart from very high catches of 21 000t of Gobies by Namibia in 1998, catches of the group are generally well under 500t per annum. Sand steenbras and Bigeye grunt are fished mainly by Angola. The highest catches of Sand steenbras of 2 800t were taken in 2002, but catches are more usually below 1 000t. Catches of Mullets nei are recorded mainly by South Africa. These tended to be above 1 000t until 1997, but have fallen in recent years and plunged to only 122t in 2002.

Sharks, rays, chimaeras (ISSCAAP Group 38) do not provide substantial catches in Area 47 although they have escalated in recent years. Catches of the group peaked in 1978 at a total of some 17 700t, made up primarily of unidentified sharks, rays, skates etc; unidentified Raja rays; and Cape elephantfish (*Callorhincus capensis*). After this, total catches declined erratically until 1996 when the total recorded was just over 3 000t. Thereafter they started to climb again, reaching 15 200t in 2001 and declining only slightly to 13 800t in 2002. At that time catches were still dominated by the same species groups. Catches of blue shark (*Prionace glauca*), shortfin mako (*Isurus oxyrinchus*) and smooth hammerhead (*Sphyrna zygaena*) are also consistently recorded.

In recent years there has been substantial interest in exploitation of the deep-sea species of the Southeast Atlantic, including orange roughy (*Hoplostethus atlanticus*) and alfonsino (*Beryx splendens*) as well as Patagonian toothfish (*Dissostichus eleginoides*). Catches of the latter have been taken in the exclusive economic zone (EEZ) of South Africa at the Prince Edwards Islands (Commission for the Conservation of Antarctic Marine Living Resources [CCAMLR] sub-areas 58.6 and 58.7) and therefore fall outside the geographic area of this review. Almost all of the deepwater fishing in the Southeast Atlantic has been undertaken in Namibian waters. Catches of alfonsino peaked at over 4 000t in 1997 but declined thereafter and just over 200t were landed in 2002. Catches of orange roughy reached a peak of over 18 000t in 1997, declined steadily after that to 857t in 2001, and increased again to 2 169t in 2002. Exploitation of the deep-sea species by coastal states of Area 47 has been undertaken almost exclusively by Namibia.

Several crustacean species support valuable fisheries in the region (Figure B7.7). Geryon crabs, dominated by the red crab (*Chaceon maritae*), are taken in both Namibian and Angolan waters. Recorded catches of Geryon crabs peaked at over 10 000t in 1993 but fell in the following years. A secondary peak of nearly 6 000t occurred in 2000, falling to approximately 4 100t in 2001 and 2002. The highest catches of crustaceans were of shrimps, particularly the

deepwater rose shrimp (*Parapenaeus longirostris*) and the striped red shrimp (*Aristeus varidens*) which are taken mainly in Angolan waters. Catches of deepwater rose shrimp were over 5 600t in 2001, the highest figure since the start of the 1990s, but declined to 2 000t in 2002. The same pattern was observed with catches of the striped red shrimp, which reached 3 400t in 2001, the highest recorded since 1987, and declined to just over 2 000t in 2002.

The Cape rock lobster (*Jasus lalandii*) and southern spiny lobster (*Palinurus gilchristi*) occur towards the south of the region, with the former occurring on the west coast of Namibia and South Africa and the latter off the south coast of South Africa. Catches of the Cape rock lobster have levelled off under TAC management at approximately 2 000t per year after a steady decline since the peak of over 25 000t per year in the 1950s. Catches in 2002 were just over 3 000t. Catches of southern spiny lobster, also managed by TAC, were reasonably constant between about 800 and 1 100t whole mass during the 1990s, but declined in 1999 and 2000, increasing to just over 1 000t in 2001 and declined again to 651t in 2002. The island of St Helena also occurs in Area 47, and it has recorded catches of Tristan da Cunha rock lobster (*Jasus tristani*) generally varying between 300 and 500t. The highest catches, over 800t, were reported for 1972 and 1976. The Natal rock lobster *Palinurus delagoae* occurs on the east coast of southern Africa and supports a directed trap fishery in Mozambique as well as occurring in catches of a mixed crustacean trawl fishery off the east coast of South Africa. However, an exploratory fishery in South Africa targeting the species has recently been closed after results obtained since fishing commenced in 1994 indicated very limited potential in South African waters (see Pollock *et al*., 2000, and other papers on these resources by the same authors).

