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WESTERN CENTRAL ATLANTIC FISHERY COMMISSION

Tenth Session

WECAFC LESSER ANTILLES FISHERIES COMMITTEE

Seventh Session

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THE STATUS OF FISHERIES RESOURCES IN THE WESTERN CENTRAL ATLANTIC REGION.

INTRODUCTION

1. The area served by the Western Central Atlantic Fisheries Commission (WECAFC) extends from Cape Hatteras in North Carolina, United States (35°N), to just south of Cape Recife in Brazil (10°S). It includes an area of approximately 15 million km^2 of which approximately 1.9 million km^2 is shelf area (Stevenson 1981). The major subdivisions in the area are the Southeast coast of the United States, the Gulf of Mexico, the Caribbean Sea and the Northeast coast of South America which includes the Guianas and Brazil (Figure 1 and Table 1).

2. The Western Central Atlantic Fishery Commission includes FAO Statistical Area 31 and the portion offshore of northern Brazil, which falls into Area 41. The major island sub-divisions in Area 31 are the Bahamas and adjacent banks and islands, which account for over half of the islands and banks shelf area, the Greater Antilles (Cuba, Puerto Rico, the Virgin Islands, and Hispaniola), and the Lesser Antilles (Stevenson 1981).

3. The Western Central Atlantic area is characterized by anti-cyclonic (i.e. clockwise) flow of currents. The South Equatorial Current flows westwards just north of the equator and divides into the Guiana current flowing northwards into the Caribbean and the southward flowing Brazil Current (Stevenson 1981). Northward the equatorial Atlantic water flows through the eastern Caribbean, mainly between Barbados and Tobago where it forms the "core" of the westward flowing Caribbean Current which occurs approximately 200 km north of South America (Appeldoorn *et al.* 1987). There is also the North Equatorial Current which flows north to north-west through the Antilles, entering the region at approximately 14 to 15^{0}N (Appeldoorn *et al.* 1987). The water entering the Caribbean then flows through the Yucatan Channel, as the Caribbean Current, and leaves the Gulf of Mexico through the Florida Straits where it forms the Gulf Stream, flowing northwards along the east coast of the United States of America and Canada (Stevenson 1981). However, the area is also marked by substantial variability, with counter currents, meanders and eddies (Stevenson 1981) and Appeldoorn and his colleagues (1987) described the flow

through the Antilles as being “complex and variable”. The region also comes under the influence of runoff from the major rivers discharging into the region, including the Mississippi, Orinoco and Amazon Rivers.

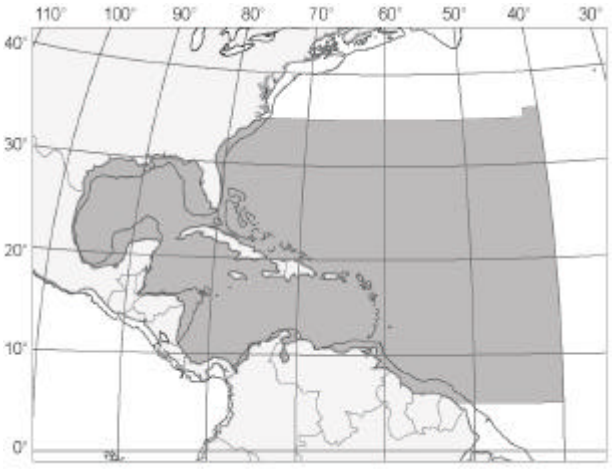


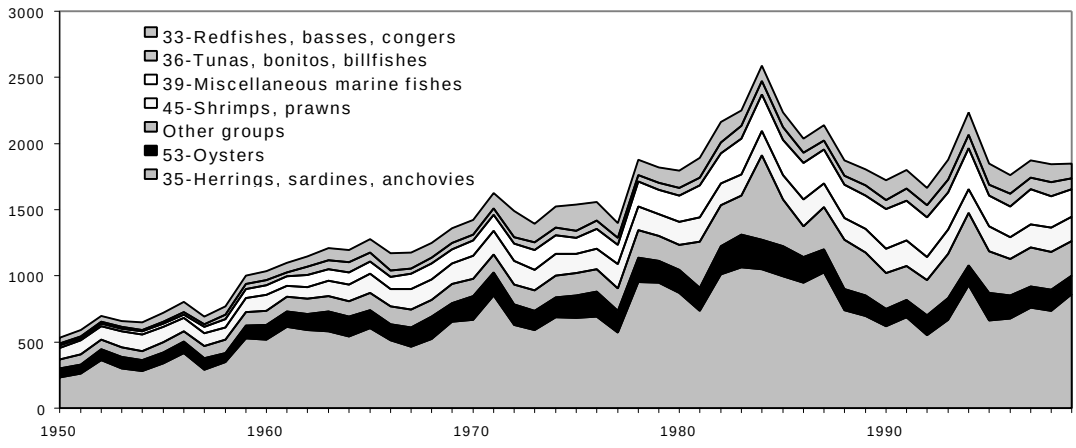
Figure 1 - The Western Central Atlantic (Area 31)

Table 1 Locality and area of the major coastal shelf zones in the western central Atlantic (Stevenson 1981).

LOCATION	AREA ('000 km^2)
Continental Shelf	
U.S. east coast	110
Gulf of Mexico	600
Yucatan – Eastern Venezuela	250
Guyana, Surinam, French Guiana	200
Northern Brazil	360
TOTAL	1520
Islands	
Islands and offshore banks	380
GRAND TOTAL	1900

4. The fish resources of the WECAFC area are extremely diverse. Cervigón et al. (1993) stated that about 680 species of bony fish of interest to fisheries and about 49 species of sharks occur in the waters of the northern (Atlantic) coast of South America from the border between French Guiana and Brazil to Colombia. When the invertebrates exploited by fisheries and additional species of the Gulf of Mexico and the Antilles islands are included, the number of species is even higher.

