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**WEST AFRICAN LIVING MARINE RESOURCE
CONSERVATION AND MANAGEMENT**

Prepared for

Office of the Assistant Secretary of Defense
for International Security Affairs,
Washington, D.C.

March, 1985

Resources Development Associates, Inc.
P.O. Box 407 (570 Main Street)
Diamond Springs, CA 95619
(916) 622-8841

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ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

INTERNATIONAL
SECURITY AFFAIRS

MEMORANDUM FOR DISTRIBUTION

SUBJECT: African Coastal Security - RDA Report

The attached report on "West African Living Marine Resource Conservation and Management," prepared by Resources Development Associates under ISA sponsorship, provides a wealth of basic data which should be very useful in our further consideration of the WACS initiative. It also has a set of basic conclusions and recommendations which should help us in our program planning efforts. The principal recommendations propose:

- Further funding support to the CECAF Project, which provides the only reliable source of fisheries statistical data for NW Africa.
- Launching of pilot country programs in Guinea-Bissau, Guinea, and Mauritania; programs possibly to include training for on-board observers, and equipment and technical assistance for surface patrol and aerial monitoring.
- Provision of available unclassified satellite technology to aid in monitoring.
- Study of the anticipated impact of effective enforcement and management of marine fisheries resources by the West African states.

I am not committed, at this point, to any of these particular recommendations, but I do think they deserve serious consideration. We need to firm up our plans for FY86 in the near future, and I think the RDA report will be useful in that regard. I look forward to your comments and suggestions. If you would like more copies of the report, or would like to recommend a broader distribution, please let me know. (Point of contact remains Randy Dentel, 4B746, 697-9753.)

A handwritten signature in black ink, appearing to read "Noel C. Koch", is positioned above the typed name.

Noel C. Koch
Principal Deputy Assistant Secretary
International Security Affairs

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1.0 EXECUTIVE SUMMARY

The waters off West Africa constitute one of the richest fishing grounds in the world. As the impacts of drought in Africa increase, the marine fisheries resource has become even more important to coastal African states, and in many cases is now viewed as the principal if not only remaining renewable protein resource. Management of this resource is particularly difficult given the current inadequate state of knowledge regarding the biological nature and geographic extent of this resource, its seasonal distribution and migration through the waters of several nations, its ability to reproduce and withstand sustained and often totally unrestricted harvesting activities, and the lack of regional rules and regulations which could act to conserve this essential resource. Heavy fishing by unlicensed foreign fleets poses a serious threat to the continued existence of this resource, and has significantly altered the biological composition of fish stocks off the West African Coast over the last decade.

Regional marine fisheries management and conservation is an item of extreme concern and high priority to almost every coastal West African nation, and has been the subject of repeated requests for assistance to U.S. Embassies and AID offices. This project was conceived as a first step in structuring an appropriate U.S. response. Its objective was to review the existing situation and prepare a report addressing the issues and problems associated with marine fisheries management and conservation in the Extended Economic Zones of the West African countries of Mauritania, Senegal, Gambia, Guinea-Bissau and Guinea. This report identifies appropriate areas for U.S. economic and technical support in the overall area of marine fisheries resource management and conservation, and makes specific recommendations for action.

1.1 Project Objectives and Goals

In August of 1984, Resources Development Associates, Inc., (RDA) was contracted to conduct a short-term study to identify pertinent issues and relevant approaches to this problem. The specific objective of the project was to

"conduct analysis and prepare a report addressing the issues and problems associated with marine fisheries conservation and management in the 200-mile Extended Economic Zone of the West African countries of Mauritania, Senegal, Gambia, Guinea-Bissau and Cape Verde" (later changed to substitute Guinea for Cape Verde).

In order to accomplish this objective, RDA was asked to perform the following tasks:

1. Assemble and review available information regarding marine fisheries resources and stocks in the EEZ areas of Mauritania, Senegal, Gambia, Guinea-Bissau and Guinea.
2. Assemble and review available oceanographic data (currents, upwelling, historical and seasonal water temperature) that could assist in determining marine fisheries resource migratory patterns.
3. Compile data and develop baseline information over an approximate 8 to 10 year period that will define the geographic distribution, extent and seasonal migration of the various fisheries resources, and changes that have taken place in recent years.
4. Compile catch, effort and economic data that will indicate harvest activity, relative value of the resource harvest, and value realized by the respective coastal states.

5. Visit the coastal states to review locally available statistical data, evaluate present marine fisheries resource conservation and management capabilities and needs, and assess local ability to support more advanced and technically complex conservation procedures.
6. Assess overfishing and other abuses of local regulations (particularly by the Soviet distant water fleet) and provide suggestions on how these problems might be addressed.
7. Assess costs and benefits to selected states of advanced conservation techniques and the development of other resource management capabilities.
8. Prepare a summary report illustrating existing situations and problems, with appropriate suggestions and recommendations.

In order to accomplish these tasks, RDA assembled a technical assistance team who traveled to the relevant countries of West Africa, conducted on-site evaluations of the existing problems and collected data regarding present fishing activity, fisheries policy, and the local and regional economics of the fishing industry.

1.2 Principal Conclusions

- o The Northwest African fishery in this study zone is a major and valuable resource. Total value of the reported catch was approximately \$1.4 billion in 1983. International trade journals have recently focussed attention on this resource and the attendant problems of management. Appendix A presents copies of some recent articles, including one by the First Deputy Minister of Fisheries of the Soviet Union.

- o The Coastal States do not have the capability to adequately monitor or control fishing operations in this area. As a direct consequence, illegal fishing and underreporting of catch is widespread. The effect is to substantially reduce the revenues otherwise accruing to these nations. Current estimates and available data on catch per unit effort, and data on the size distribution of the fish caught in Northwest African waters, confirm that some stocks are being depleted and that pressure on fish resources is increasing. In some cases, the stocks themselves may be irreparably damaged by overfishing. Appendix B presents a recent interview with a Russian fishing trawler Captain who defected to the West in 1982 in "ecological protest" against such destructive fishing policies.
- o The value of the resource taken illegally and not reported is estimated at \$400 - \$600 million per year. The Soviet Union and Eastern Bloc nations operate the largest fleets in this area, and report taking one-third of the entire reported catch in the area (950,000 metric tons in 1983). This figure is commonly believed to be less than half the catch actually taken. Available data indicates the actual Soviet catch may be three times that reported. Other distant-water fleets also underreport their catch, but to a lesser extent.
- o The United States has the technology to monitor fishing activity throughout the West African fishing zone. This technology can be transferred to the West African coastal states.

equipment (i.e., surface patrol vessels, aircraft, surveillance and communications equipment). The nations have requested such assistance.

- o Some additions to regional fishing laws and regulations are highly desired. These include requirements for highly visible and uniform marking on fishing vessels, radio reporting when entering and leaving an EEZ, and periodic activity reporting while in the zone. The nations have indicated their interest and in some cases have requested assistance to draft appropriate legislation.
- o Major portions of the fisheries resources are international in that they migrate through the waters of more than one nation. A multinational regional management approach would be desirable from a technical perspective. Unfortunately, regional management projects involving more than one country are unlikely to succeed at this time as the nations are reluctant to delegate direct control authority to any regional organization. Each nation would prefer its own program. Cooperation between programs (sharing of information, possible sharing of some equipment) is possible and exists at present to some extent.
- o Country programs should have a substantial technical assistance and training component. The Canadian program in Senegal is considered a failure by the Canadians themselves, as having been delivered to the Senegalese without adequate continuing technical support.