Figure B7.7 - Annual nominal catches ('000t) of selected crustaceans, Southeast Atlantic (Area 47)

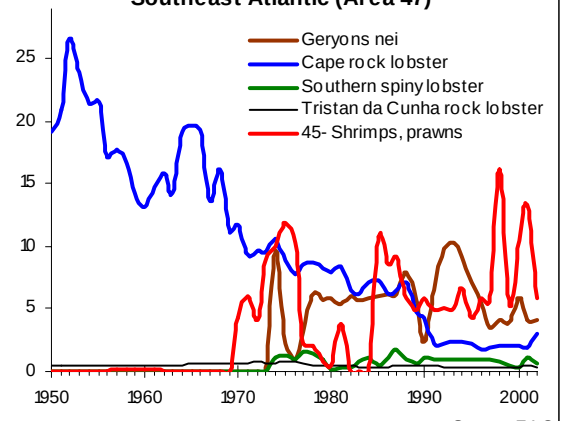
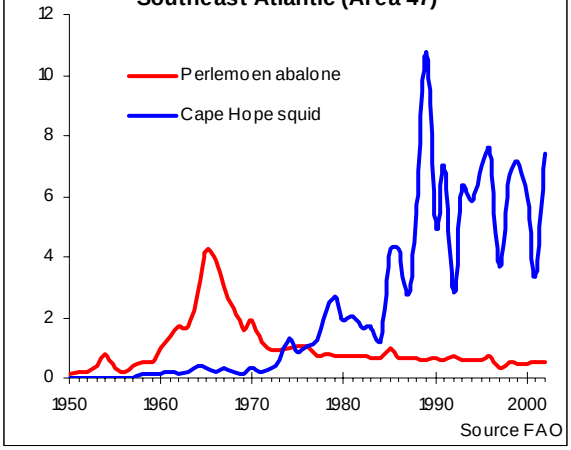


Figure B7.8 - Annual nominal catches ('000t) of selected species of molluscs, Southeast Atlantic (Area 47)



The major fisheries for molluscs in the region are for the Cape of Good Hope squid (*Loligo vulgaris reynaudii*) and for Perlemoen abalone (*Haliotis midae*). The highest catches for squid, 10 730t, were made in 1989 and since then catches have shown considerable variability, as would be expected from a short-lived species, varying from a peak of over 7 500t in 1996 to a low of 2 800t in 1992 (Figure B7.8). Catches in 2002 were 7 400t. Catches of abalone have declined fairly steadily since a peak of over 4 000t in the mid-1960s but were maintained between approximately 550 and 750t from the mid-1980s to the late 1990s, before dropping further.

RESOURCE STATUS AND FISHERY MANAGEMENT

Most of the commercially important stocks within the region are classified as being between fully exploited and overexploited. The latter status is frequently, but not always, a result of historical over-exploitation rather than current excesses. In more recent years, again varying from stock to stock, more conservative management measures have generally been put in place and at present the most important resources are managed either for sustainable yields or with a goal of encouraging recovery. Both Namibia and South Africa have well-developed management systems in place for the fisheries exploiting their most important stocks, and Angola is also making progress in monitoring

and implementing effective management for some of the important resources.

Nevertheless, in common with most fisheries in the world, substantial problems still exist in many fisheries, with varying underlying causes including environmental variability, scientific uncertainty and conflicting biological and socio-economic objectives. Difficulties in monitoring, control and surveillance occur throughout the region and are particularly significant in some coastal fisheries where access and catches are difficult to control. In South Africa, severe problems with illegal fishing are being experienced in the abalone (perlemoen) fishery. It has been difficult to estimate the size of the illegal take but an indication of the magnitude of the problem is that in 2002, more abalone, in terms of numbers, were confiscated by the law enforcement agency than were landed by the legal fishery. In addition, 55 percent of the illegally caught abalone that were confiscated were below the minimum legal size (Tarr and MacKenzie, 2002). In recent years, South Africa has also been experiencing problems in implementation of the new South African fisheries policy, developed after the 1994 democratic elections. Attempts to develop an appropriate system of access rights had met with substantial legal challenges, in some cases resulting in the suspension of fishing activities, until a solution had been reached. A new system of allocation of medium-term rights was launched in July 2001 and the indications of success at this stage are promising (DEAT, 2002).