Figure 2 Annual nominal catches ('000 t) by ISSCAAP species group in the Western Central Atlantic (Area 31)

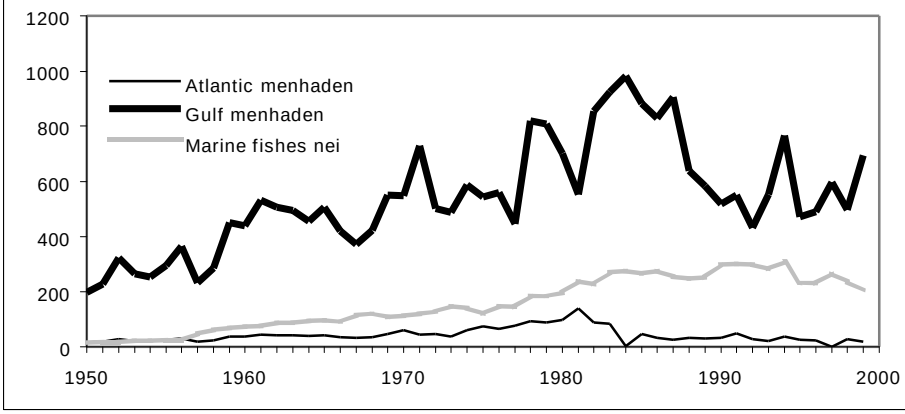


PROFILE OF CATCHES

5. Nominal catches from the region increased steadily from approximately 500 000t in 1950, to a peak of approximately 2.5 million tonnes in 1984. They subsequently declined but showed some increases in the early 1990s, with 2.2 million tonnes being landed in 1994 but seem to have stabilised at around 1.8 million tonnes in recent years (Figure 2).

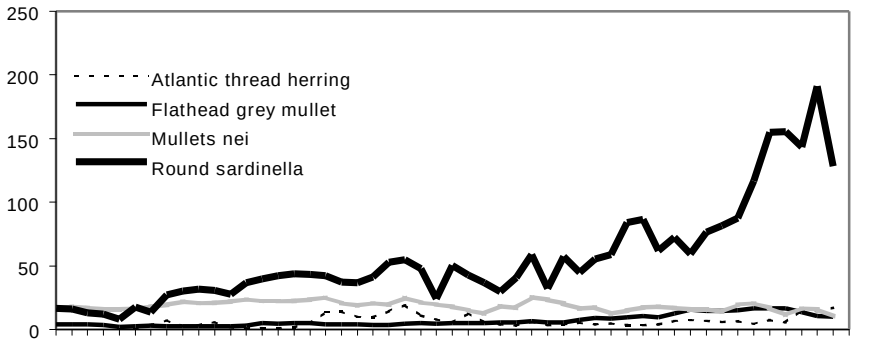
6. Overall, small pelagics accounted for the largest catches by mass and fishes from seven families dominate small pelagics catches in the region. These are: Exocoetidae (flyingfish); Clupeidae (herrings and sardines); Engraulidae (anchovy and anchoveta); Carangidae (jacks, bumpers and scads); Hemiramphidae (halfbeaks); Belonidae (needlefish) and Mugilidae (mullet). The ISSCAAP group making the largest contribution to catches continues to be Group 35 Herrings, sardines, anchovies. This group is dominated by the Gulf menhaden (*Brevoortia patronus*) which occurs from the Yucatan Peninsula to Florida. Catches of the species increased irregularly from about 200 000t in 1950 to close to one million tonnes in 1984 but have shown a general decline since then, varying around approximately 500 000t during the 1990s (Figure 3). There was also an important fishery for the other menhaden species, Atlantic menhaden (*B. tyrannus*), with peak catches of 140 000t in 1981, but the fishery declined steeply in subsequent years to 4 000t in 1984. Catches have generally been under 40 000t since 1992 and were less than 20 000t in 1999 (Figure 3).

Figure 3 - Annual nominal catches ('000t) of selected species in ISSCAAP Groups 35 and 39



7. The round sardinella (*S. aurita*) is also an important small pelagic species and total catches of this species increased steeply from 59 000t in 1990 to almost 200 000t in 1998 but fell back sharply to 128 000t in 1999 (Figure 4). Landings of this species are mostly recorded by Venezuela. Other small pelagic species occurring in ISSCAAP Groups 34 (Jacks, mullets, sauries) and 35 include the flathead grey mullet (*Mugil cephalus*), unidentified mullets and the Atlantic thread herring (*Opisthonema oglinum*), all of which have generated catches under 20 000t in recent years (Figure 4). There has been a substantial increase in catches of the unidentified jacks and crevalles of the genus *Caranx*. Fished mainly by Mexico and Venezuela, catches of this group have approximately doubled from the early 1980s, reaching a peak of over 12 000t in 1997 and 1998 but declining to just under 10 000t in 1999. The four-winged flyingfish (*Hirundichthys affinis*) supports locally important fisheries in some of the lesser Antilles islands, including Barbados, Grenada and Tobago. Catches of this species peaked at nearly 6 000t in 1988, but more typically fluctuate between 1 000 and 3 000t, as they did throughout the 1990s. The common dolphinfish (*Coryphaena hippurus*) is another pelagic species important to the small island states. It is also landed by the United States and Mexico and a directed fishery for the species has developed in Venezuela in recent years. Catches of common dolphinfish in the region doubled from 2 000t in 1984 to 4 300t in 1997.