1.3 Principal Recommendations

There are a number of activities which should be pursued in order to improve the health of the fisheries stocks and to increase potential economic benefits to the coastal nations. The following areas of activity should ideally be undertaken as part of a coherent and coordinated project. The main recommendations include (1) the development of an effective information system, (2) clarification and development of effective fisheries policy, and (3) design and implementation of a surveillance, monitoring and control system.

- o The CECAF Project, headquartered in Dakar, Senegal, is the only reliable source of fisheries statistical data in the entire Northwest African region. This project is scheduled to effectively terminate operations in the very near future as a result of funding cutbacks within FAO. (See Appendix A) The continued existence of this project is considered essential to a regional understanding of marine fisheries resources in this area. Funding and support could logically be provided through USAID and this support is strongly recommended.
- o Country-level programs in either or both Guinea-Bissau and Guinea (Conakry) are recommended. Both countries have serious problems of a similar nature, and both countries have requested assistance from the United States. Training for on-board observers (to obtain basic data regarding the status of the stocks) and for fisheries management personnel could be provided through USAID. Equipment and technical assistance for surface patrol and aerial monitoring could be provided through the U.S. Department of Defense.

- o Pilot level programs established in either or both of these countries can serve as demonstration role models for other countries in the area. A project should be considered for Mauritania in the near future.
- o Available unclassified satellite technology could be provided to the coastal states and employed to monitor the location and activity of major fishing vessels in the West African zone. This would include all distant-water vessels operating in this area. The technology has been operationally demonstrated in U.S. waters. The technology could be introduced as part of a pilot project.
- o If the coastal states acquire the capability to adequately enforce their existing laws and effectively manage their marine fisheries resources, this will have a major and immediate economic impact on nations presently fishing illegally in this area. A study should be undertaken immediately to examine the spread of this impact, alternatives available and likely courses of action by affected nations, and the resulting political and economic consequences for the distant-water fishing nations as well as for the coastal states themselves.

2.0 MARINE FISHERIES RESOURCES IN NORTHWEST AFRICA

This study examines issues and problems associated with marine fisheries conservation and management in the 200-mile Extended Economic Zone (EEZ) of the Northwest African countries of Mauritania, Senegal, Gambia, Guinea-Bissau and Guinea. Information regarding the status of the marine resource in this region, its nature, extent, and level of exploitation is, in general, scattered and incomplete. The most reliable and complete statistical data is maintained in the files and records of the "CECAF Project" headquarters office in Dakar, Senegal. These data are compiled by geographical region and sub-region. This report primarily deals with the area from 26 degrees to 9 degrees North Latitude and extending from the coast offshore to approximately 20 degrees West Longitude. This area was selected to coincide with existing CECAF statistical divisions.

2.1 CECAF

The Fishery Committee for the Eastern Central Atlantic (CECAF) was established by the FAO in 1967. Its area of competence extends from the Straits of Gibraltar to the mouth of the Congo River. Its functions are "to promote, coordinate and assist national and regional programs of research and development leading to the rational utilization of the marine resources and to formulate management measures aimed at the conservation and improvement of these resources".¹ At the present time, CECAF is the only source of reliable statistical data on the regional and local fisheries of Northwest Africa.

Of the 20 coastal nations lying between Gibraltar and the Congo, all but Equatorial Guinea were members of the Committee at the end of 1983. Non-coastal members include such key distant-water fishing nations as

Spain, France, Japan, Korea and Norway and, from the eastern bloc, Romania and Poland. The United States is a member; the Soviet Union is not.

The CEECAF Project became operational in 1975 with headquarters in Dakar. It is managed by FAO with funding primarily from UNDP. FAO has announced that, due to funding restrictions, the project will be cut back to a single person "caretaker" function in early 1985. Unless new sources of funding are found, the CEECAF project will, for all practical purposes, expire by mid-1985.

2.2 The Project Area

For statistical purposes, the CEECAF area is divided into 12 divisions grouped into three subareas. These are:

1. The Northern Subarea, extending from the Straits of Gibraltar to 9 degrees north (roughly the border between Guinea and Sierra Leone). It has 3 coastal divisions.
2. The Southern Subarea, extending from 9 degrees north to the mouth of the Congo, with 5 coastal divisions.
3. The Oceanic Subarea, with the 4 remaining divisions, all of which are offshore.

This study is limited to two of the northern divisions:

1. The Sahara Coastal Division, extending coastwise from 26 degrees north to 19 degrees north and offshore to 20 degrees west.
2. The Cape Verde Coastal Division, bounded by 19 degrees north, 9 degrees north and 20 degrees west.

These divisions are shown on the map in Figure 1.

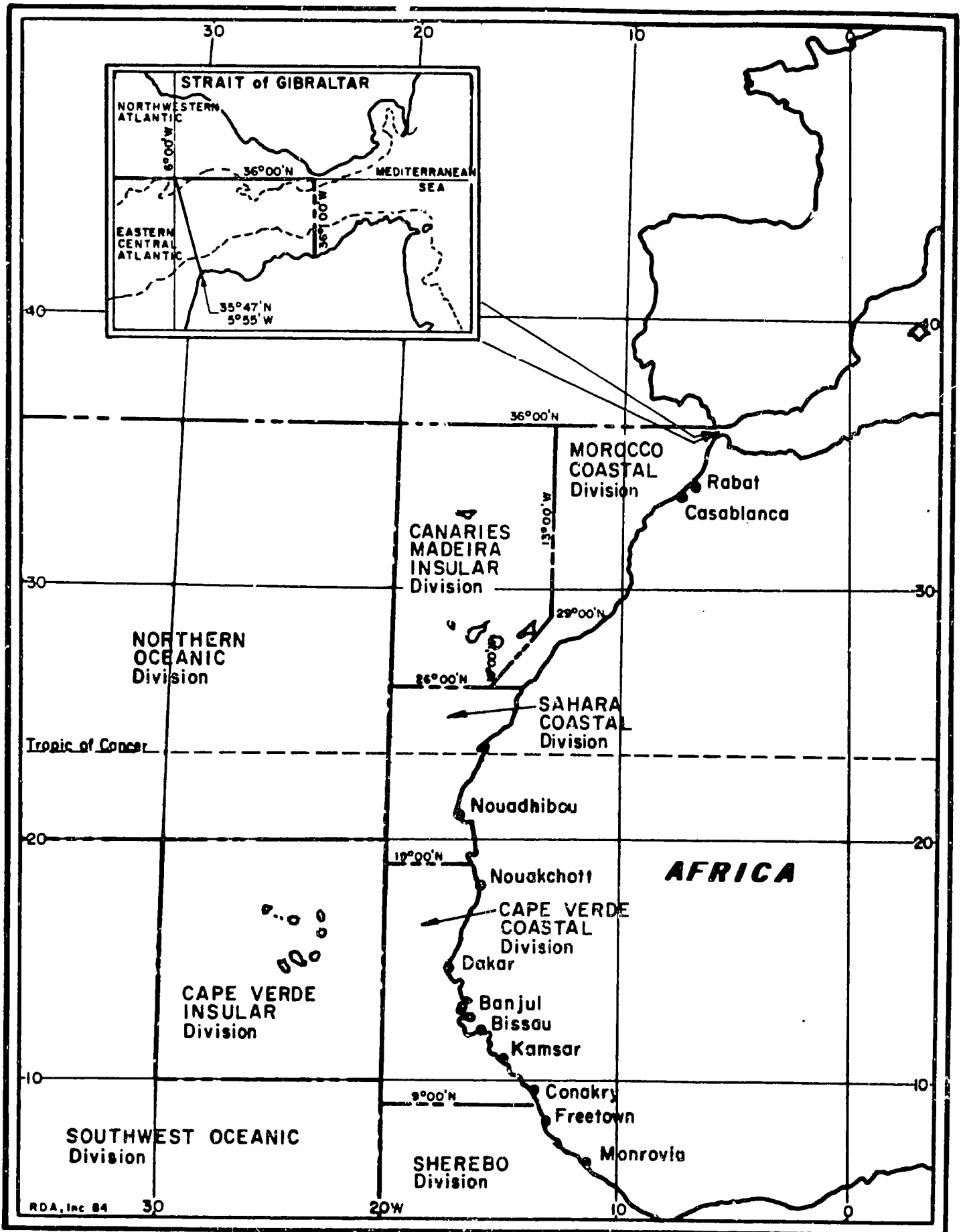


Figure: 1 NORTHWEST AFRICA SHOWING THE CECAF DIVISIONS
 This report concentrates on the Sahara
 and Cape Verde Coastal Divisions