The commercially important small pelagic stocks in all three countries are closely monitored, both by recording commercial catches and by making use of regular hydro-acoustic surveys. In South Africa, the stocks of pilchard and anchovy are managed on the basis of formal management procedures, which are negotiated decision rules developed using rigorous simulation models of the fishery (Cochrane, Butterworth and Payne, 1997; De Oliveira *et al.*, 1998). The status of the small pelagic resources of the region varies from stock to stock, with current conditions apparently being generally more favourable in the south and less so in the north. The South African stock of sardine remains in a very healthy state, and the biomass estimated on the hydroacoustic survey in November 2002 was the highest since surveys started in 1985 and, at 2.5 million tonnes, nearly one million tonnes up on that of the previous year. In contrast that of Namibia remains worryingly low. The anoxic event in 1993 and 1994 and the Benguela Niño in 1995, both led to poor recruitment which, in combination with continued fishing, are thought to have been the primary causes of the decline in Namibia. After those adverse environmental conditions, the environment was more favourable in the spawning season of 1995-1996 (Namibia Foundation, 1998). However, there was no sustained improvement in status and in 2002, a zero TAC was set by the Ministry of Fisheries and Marine Resources in response to serious concern about the status of the resource. Early indications are that this measure has had a positive impact, and surveys in October 2002 and March/April 2003 resulted in estimates of biomass of over 300 000t and 550 000t respectively, substantially higher than the 40 000t estimated in March 2002.

The South African stock of anchovy is in a healthy condition. The biomass estimated on the November 2002 survey was 2.5 million tonnes. This is considerably lower than the record 4.4 million tonnes estimated the previous year, but still the third highest biomass estimate since surveys started in 1985. Fishing for Whitehead's round herring, which occurs mainly in South Africa, is not directly regulated at present, as assessments have suggested that it is being underexploited. However, with the recent increases in catches of the species, this approach is currently being re-examined.

The biomass estimates for Angolan waters of the two species of sardinella combined showed substantial variability during the 1990s, ranging from 164 000t in February/March 1995 to 574 000t in August of the same year (Bianchi, 1999). However, the very low biomass estimate of February/March 1995 was attributed to the unusual schooling behaviour displayed by sardinellas in connection with the extreme environmental conditions observed in that period (very high water temperatures and low salinity in the upper 50-m water layer that were later ascribed to the “95 Benguela Niño”). Trends in biomass estimates from the surveys carried out in the winter season (August-September) are more consistent and show an increase in biomass in the mid-90s as compared to the mid-80s. Although biomass seems to have decreased again in later years, it is still higher than at the time of heavy exploitation by the USSR. The flat sardinella is still dominating the catches and accounts for

about 75 percent of the total sardinella biomass. An assessment of sardinellas in Angola, Congo and Gabon, undertaken in 1997, suggested that the combined sardinella resource was underexploited at that time (FAO, 2000). However, there is a need for caution if the fishery is to be developed, particularly in view of the uncertainty about the magnitude of catches taken by the artisanal fisheries.

The stock structure of the Cape horse mackerel population of the Southeast Atlantic is not clear, although for management purposes they are treated in the same way as sardine, as separate stocks in Namibia and South Africa, separated by the upwelling cell off Lüderitz. The South African stock is managed by a catch limit on adults on the Agulhas Bank and a bycatch limit on juveniles taken in the pelagic fishery on the West Coast. The adult catch limit has rarely been fully subscribed in recent years, and the species is generally considered to be underutilized. However, in 1997, a joint venture involving a large Russian midwater trawler was entered into to increase exploitation of the South African stock (Verheye, 1998). In 2001, fishing rights for horse mackerel in South Africa were allocated to 18 companies as a part of a plan to develop the fishery in an incremental fashion (DEAT, 2002). In Namibia, the stock is an important contributor to the national fishery and is fished by midwater trawl and a purse-seine fleet. The stock is considered to be resilient and its status variable, but there was evidence of a decline in abundance between 1999 and early 2003 (MFMR, 2002 and G. D'Alemida, NatMIRC pers comm.). In 2000, the total stock biomass was estimated to be in the order of 1 million tonnes (Krakstad, 2002). The stock, shared with Angola, is considered to be fully exploited (Namibia Foundation, 1998). The Cunene Horse mackerel is another important pelagic species north of the Angola-Benguela front. Biomass estimates from the winter surveys show a similar trend to that of the sardinellas, with an increase in the mid-1990s from the lower levels in the 1980s. Recent trends indicate a drastic decrease in biomass, particularly affecting the adult part of the population (IIM, 2001). An assessment undertaken in 1997 estimated the resource to be underexploited, contributing to the growth in biomass in the mid-1990s. However, more recent estimates by the Instituto de Investigaçao Marinha (IIM) indicate a condition of growth overfishing and measures are being taken to limit the fishery (IIM, 2001).