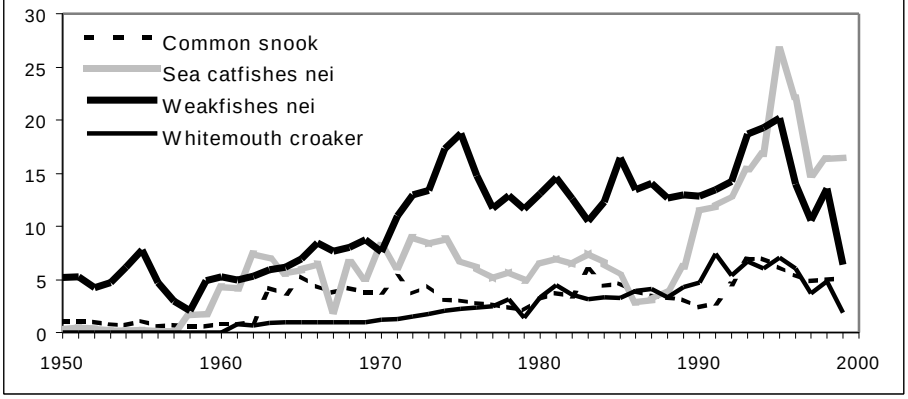
Figure 4 - Annual nominal catches ('000t) of selected species in ISSCAAP Groups 34 and 35



8. The ISSCAAP Group 33 – redfishes, basses, congers also makes an important contribution to the catches of the region (Figure 2). This group covers a wide diversity of species, of which the following contribute most to catches : sea catfishes (*Ariidae*); the groupers, seabasses etc. (*Serranidae*) especially the groupers (*Epinephelus spp.*); grunts, sweetlips (*Haemulidae*); snappers, jobfishes (*Lutjanidae*), especially the unidentified snappers (*Lutjanus spp.*) and the yellowtail snapper (*Ocyurus chrysurus*); croakers, drums (*Sciaenidae*) especially the weakfishes (*Cynoscion spp.*) and the whitemouth croaker (*Micropogonias furnieri*); the ponyfishes (*Leiognathidae*); and the snooks (*Centropomidae*) especially the common snook (*Centropomus undecimalis*). The catches made up by members of this group totalled 113 000t in 1999 compared to an average annual value of 140 000t during the 1990s as a whole.

9. The redfishes, basses, and congers can be subdivided into two broad groups based on habitat: those occupying areas with soft substrata and those typically occurring over reefs. Amongst those occupying areas with soft strata, unidentified sea catfishes have accounted for the highest catches in recent years, and these showed a substantial increase from under 5 000t in 1988 to over 26 000t in 1995 but have subsequently declined to less than 20 000t (Figure 5). These species are recorded on the FAO database as

Figure 5 - Annual nominal catches ('000t) of selected soft-bottomed demersal species

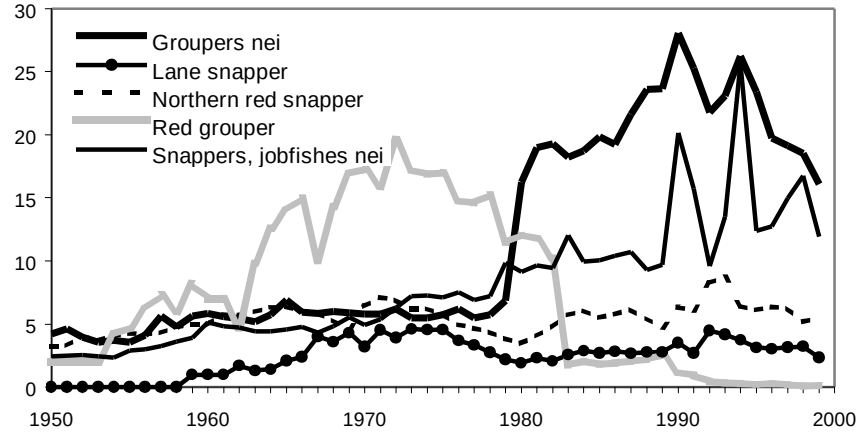


being landed by mainland countries. Unidentified weakfishes peaked at over 20 000t in 1995 but have also subsequently declined, falling to 6 400t in 1999 (Figure 5). Catches from Mexico and the United States of America, identified as spotted weakfish (*Cynoscion nebulosus*), contributed additional catches of weakfish of over 6 000t in 1998 and 1999. The whitemouth croaker and common snook were also important contributors to catches of fish from soft-bottomed habitats. Catches of both these species have shown increases since 1950, with the whitemouth croaker generating catches of near 5 000t in 1998, but with

only 1 900t recorded in 1999, and the common snook producing catches of over 5 000t in 1998 and 1999 (Figure 5).