2.2.1 Physical Characteristics of the Area

The oceanographic pattern of the Eastern Central Atlantic has a major bearing on the distribution and abundance of West Africa's coastal fishery resources. Two major cool-water ocean currents, the Canary from the north and the Benguela from the south, sweep toward the equator. The Canary Current turns westward around 5 degrees north, merging with the North Equatorial Current. The Benguela Current turns westward about 10 degrees south, merging with the South Equatorial Current. The warm Equatorial Countercurrent flows eastward between them.

Parts of the West African coast are major upwelling areas, which means that cold nutrient-rich waters rise periodically to the surface. North of the equator, there are major upwelling areas off Morocco, Mauritania and Senegal. It is the current pattern coupled with winds and other factors, such as the rotation of the earth, that combine to push the warm surface waters offshore and permit this phenomenon to take place. The net result is greatly increased plankton production permitting major fish populations to develop.

The system, which is illustrated in Figures 2 and 3 is described² most lucidly in Troadec and Garcia (1982):

"From the point of view of hydrography, the characteristic feature is the existence, on the surface, above the shelf, of a layer of warm tropical water (>24 degrees C) that usually has a low salinity, and which can reach a thickness of 30 to 40 meters. This layer rests on Southern Central Atlantic water that is cold and of low salinity at the levels we are interested in, through the intermediary of a transition zone (thermocline and halocline)...

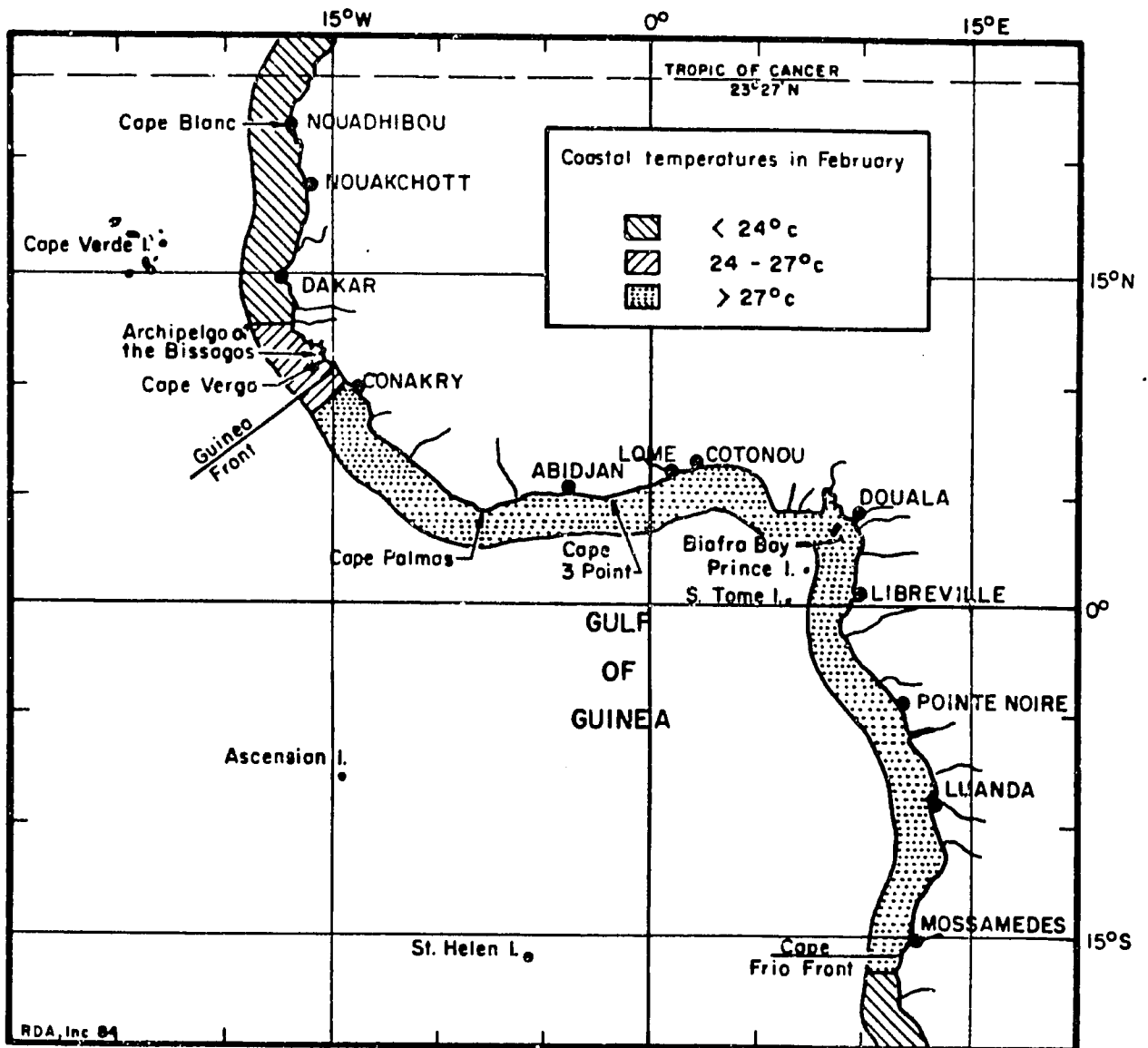


Figure: 2 LOCATION OF THE SUPERFICIAL LAYER AND UPWELLING ZONES (SURFACE $T^{\circ} < 24^{\circ}\text{C}$) DURING THE NORTHERN WINTER