The Cape hakes are found in Namibia and South Africa and the Benguela hake (*M. polli*) occurs north of the Cunene River, the border between Namibia and Angola. Each State manages the fisheries occurring in their own EEZs. The shallow water Cape hake (*M. capensis*) used to dominate the catches from Namibia, and is still dominant in catches from the south coast of South Africa. The deepwater Cape hake (*M. paradoxus*) is an increasing component of catches from Namibia and dominates catches from South Africa's west coast, but the two species are not identified separately in commercial catches. Until recently, because of difficulties in separating the two Cape hake species in commercial catches, South Africa assessed the two as a single stock (Payne and Punt, 1995), but separate assessments are now being attempted. At the time of writing in mid-2003, *M. capensis* on the south coast was assessed separately whereas a combined species assessment was conducted on the West Coast. An *ad hoc* adjustment to the west coast estimate is made to account for *M. paradoxus* on the south coast. Work has begun to develop separate assessments for west coast *M. capensis*, south coast *M. capensis* and a combined assessment of *M. paradoxus* for both coasts (R. Rademeyer, University of Cape Town and R. Leslie, MCM, *pers comm.*). Recent assessments estimated the biomass of *M. capensis* on the south coast in 2002 to be close to that producing maximum sustainable yield level (MSYL). That of *M. paradoxus* was estimated to be substantially below MSYL on both the west coast and for both coasts combined. The biomass of both species combined on the west coast was higher in relation to the MSYL than that of *M. paradoxus* alone. Overall, therefore, the status of *M. capensis* in South Africa is thought to be considerably better than that of *M. paradoxus*.

Namibia has implemented an observer programme which enables commercial catches of hakes to be split by species and, based on results from this programme, it was estimated that the deepwater Cape hake accounted for about 80 percent by mass of the Namibian hake catches in 1997 (Voges *et al.,* 1998). Nevertheless, the assessments in Namibia are currently undertaken on both species combined and make use of commercial catch-per-unit effort (cpue) information and the results of research surveys. Problems are being faced in achieving reliable assessments of the resource because of the highly

variable nature of these data. This means that estimates of quanities such as MSY and stock status, which are obtained using age-structured production models, are not precise and have varied substantially in recent years as more data have become available. Survey results over the past decade have shown little overall trend although, following a peak in 1998, there was a decline in survey estimates of biomass until 2001, stabilizing in 2002. However, cpue now shows a clear decline. This has resulted in assessments of decreasing optimism over recent years, and allowable catches for 2003 were consequently reduced in accordance with the management procedure used to provide recommendations for the resource.

Fisheries targeting tuna and tuna-like species (ISSCAAP Group 36) are also important in Area 47, attracting several distant water fishing nations in addition to participation by the coastal states. Big eye tuna *Thunnus obesus* supported the highest catches in 2001, followed by albacore *Thunnus alalunga*, swordfish *Xiphias gladius*, southern bluefin tuna *Thunnus maccoyii* and then a number of other species. South Africa and Namibia landed more albacore than any other species in this ISSCAAP group in 2002, while the highest catches by Angola were of Atlantic bonito *Sarda sarda* in 2001 and of Tuna-like fishes nei (Scombroidei) in 2002.