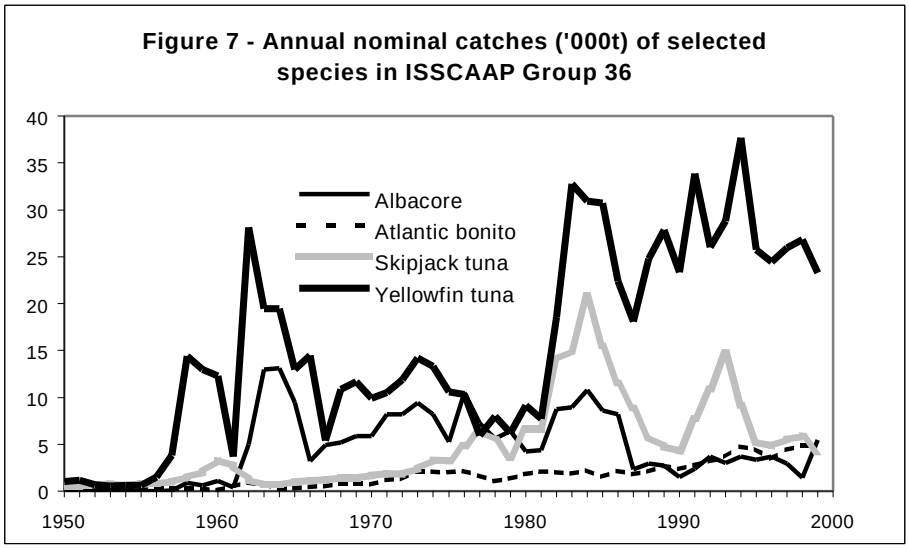
10. Amongst the dominant reef fishes in catches, those of unidentified groupers increased markedly in the late 1970s and early 1980s, from under 10 000t, to above 20 000t which they maintained until 1995, subsequently falling to 16 000t in 1999 (Figure 6). Catches of red grouper (*Epinephelus morio*) fell from a peak of 19 600t in 1972 to 119t in 1999, while those recorded for Nassau grouper (*E. striatus*) fell from 3200t in 1962 to 429t in 1999. However, the WECAFC Scientific Advisory Group, at their meeting in Trinidad in April 2001, suggested that some landings of red grouper may not be being recorded as such, thereby leading to an underestimate of true landings. Catches of the unidentified snappers and jobfishes have shown a substantial increase from under 5 000t in 1950 to more than 25 000t in 1994 although they have declined since then. Catches of northern red snapper (*Lutjanus campechanus*) have remained relatively constant, as have those of lane snapper (*L. synagris*) over the last two decades.

Figure 6 - Annual nominal catches ('000t) of selected reef species

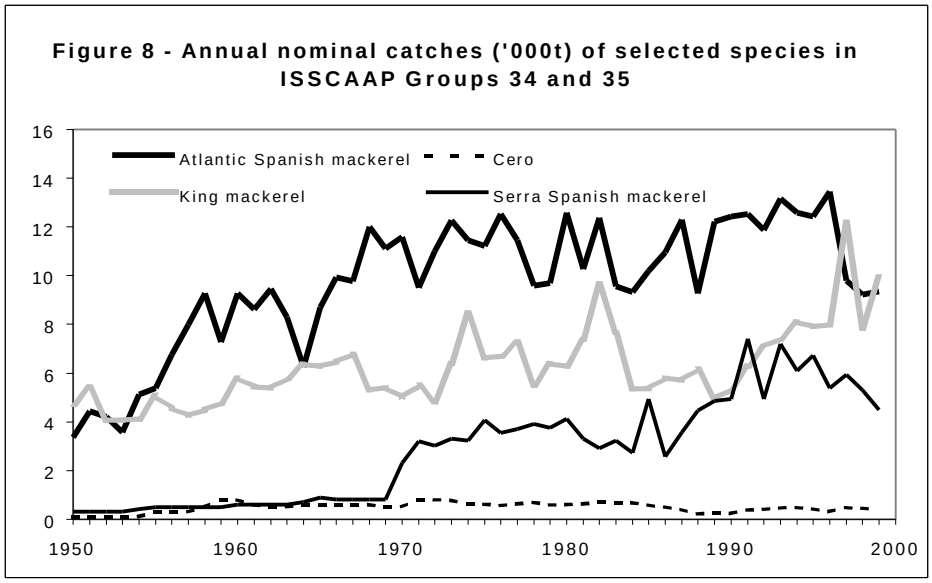


11. There are also important fisheries for snapper on the Brazil-Guianas shelf, targeting particularly the southern red snapper (*L. purpureus*) but also lane snapper and the Vermillion snapper (*Rhomboplites aurorubens*). Several of the countries of the Brazil-Guianas shelf have local and foreign fleets fishing for snapper in their waters and Venezuelan vessels are particularly active, fishing legally in the EEZs of most countries in the area. Catches have not been recorded on the FAO fisheries database, but Venezuelan authorities have reported that between about 3 500 and 5 000t of southern red snapper are landed annually in Venezuela, with over 50% caught in foreign waters (FAO 2000).

12. The catches of ISSCAAP Group 36 tunas, bonitos, and billfishes have increased over the last three decades and catches during the 1990s averaged 89 000t (1999 catches = 82 000t), compared to averages of 79 000t in the 1980s and 53 000t in the 1970s. For management purposes, this group is divided into two sub-groups, the oceanic species whose distribution extends beyond the WECAFC region and can be trans-oceanic, and the coastal large pelagics whose distribution is largely confined to the WECAFC region. Amongst the oceanic species, by far the largest catches are for yellowfin tuna (*Thunnus albacares*), catches of which increased steeply in the early 1980s, as a result of increasing fishing effort mainly by fleets from within the region. Some 23 000t of the species were landed in 1999, compared to about a quarter or less of this for the other major species (Figure 7).



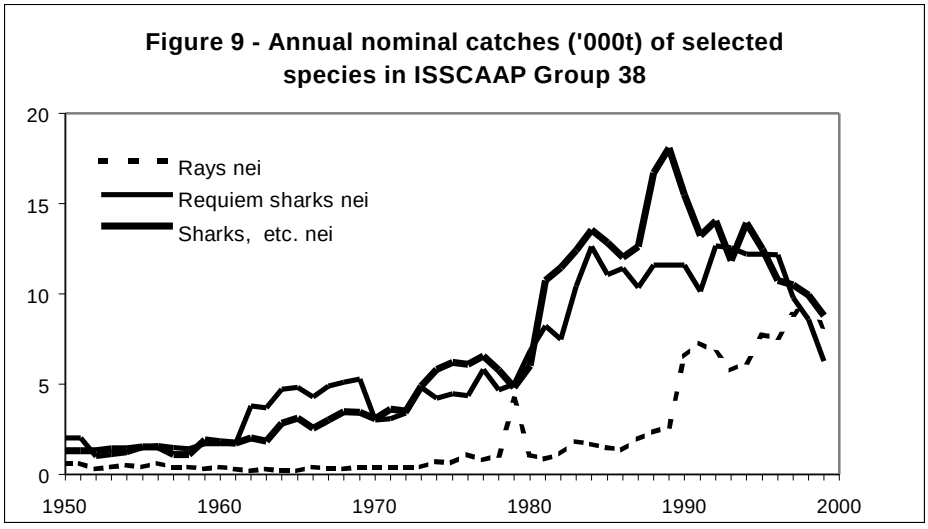
13. The coastal large pelagic catches were dominated by four species of *Scomberomorus*. These were, in 1999, king mackerel (*S. cavalla* - 10 000t) and Atlantic Spanish mackerel (*S. maculatus* - above 9 000t), Serra Spanish mackerel (*S. brasiliensis* – 4 500t) and Cero (*S. regalis*) of which only 411t were landed. Catches of Serra Spanish mackerel increased considerably between 1970 and 1997 (Figure 8).