From Troadec and Garcia 1982

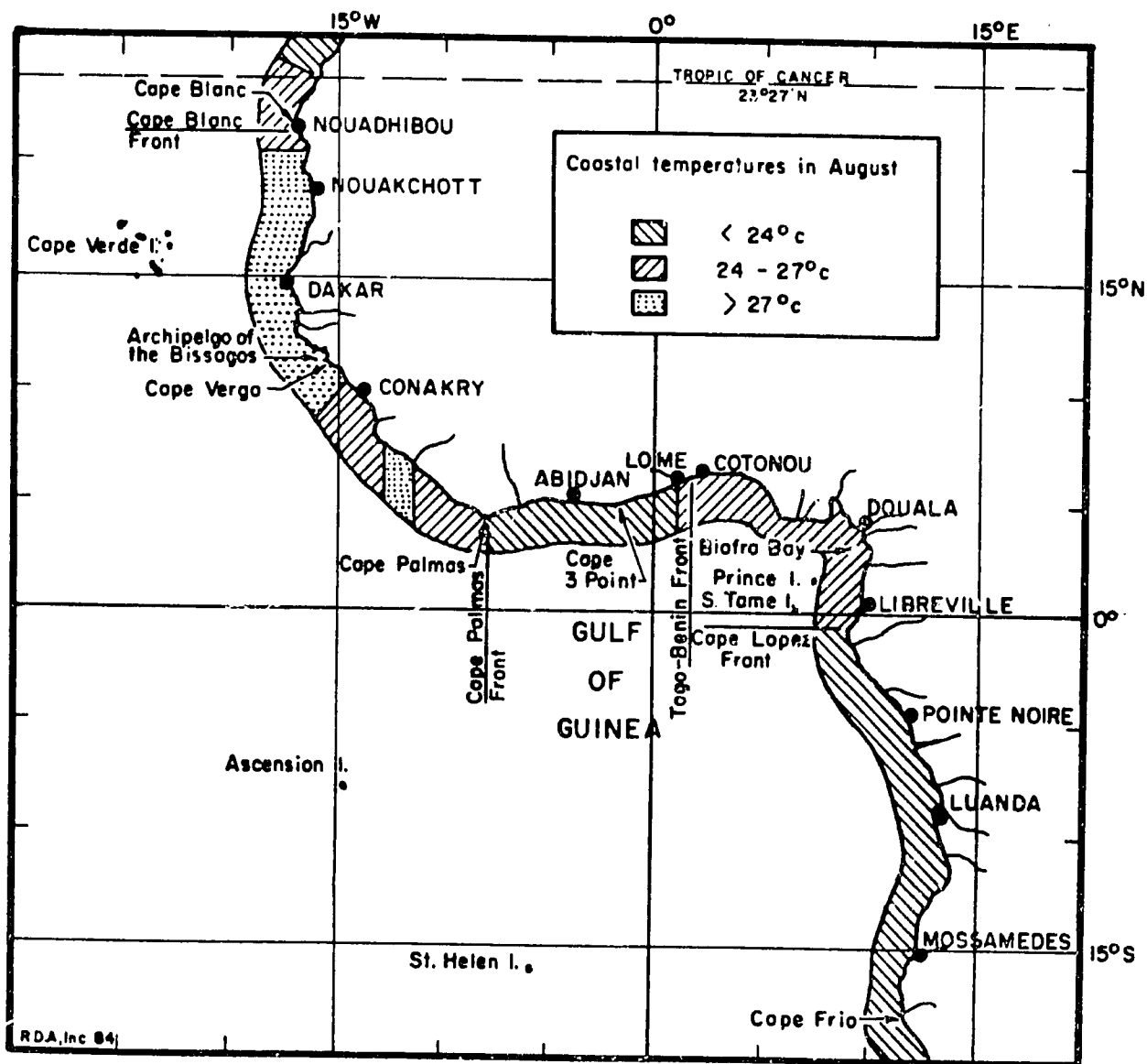


Figure: 3 LOCATION OF THE SUPERFICIAL LAYER AND UPWELLING ZONES (SURFACE $T^{\circ} < 24^{\circ}\text{C}$) DURING THE NORTHERN SUMMER

From Troadec and Garcia 1982

"At the northern and southern limits of the extension of the warm layer, the thermocline rises towards the surface to form two frontal zones, characterized by a contraction of the surface isotherms (23 degrees to 27 degrees C)...

"Along with the appearance of seasonal upwellings, during which the colder water that lies just beneath comes up to replace the warm layer on the surface over the shelf, the vertical and horizontal frontiers (the fronts and thermocline, respectively) are subject to seasonal movements...

"These seasonal variations condition the whole hydro-climatology of the region... Twice a year, at what are called transition periods, the clusters of isotherms move and then settle for periods that may be up to six months, in positions that only vary slightly from one year to the next. The areas swept by the passage of these fronts are called alternation zones. One of these, to the North, extends from Cape Verga (Guinea) to Cap Blanc (Mauritania). Its southern counterpart covers the area which runs between Cape Lopez (Gabon) to Cape Frio (Angola) ... During the winter, the northern front is around Cape Verga; to southern front around Cape Frio. Six months later, during the southern winter, these two frontal zones are shifted, the first up to Cap Blanc, the second as far as Cape Lopez."

Figure 4 (from a 1978 CECAF document PACE SERIES/78/10) gives further detail of upwelling areas during the period February-April along the coast from north of Mauritania to Guinea-Bissau, the area of principal interest in this study.

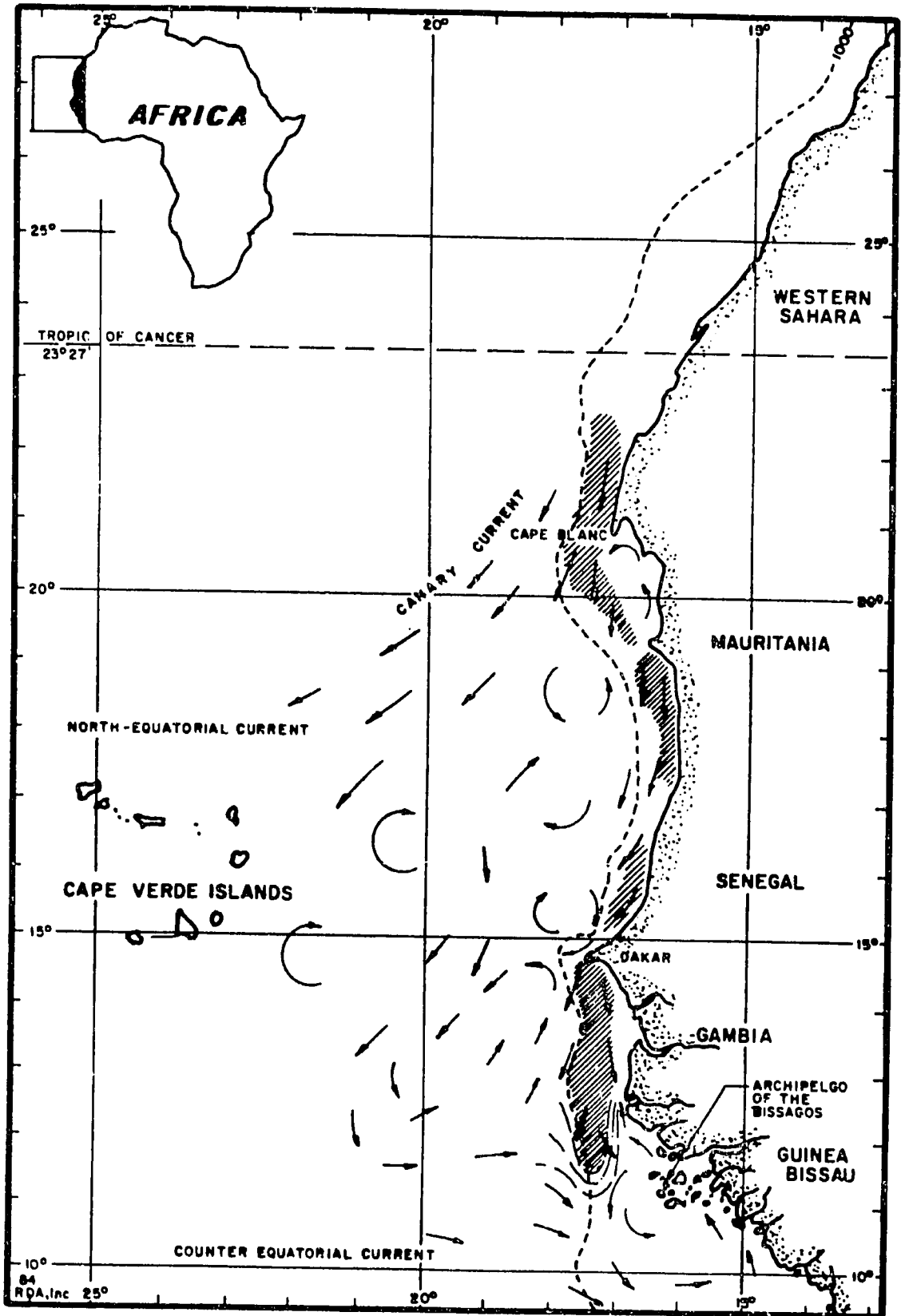


Figure: 4 SURFACE CURRENTS, ZONES OF UPWELLING (///) AND FRONTS IN THE WINTER SEASON (FEBRUARY - APRIL)