ICCAT is responsible for the assessment of these species and stocks and for the management of fisheries exploiting them. It regularly assesses the status of some of the more important of them. Big eye tuna is considered to consist of a single, Atlantic wide stock. According to ICCAT's assessments (ICCAT, 2002), the biomass of big eye tuna is below the MSYL, and fishing mortality is above the rate that would achieve maximum sustainable yield (MSY). The assessment was, however, hampered by a lack of data from several of the more important fisheries on the stock. The albacore caught in Area 47 would be a part of the southern Atlantic stock and the biomass of this stock, as estimated in 2000, is thought to be above the MSYL, but the assessment was not considered by ICCAT to be very reliable. Concern was expressed by ICCAT at the escalation in catch of albacore reported in 2001. Swordfish in the region are considered to be part of a South Atlantic group. In 2002, ICCAT reported that they had been unable to complete a reliable assessment for swordfish due to conflicting trends in the available catch per unit effort series. It was noted that the total catches of the group had declined since 1995, as had been recommended by ICCAT, although some countries had increased their catches. The Commission for the Conservation of Southern Bluefin Tuna assessments of southern bluefin tuna (as reported by ICCAT, 2002) indicated that the biomass had been largely stable since the early to mid-1990s, but remained below the target biomass: the biomass estimated for 1980. Recruitment has been low in recent years relative to that of earlier years in the history of the fishery.

The species composition of demersal assemblages off Angola display important changes in a north-south direction, the fauna being predominantly subtropical-temperate off southern Angola and tropical and more diverse in the central and northern parts. Seabreams (Sparidae) and croakers (Sciaenidae) are prominent components of the fauna both in abundance and economic interest. In the southern shelf (south of Tombua), large-eyed dentex and African weakfish are the main species, also fished commercially. Biomass estimates for both species dropped substantially in recent years (Johnsen *et al*., 2003). A decrease in seabream biomass (including several species of *Dentex* and *Sparus*) was also observed in the central region while the estimates seem to be more stable in the northern area (north of Pta. das Palmeirinhas; Johnsen *et al.*, 2003).

In addition to the major fish species described above, many other species contribute to the fisheries of the region. For example, more than 200 species make up the catches from South Africa's line-fishery (Verheye, 1998) of which 20 can be considered to be economically important (Griffiths, 2000). The global catches of fish reported to FAO are included in 150 different taxonomic groups, many of which are at the level of Genus or higher and include a number of individual species. Within the region, there is much less information on the status of most species and stocks than there is on the few commercially more important stocks discussed above. However, South African catches of species such as seventy-four seabream (*Polysteganus undulosus*), red steenbras (*Petrus rupestris*), African weakfish, known locally as geelbek, (*Atractoscion aequidens*) and others have fallen considerably since the 1960s when line-fish catches peaked (Verheye, 1998). In Namibia, there is evidence that the abundance of

kob has declined in recent years (Namibia Foundation, 1998). A recent analysis of trends in cpue of linefish species in South Africa indicated that many were severely overexploited during the 20th century. In order to address this and to allow the depleted stocks to recover, South Africa is aiming to achieve a 70 percent reduction in commercial effort in the linefishery, accompanied by stringent regulations to recreational fishing (M. Griffiths, MCM, *pers. comm.*).

Both Namibia and South Africa have developed national plans of action in accordance with the FAO International Plan of Action for the Conservation and Management of Sharks.

Namibia has taken a cautious approach to the development of a fishery for its deep-sea resources, which started with a small experimental fishery in 1994. Recent assessments for orange roughy suggested that the high catches of the early period in the development of the fishery would not be sustainable and a precautionary management scheme has been implemented. This scheme has established four quota management areas, with a separate TAC for each area. Few data are available for alfonsino, but it is expected that, as with orange roughy, the yield will be considerably less than the initial TAC.

In response to the interest in and potential of deep-sea resources of the Southeast Atlantic Ocean, and out of concern to ensure that the region's resources are utilized in a rational and responsible manner, the coastal states of the region: Angola, Namibia, South Africa, and the United Kingdom, on behalf of St Helena and its dependencies Ascension and Tristan de Cunha, took the initiative in 1997 to begin negotiations for the establishment of a regional fisheries management organization, the South East Atlantic Fisheries Organization (SEAFO), within the framework of the 1995 UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks. The European Union, Iceland, Japan, the Republic of Korea, Norway, Poland, the Russian Federation, Ukraine and the United States of America also participated in the negotiations as Interested States.