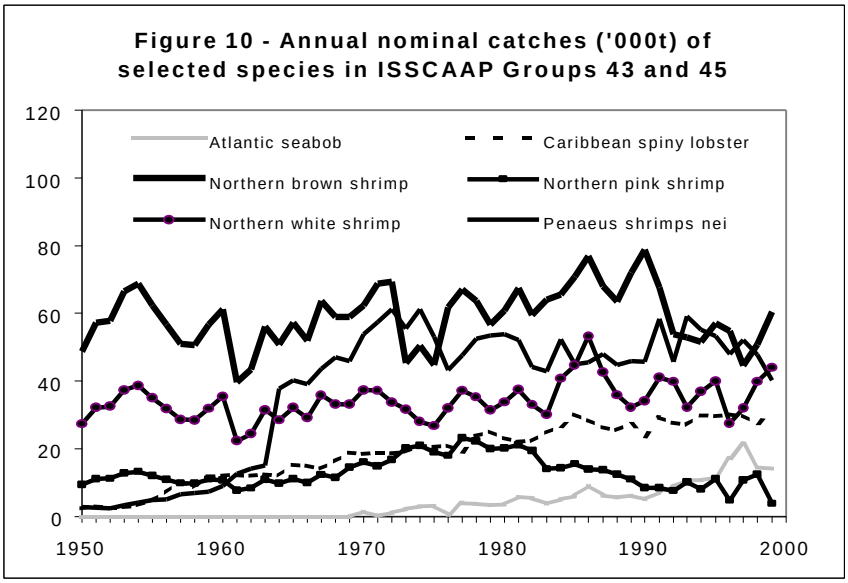
14. Sharks have attracted considerable attention in recent years, as concerns have been raised about their over-exploitation. Within the WECAFC region, recorded catches escalated substantially after 1950 (Figure 9) and peaked at nearly 37 000t in 1994. Since then, however, they have fallen steadily and only 23 000t was recorded in 1999. The fact that little information is available on the species composition of the landings reinforces the need for careful monitoring.

15. A report by Yegres *et al.* (1996) on the shark fishery in Venezuela, operating beyond the EEZ of that country in both the Caribbean Sea and the Atlantic Ocean in the south western reaches of the WECAFC area, listed 31 shark species as being caught. The most common, by number, in the industrial fleet included blue shark (*Prionace glauca* - 36%), reef shark (*Carcharhinus springeri* - 14%), and short-fin mako (*Isurus oxyrinchus* - 12%), and in the artisanal fleet, Caribbean sharpnose shark (*Rhizoprionodon*

porosus - 21%), scalloped hammerhead (*Sphyrna lewini* - 14%) and smalleye hammerhead (*S. tudes* - 12%). Bonfil (1997) reported that 34 species of shark occur in the Mexican waters of the Gulf of Mexico, of which 14 are important in fisheries and nine of these he described as being of "prime importance". Included in the nine most important were five *Carcharhinus* species and two *Sphyrna* species.



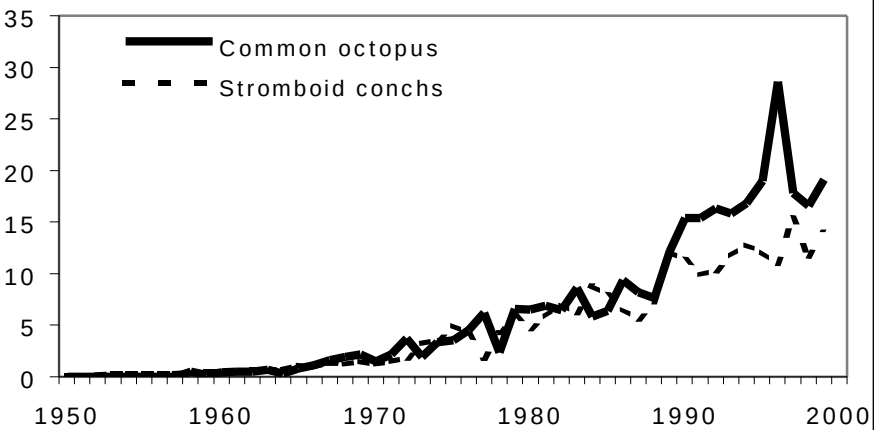
16. Some of the most valuable fisheries in the Western Central Atlantic are crustacean fisheries, in particular that for Caribbean spiny lobster (*Panulirus argus*) and those for a number of shrimp species, particularly penaeid shrimps (Figure 10). Catches of spiny lobster have been consistently above 27 000t since 1991 and reached their highest recorded level of 31 500t in 1999. With a high monetary value per unit mass, spiny lobster represents one of the most valuable fishery resources in the region. Recorded catches of unidentified penaeid shrimps have varied without meaningful trend between approximately 40 000 and 59 000t since the mid-1970s, with the minimum during this period of 40 100t being recorded in 1999. The most productive shrimp species is the northern brown shrimp (*Penaeus aztecus*), with 1999 catches of over 60 000t, followed by the Northern white shrimp (*P. setiferus*) with catches of 44 000t in the same year. Recorded catches of Atlantic seabob (*Xiphopenaeus kroyeri*) increased in recent years from approximately 5 000t in 1990 to 21 000t for 1997, but fell back to 14 000t in 1998 and 1999.