From CECAF/ECAF Series 70/10 1979

The significant feature is the nearly continuous band of upwelling inside the 1000 m. isobath from north of Cap Blanc at approximately 23 degrees north to Guinea-Bissau at about 11 degrees north. There is, as well, some local upwelling throughout the year, for example, off Cap Blanc in the late summer.

The large populations of small pelagic fish, principally sardines, sardinellas and horse mackerel, and the consequent major fisheries based on them are found in this coastal transition zone characterized by upwelling and high biological productivity.

The principal physical feature affecting fisheries is the size of the continental shelf, for large fish populations are associated with it. With two important exceptions, the shelf is narrow off Northwest Africa, not more than 20 or 30 nautical miles wide. It is up to 100 n.m. wide from roughly 24 degrees north, south to 20 degrees north off Mauritania and again between Dakar (15 degrees north) and Freetown, Sierra Leone at 8 degrees north. Since major fisheries tend to concentrate on the shelf, these areal factors take on particular significance. Further, the shelf areas are well within each nation's EEZ.

Table 1 gives the pertinent data for the coastal nations of Northwest Africa.

TABLE 1: APPROXIMATE COASTLINE, AREA OF CONTINENTAL SHELF, AND AREA OF COUNTRY IN CEEAF NORTHERN SUBAREA

<u>COUNTRY</u>	<u>COASTLINE KM</u>	<u>SHELF AREA '000 KM²</u>	<u>LAND AREA 1000 KM²</u>
MOROCCO (TO 21 DEGREES N)	2,400	115.1	712.5
MAURITANIA	667	33.9	1,082.6
SENEGAL	718	23.8	196.1
GAMBIA	70	3.9	11.3
CAPE VERDE	2,000	10.2	4.0
GUINEA BISSAU	350	45.0	36.1
GUINEA	350	50.2	245.9

SOURCE: Everett et. al., Recent Trends in CEEAF Fisheries, Dakar, CEEAF Project, CEEAF/TECH/82/42, July, 1982.

2.2.2 Fisheries of the Area

The major fisheries, except tuna, are prosecuted within 30 or 40 miles of the coast and virtually all of the reported catch in the divisions of concern come from the coastal zones. There is little reported activity in the Cape Verde Insular division. Divisional catch records do not include tuna -- they are lumped for CECAF as a whole -- so that fishery is of necessity omitted from this discussion.

In the following analyses, we present the reported figures for the Sahara and Cape Verde Coastal Divisions with some summary data for the Northern Subarea and for CECAF as a whole. There are known (and surely, unknown) anomalies: for example, in 1977 and 1982, Spain did not report its catches by divisions though it did report a figure for CECAF as a whole. The divisional records are obviously low for these two years.

The general validity of the statistics is open to question. Some nations appear to provide the best numbers they have available though their data bases may be weak. Others are pretty clearly spurious (e.g., the exact same catch figure reported for several years running). Still other nations are believed to manipulate their data by quantity taken, locality fished and/or species caught.

The system obviously needs a lot of improvement. These are, however, the only numbers that exist, and it seems likely that they reflect at least trends in fishing over a period of years. The numbers themselves should not be considered correct.

Trott, for example, has this to say in his 1984 report to USAID:

"Foreign fishing nations are operating principally in the EEZ of nations in the northern sector, sometimes with a bilateral agreement, but often illegally. Nations of the

region have little ability for surveillance and enforcement, but consider this activity of principal importance in developing their fisheries."

Posner and Sutinen, in their 1984 report also made to USAID, are more blunt:

"The foreign fleets report on their catches, but with varying obeisance to the truth. FAO, CECAF and some individual countries have tried to improve these statistics, and at least one official of CECAF has traveled unsuccessfully to Moscow for this reason. Foreign fleet report deficiencies are the biggest source of error. The one redeeming feature of this otherwise bleak situation is that the reported data are always an understatement."

Despite these caveats, there are a number of conclusions or strong inferences that can be drawn from the data, especially where these can be interpreted by people who are familiar with the fisheries and politics of West Africa and who, unofficially at least, are willing to give their evaluation of a given fishery or stock.

The statistical data presented here are drawn principally from CECAF Statistical Bulletin No. 4 (1984) which contains records through 1982 (those for 1983 are still being compiled). In this section, we use the 10 year period, 1973-1982, as a base.

2.2.3 Principal Species and Species Groups

Two kinds of fishes dominated the catch in the Sahara and Cape Verde coastal divisions during the 1973-1982 decade. Both are small coastal pelagic species. The bottom-dwelling or demersal species were far less important.

The same picture holds true for CECAF as a whole. However, tonnage, it must be remembered, is only one criterion; the relatively small catches of oceanic pelagics (principally tuna) and molluscs (principally octopus, cuttlefish and squid) are of higher value.

The dominant species or groups of species in the Sahara and Cape Verde coastal divisions are:

1. The clupeids, particularly the European sardine or pilchard (Sardina pilchardus) in the Sahara division and the round sardinella (Sardinella aurita) in the Cape Verde.
2. The carangids, particularly the horse mackerel, Trachurus trachurus, but including as well a similar species, T. tracea.

The sardine is a temperate-water fish that extended its range southward in the late '60's and early '70's from about 26 degrees north down to the latitude of Dakar (see Map, Figure 5).

The sardinella has a more southern distribution (Map, Figure 6), though it prefers cooler waters. It is found in areas of upwelling and at depths of 70-90 meters when surface waters are warm. It is migratory. A similar species, the flat sardine (Sardinella maderensis), prefers low salinities, is often found near river mouths and rarely occurs below 40 meters. It is relatively non-migratory.

The horse mackerel, T. trachurus, ranges north into Europe from about 14 degrees north and is fished in our area from 14 degrees to about 26 degrees. The similar species, T. tracea, ranges south from about 26 degrees and is fished throughout the area south of about 24 degrees (Map, Figure 7). The catches of the two species are lumped in the statistics. They go into deep water and are taken in bottom trawls to depths of 200 m.