The area managed by SEAFO includes a substantial portion of the high seas of the south east Atlantic and covers alfonsino, orange roughy, armourhead grenadier, wreck fish, deepwater hake and red crab. The agreement was signed on 20 April 2001 by the coastal states of Angola, South Africa, Namibia and the United Kingdom of Great Britain (on behalf of St. Helena and its dependencies of Tristan da Cuhna and Ascension Island) and the deepwater fishing nations: the European Community, Iceland, Norway, Republic of Korea and the United States of America. The SEAFO Convention has recently come into force after ratification by three signatory States: Namibia, the European Union and Norway.

Tagging results suggest that there is a single stock of deep-sea red crab (*Chaceon maritae*) shared between Namibia and Angola. Assessment of the stock indicated that it is currently fully exploited and that, from 1990, the biomass had been stable at approximately 40 percent of the biomass in 1980, at which time it had been moderately fished for seven years (Namibia Foundation, 1998). More recent results suggest that the stock is increasing in biomass (MFMR, 2002). Preliminary assessments of the Angolan stocks of deepwater rose shrimp (*Parapenaeus politus*) and striped red shrimp (*Aristeus varidens*) were undertaken early in 1999 (FAO, 1999). The results suggested that catches of the deepwater rose shrimp in 1997 were above the estimated MSY and that the stock is fully to overexploited, with a biomass considerably lower than that in 1985/1986. The estimated MSY for striped red shrimp was similar to the mean catch for the period 1993 to 1997, although the reported catch for 1997 was lower than the MSY. The biomass of the striped red shrimp is similar to that in 1985/86 and the stock is considered fully exploited.

The Cape rock lobster (*Jasus lalandii*) has been the subject of intense monitoring and assessment for nearly a decade, following a sudden decline in somatic growth rates and hence in productivity in the late 1980s. Current estimates are that the stock has undergone a major decline since catches peaked in the 1950s, and that the resource is estimated to be depleted. As a result, a formal management procedure has recently been adopted for the stock in South Africa which, while aiming to sustain some fishing, is projected to lead to a 15 percent increase in the fishable component of the population between 1996 and 2006 (Cockroft and Payne, 1999; D. Butterworth, UCT, pers comm.). Recent stock assessments indicate some growth in the biomass since the end of the 1990s. In Namibia, the stock of Cape rock lobster is similarly estimated to be depleted, but has shown

signs of modest recovery under low TACs implemented since 1992 (Namibia Foundation, 1998 and MFMR, 2002).

The other important crustacean stock in the region is the southern spiny lobster (*Palinurus gilchristi*) which is estimated to have declined continuously between the 1988/1989 season and 1998/99. Between 1998/99 and 2002/2003 it is estimated to have grown considerably, allowing for an increase in the TAC for 2003/2004 (MCM, 2004).

The Cape of Good Hope squid (*Loligo vulgaris reynaudi*) is managed on the basis of effort control and a closed season. Being a short-lived species, catches in any year are heavily dependent on recruitment to the fishing grounds that year. Recent assessments have indicated that the stock is fully exploited and that effort must be reduced in the future if sustainability is to be achieved; adjustements to the duration of the closed season are used to try to limit effort, (MCM, 2000, 2004).

The prognosis for the stock of abalone (*Haliotis midae*) in South Africa is pessimistic given the current scale of illegal harvests. Fishery independent diver surveys have been undertaken annually since 1995, and the resulting time-series have only recently become long enough for inclusion in comprehensive assessments of the resource. The commercial fishery is managed by TACs which were kept relatively constant in recent decades but have been steadily reduced since 1996-1997 in response to a number of warning signals (Verheye, 1998). In particular, there is concern that poaching is currently seriously impacting the resource. In recent years, a new, ecological problem has also emerged. In the early 1990s, West coast rock lobster moved into a significant part of the range of abalone. The lobsters reduced the local population of sea urchins *Parechinus angulosus*, which they feed upon. Sea urchins provide important shelter for juvenile abalone and their disappearance from the area has allegedly exposed the young abalone to predation by the lobsters and other predators, negatively impacting the reproductive success of the stock (Mayfield and Branch, 2000; Tarr and McKenzie, 2002).

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