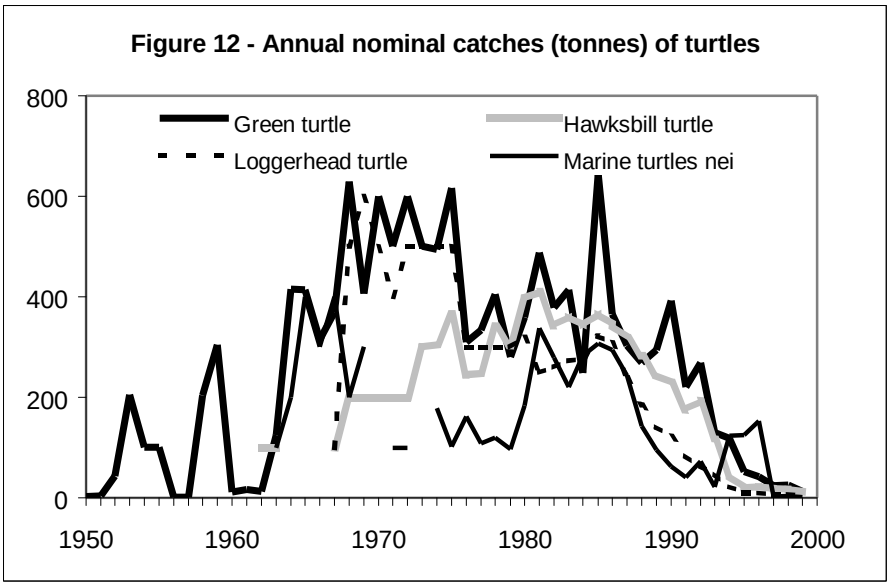
17. Amongst the molluscs, the highest catches (given in total weight, including shell) in recent years have been of American cupped oyster (*Crassostrea virginica*), which peaked at 159 000t in 1983, fell to 59 000t in 1991 but remained above 85 000t from 1993 to 1999 inclusive, and ark clams (*Arca spp.*) of which over 40 000t were landed in 1999. Catches of calico scallop (*Argopecten gibbus*) have been highly variable, peaking at nearly 400 000t total weight in 1984, but with zero catches recorded in 1991 - 1993 and again since 1996.

18. Two resources in which substantial increases have been observed in recent years are the octopus, recorded as common octopus (*Octopus vulgaris*), and the stromboid conchs (*Strombus spp.*). Catches of both have increased steadily since 1950 (Figure 11). Catches of common octopus were slightly over 8 500t in 1983 and have subsequently climbed to an average of over 18 000t in the 1990s, with the highest recorded catch of over 28 000t in 1996. The increase in catches of stromboid conchs has been less steep but nevertheless marked, rising from an annual average of 3 200t in the 1970s to over 12 000t in the 1990s.

Figure 11 - Annual nominal catches ('000t) of Common octopus and stromboid conchs



19. All species of Chelonidae, the sea turtles, have been listed on CITES Appendix 1 since 1977. Despite this, landings of the three species recorded on the FAO database for the WECAFC area (green, hawksbill, loggerhead) and those not identified, remained high until the late 1980s and, in fact, peaked at 1 600t in 1985. Thereafter, they declined rapidly, falling to only 31t in 1999, made up mainly of green and hawksbill turtles (Figure 12). Marine turtles are harvested and utilised in the WECAFC region for a range of uses from subsistence to provision of luxury items (Fleming, 2001).



RESOURCE STATUS AND FISHERY MANAGEMENT

20. The capacity for effective fisheries management differs markedly between the different coastal states of the Western Central Atlantic. In some countries there are appropriate institutions, with fishing and fisheries being monitored and controlled in attempts to ensure sustainable utilisation, while in others fisheries are largely unmanaged or managed only in a rudimentary manner. However, even amongst the most advanced fisheries management agencies in the region, there are problems in coping with the high species diversity and from the region as a whole there is little information on the status of the important resources and even less on the hundreds of species of lesser importance to the region's fisheries. This is, again, reflected in the 2000 Report to Congress by the National Marine Fisheries Service (NMFS) of the United States. In this report, it is recorded that of the 57 stocks falling under the jurisdiction of the Gulf of Mexico Fisheries Management Council (GMFMC), the status of 46 (81%) was unknown or undefined, while of the 179 stocks falling under the jurisdiction of the United States Caribbean Fisheries Management Council (CFMC), the status of 175 (98%) was unknown or undefined. Such uncertainty applies to a country with one of the highest, if not the highest, capacity for fisheries assessment and management in the region, and therefore the position in most other countries is likely to be similar or worse.

21. Based on their stock sizes, neither of the two menhaden species, the Gulf and the Atlantic menhaden, are considered to be overfished (NMFS 2001). Amongst the small pelagics, quantitative estimates of status are available only for the round sardinella in Venezuela, which supports an important local fishery. Using virtual population analyses (VPA) techniques, Mendoza, Fréon and Guzmán (1994) estimated that the stock was lightly exploited at that time, but that may have changed with the increased annual catches showed in Figure 4. The general understanding of the stock status of small pelagics in the region is that they vary from under- to fully-exploited (FAO 1998).