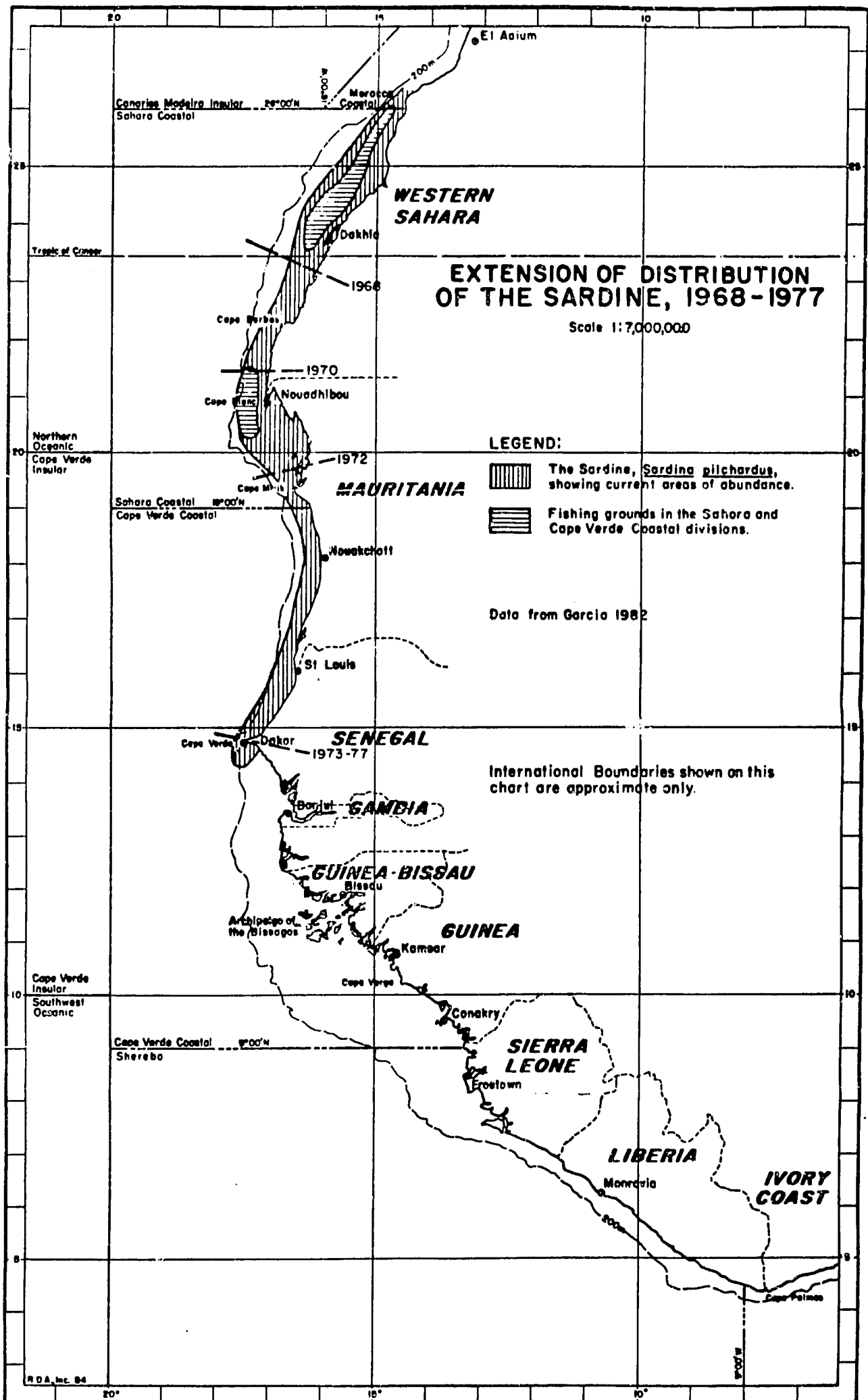


Figure: 5

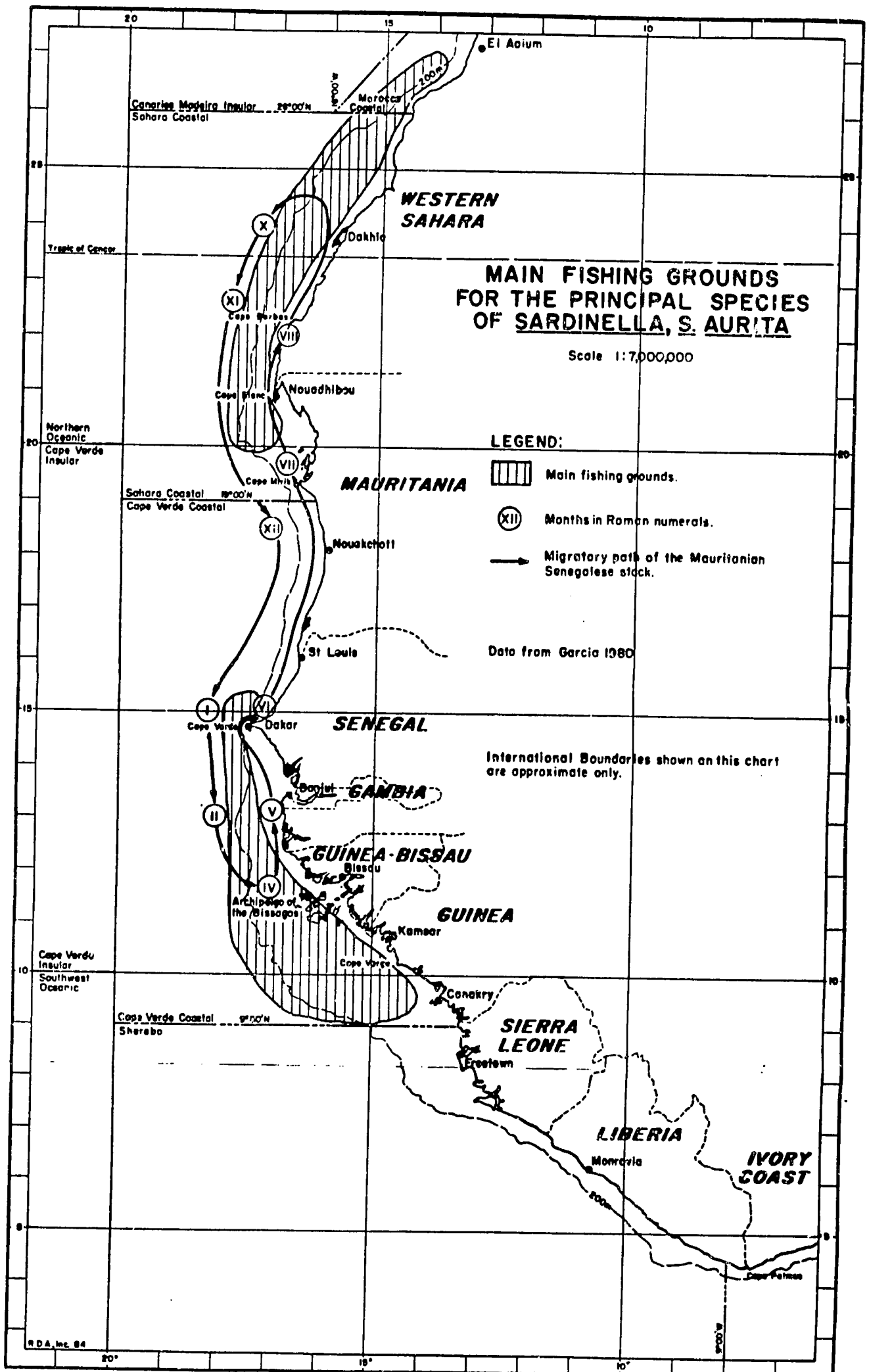


Figure: 6

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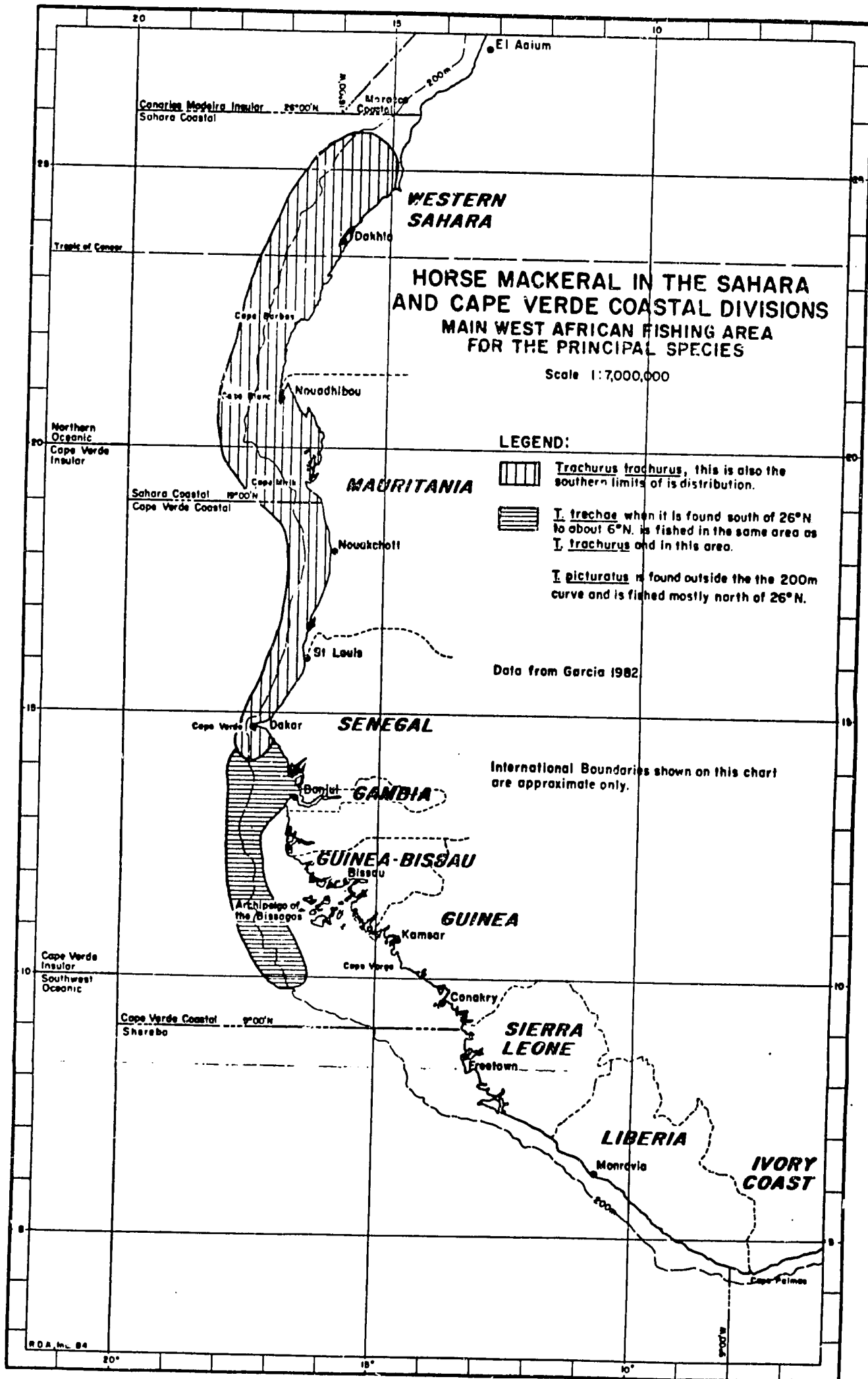


Figure: 7

2/2

A number of species make up the demersal finfishery: members of the croaker family, Sciaenidae, and the sea breams, Sparidae, are mainstays, and hakes have been important. The snipefish (Macrorhamphosus scolopax) has been taken in some quantity in the Sahara in recent years. The prime newcomer among demersals is, however, the triggerfish, Balistes carolinensis, (Map, Figure 8). The population has exploded and the fish has extended its range northward from about 10 degrees north in 1976 to 19 degrees in 1980. In 1981 and 1982, it supported for the first time a fishery of magnitude in the Cape Verde Coastal division.

The cephalopods, also demersal, deserve special mention because of their high value. Three principal varieties comprise the catch: octopus, cuttlefish and squid. They are taken in various places along the coast between 9 degrees and 26 degrees north (Map, Figure 9).

The tunas do not enter into this analysis because the West African catch is lumped in the CEECAF data so figures are not available by statistical division. The catch is important and valuable; landings have been around 300,000 mt per year since 1980. Spain is the leading tuna nation followed by France, Korea, Japan, Ghana and Ivory Coast.