22. Within the groundfish species, dominated by ISSCAAP Group-33, Redfish, basses and congers, NMFS (2001) recorded four Gulf of Mexico stocks, the Red snapper (*Lutjanus campechanus*), Red grouper (*Epinephelus morio*), Nassau grouper (*Epinephelus striatus*), Jewfish (*Epinephelus itajara*) and Red drum (*Sciaenops ocellatus*) as being overfished, while the Gag grouper (*Mycteroperca microlepis*) is estimated to be approaching an overfished condition. Overfishing was reported to be occurring on the Red snapper, Red grouper, Gag grouper and Vermilion snapper (*Rhomboplites aurorubens*). The status of the large majority of remaining reef fishes falling under the jurisdiction of the GMFMC was unknown.

23. Within the area under the jurisdiction of the CFMC, the local stocks of Nassau Grouper, Jewfish and Queen conch are considered to be overfished and the stock of Spiny lobster not to be overfished. Overfishing was not considered to be occurring at the time of reporting on Spiny lobster, Nassau Grouper and Jewfish but to be taking place on the Queen conch resource. The status of the remaining Caribbean stocks is reported to be unknown (NMFS 2001). Red grouper in the coastal waters of Mexico has been estimated to be over-exploited (Arenas and Díaz de León 1998).

24. Some recent work has been undertaken, and is on-going, on the groundfish stocks of the Brazil-Guianas shelf, under the auspices of the CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP) and the FAO WECAFC *ad hoc* Working Group on the Shrimp and Groundfish Fishery of the Brazil-Guianas Shelf. The data are sparse and the results only preliminary, but using yield and spawner biomass per-recruit reference points, there are indications that the stocks which have been examined, predominantly soft bottom dwellers, are being overexploited. The stocks which have undergone preliminary analyses include some local stocks of whitemouth croaker (*Micropogonias furnieri*), Jamaica weakfish (*Cynoscion jamaicensis*) and green weakfish (*C. virescens*), smalleye croaker (*Nebris microps*), and king weakfish (*Macrodon ancylodon*) (FAO 1999, 2000). A recent assessment of *L. purpureus* in French Guiana, showed indications of over-exploitation of the stock (Charuau 2000). At a meeting of senior decision-makers from the fisheries agencies of the six Brazil-Guianas countries (Brazil, Guyana, French-Guiana, Surinam, Trinidad and Tobago, and Venezuela), the delegates undertook to continue, and strengthen as far as practicable, national and regional efforts for responsible management of these fisheries resources (FAO 2001a).

25. Apart from these scientifically-based estimates, there is a general acceptance of the fact that the inshore reef and groundfish resources are commonly fully exploited and some are over-exploited (FAO 1998). Mahon (1993) reported that "It is generally accepted that reef fish resources of the island platforms are extremely overexploited in most Lesser Antillean countries".

26. There is considerable interest amongst some states of the region in expanding their fisheries for large pelagics, both oceanic and coastal, and in recent years fisheries for these stocks have increased considerably. FAO is currently assisting the CARICOM countries of WECAFC, through a Technical Cooperation Project, in planning future development of their fisheries for large pelagics. The stocks being targeted by these expanding fisheries fall under the mandate of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Recent assessments (ICCAT 1999) of the status of the most important stocks in the WECAFC area indicate that yellowfin tuna, which is considered to consist of a single Atlantic stock, is fully-exploited and possibly over-exploited. The stock structure of skipjack tuna (*Katsuwonus pelamis*) is not well known, but it is treated as two management units, an eastern and a western unit. ICCAT (1999) considered that "a state of over-exploitation of skipjack seems to have been reached" for the western management unit. ICCAT (1999) considers albacore (*Thunnus alalunga*) to consist of a northern, a southern and a Mediterranean stock, and the northern, of primary interest to WECAFC, is considered to be fully or over exploited. ICCAT did not provide an estimate of the status of Atlantic bonito (*Sarda sarda*).

27. Amongst the coastal species, the status of Serra Spanish mackerel and Cero is unknown. NMFS (2001) considered a Gulf of Mexico "group" of the king mackerel to be overfished, while the Atlantic "group" is considered to be "not overfished". Marcano *et al*. (1999) found no signs of overexploitation of King mackerel in their study on a fishery for the species in eastern Venezuela. Neither the Gulf nor the Atlantic "groups" of Atlantic Spanish mackerel are considered overfished by NMFS.

28. The status of the stocks of sharks in the region is poorly understood, but there is concern due to their vulnerability to over-exploitation. Bonfil (1997) referred to some assessments undertaken on shark in Mexico, suggesting fishing mortalities ranging from approaching that yielding the maximum sustainable yield (F_{MSY}) to above them. However, he stressed the preliminary nature of these assessments. He did draw attention to the concentration of fishing effort on juvenile sharks in Mexico, which he suggested was

one of the most important concerns in these fisheries. Many of the stocks of shark in Area 31 are likely to be widely distributed and hence to require regional and international co-operation for adequate fishery management.

29. The status of the Caribbean spiny lobster was examined at three WECAFC workshops held in 1997, 1998 and 2000, attended by scientists from all the major lobster producing nations in the region (FAO 2001b, 2001c) and, in the case of the 2000 workshop, also by senior decision-makers from these countries. The results from these workshops indicated a resource that is being fully or over-exploited throughout much of its range, although there were insufficient data from some areas to estimate the status reliably. The workshops concluded that in most countries there is an urgent need to control and in many cases to reduce the fishing effort in the lobster fisheries. As many countries have open access to their lobster fisheries, this may require implementing restricted entry systems into the fishery, ensuring that the resulting total effort is commensurate with the productivity of the resource, and that the licensed fishers are able to obtain acceptable economic returns. In some areas, the size of the lobsters being caught was smaller than desirable and in these cases it was recommended that suitable minimum size restrictions should be implemented and enforced.

30. The other valuable crustacean fisheries in the region are those for shrimp, mainly penaeid shrimp, and also the Atlantic seabob. Stocks of brown, pink (*Penaeus duorarum*), white (*P. setiferus*) and royal red shrimp (*Hymenopenaeus robustus*) have been estimated by the GMFMC not to be overfished in that region, while the status of seabob (*Xiphopenaeus kroyeri*) is unknown. The CFRAMP/WECAFC workshops referred to above (FAO 1999, 2000) have made good progress in assessing the status of important shrimp stocks in the Brazil-Guianas continental shelf, along the coastline of Venezuela, Trinidad and Tobago, Guyana, Surinam, French Guiana and the northern coast of Brazil. The results suggest that in most cases, the national stocks which have been assessed of southern white shrimp (*P. schmitti*), southern pink shrimp (*P. notialis*) and brown shrimp (*P. subtilis*) are not being biologically overexploited but were probably being fished above the economic optimum fishing effort. There are indications of high rates of fishing mortality on red spotted shrimp (*P. brasiliensis*).

31. Amongst the molluscs, the recent catches of octopus (*O. maya*) are estimated not to be sustainable (Arenas and Díaz de León 1998). One molluscan stock which has been the subject of considerable study is the Queen conch (*Strombus gigas*). At the Queen Conch Stock Assessment and Management Workshop held in Belize in March 1999, it was found that many countries did not have sufficient or suitable data to make reliable estimates of the current status of the stocks (CFMC and CFRAMP, 1999). In those cases where there were sufficient data, the estimated status varied from lightly to over-exploited. The Second International Queen Conch Conference was held in the Dominican Republic in July 2001.

32. At the CITES Conference of the Parties held in April 2000, a proposal was put forward by Cuba to downlist the Cuban population of hawksbill turtles from Appendix I to Appendix II, which would have allowed international trade for this population. However, the proposal was unsuccessful. The status of management of turtles varies considerably between the countries of the region and in some countries the marine turtle populations have increased under effective management programmes, while in others there have been substantial declines. At the 21st Annual Symposium on Sea Turtle Biology and Conservation, held in the United States of America in February 2001, it was agreed that a special group on marine turtles should be formed to investigate the impact of incidental fishing on sea turtle populations and to establish a framework of reference for conservation and regulation for the controlled use of this resource.

33. Overall, the discussion above reflects the great uncertainty regarding the status of even the more important fisheries resources of the region. There are no easy solutions to this problem. The Western Central Atlantic is a region with a high diversity of species and this is compounded by what is most probably a very complex stock structure arising from the complex patchwork of continental shelf, traversed by several major rivers, and many island platforms. It is therefore not surprising that knowledge of the status of stocks is sparse. However, in order to conserve and maintain the social and economic benefits

being derived from the region's marine resources, it is important that those states lacking sufficient information take steps to monitor and assess at least selected key and indicator stocks. In some cases it may be sufficient to monitor the trends in species groups or communities, although attention may then need to be given to the relative abundance of species of particular conservation concern. As so many of the resources are shared between two or more countries, this will also require close co-operation at a variety of international levels.

34. Within each country, it is recommended that the key species or groups from a socio-economic perspective, as well as selected indicator species or groups for each major habitat type and taxonomic group, are carefully monitored and regularly assessed, including sub-regionally or regionally as appropriate. This will require at least adaptation and, frequently, improvement, to existing fishery monitoring and data collection programmes and systems. As already mentioned, the fisheries of the region are frequently marked by high species diversity and, while single-species management approaches have a key role to play in some of the fisheries, consideration should also be given to implementing management measures and strategies that are less demanding of high quality, recent data, and that are more robust to uncertainties in the available information. Management measures such as suitable control on total effort and greater use of closed areas (Marine Protected Areas) would be appropriate in many fisheries and habitats.

35. This may require additional financial commitments in several countries, and these additional financial resources are likely to be hard to find. However, in considering the costs of effective management, attention also needs to be given to the severe social and economic consequences of the alternative to effective management, which alternative is almost certain over-exploitation of resources, resulting in their depletion and the loss of the benefits being derived from them.

SUGGESTED ACTION BY THE COMMISSION

36. It is suggested that the Commission examine the groups of resources where there is particular cause for concern, either because current catches are considerably lower than the historically highest levels, reflecting decreases in abundance, or where a lack of information makes accurate assessment of the true state of the resources impossible. To a lesser or greater extent, one of these two conditions applies to all the groups discussed in this report but examples of resources of particular fisheries or conservation interest which are not currently receiving close attention at a regional scale include: a number of the soft-bottom and reef dwelling species of redfish, basses and congers; and the large pelagics, in particular the coastal large pelagics. The Commission may wish to discuss means of addressing these problems at a regional or sub-regional level.

37. The International Plan of Action for the Conservation and Management of Sharks was adopted at the 23rd Session of COFI in February 1999. This WECAFC report draws attention to the lack of detailed information on catches of shark in the WECAFC area, especially with regard to the taxonomic composition of catches. The WECAFC Scientific Advisory Group proposed that there was a need for WECAFC countries to improve their sampling programmes to collect information on sharks at the lowest appropriate taxonomic level. The Commission may wish to discuss the feasibility of this proposal and means to achieve it at a regional level.

38. Some progress has been made in improving assessment and management of some resource groups at a regional and sub-regional level through the activities of Working Groups, several of which fall under WECAFC. These Working Groups include those focussing on: the Brazil-Guianas shrimp and groundfish fisheries; Caribbean spiny lobster; flyingfish; and queen conch. The Commission may wish to consider means of strengthening the activities of these groups and the need to address other resources in the same cooperative manner.

APPENDIX

SOME SOURCES OF INFORMATION

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