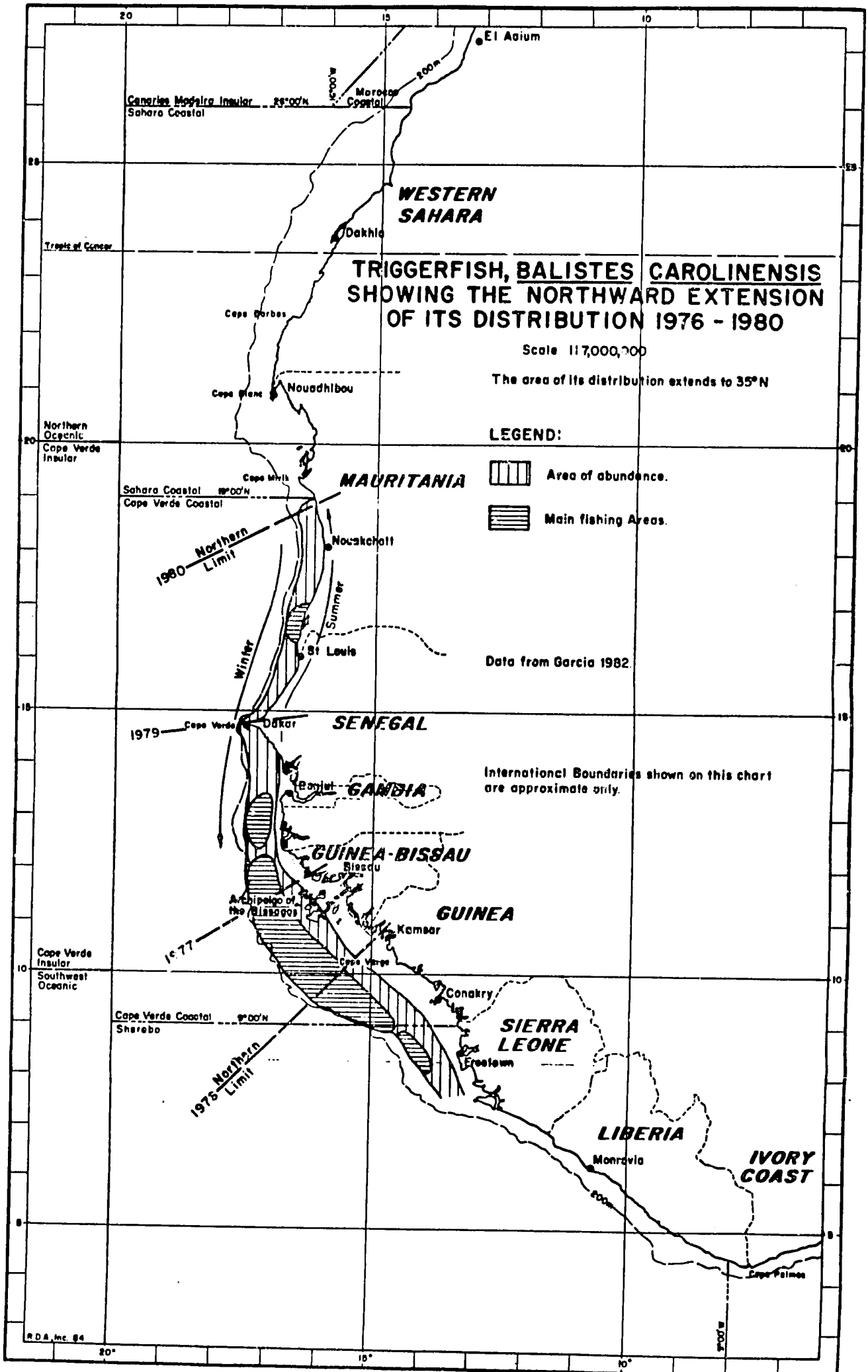


Figure 8

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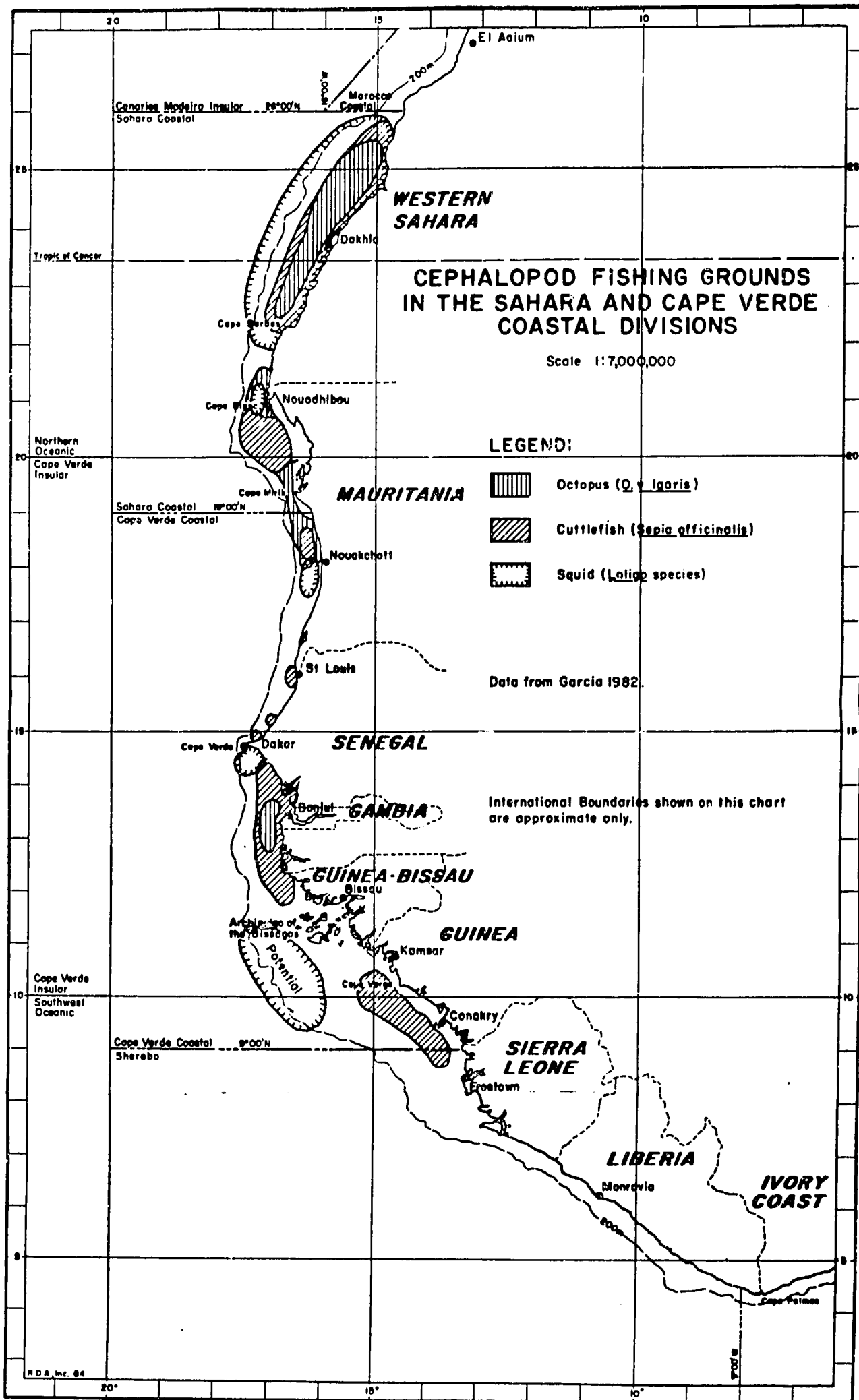


Figure: 9

2.3 Status of the Stocks

There is a general agreement that the traditional target species are by and large either nearly or fully exploited or overexploited. There are exceptions among non-conventional species such as triggerfish and the small grunt Brachydeuterus auritus, and Troadec and Garcia (1980) note that the sardinellas off Senegal and Mauritania may not yet be fully exploited. Their general comment, however, is that the most important pelagic stocks are at their limit and that "prospects for the expansion of demersal fishing in the region as a whole are equally slight". The cephalopods (octopus, cuttlefish, squid) fall into the "overexploited" category.

A summary table prepared for the FAO Committee on Fisheries meeting in 1983 gives the latest word. It is reproduced as Table 2.

TABLE 2: STATUS OF STOCKS IN CEEF AREA REPRODUCED FROM PRO/CBPT/03/INL.4/TABLE 6

CEEF SUB-AREAS	STOCK	MAIN FISHING COUNTRIES	ESTIMATED POTENTIAL	CATCHES ('000 T) (a)				STATE OF EXPLOITATION
				1970 -74	1975 -79	1980	1981	
NORTH	Cephalopods of which:			171	164	64	...	
34.1.1, 34.1.3	Octopus	Korea Rep., Spain, USSR	118	181	185	48	...	
34.3.1	Cuttle Fish	Greece, Senegal, Spain	48	48	26	5	...	Over-exploited
34.1.1/34.1.3	Squid	Korea Rep., Spain	48	38	32	11	...	Over-exploited
334.7.1/34.1.3	European Sardinia	Morocco, Spain, USSR	1000(?)	441	637	455	...	Over-exploited
34.1.3/34.3.1	Sardinellas	Bermuda, Poland, Senegal, USSR	600(?) (d)	329	287	278	...	Possibly fully exploited
34.1.3/34.3.1	Bonga	Gambia, Senegal		27	27	17	...	Possibly moderately to intensively exploited
34.1.3/34.3.1	Horse Mackerels	Romania, Senegal, USSR	588(?)	481	381	446	...	Possibly fully exploited
34.1.3/34.3.1	Mackerels	Morocco, Spain, USSR	188	91	78	36	...	Over-exploited
34.1.3/34.3.1	Sea Breams	Greece, Senegal, USSR	158(?)	138	72	35	...	Probably over-exploited
TOTAL NORTH:				2258	2327	1898	...	
SOUTH	Prawn and Shrimp	Cameroon, Ivory Coast, Nigeria	15	7	9	11	...	Close to full exploitation
34.3.3-34.3.6	Basswale(c)		68-85	188	285	285	...	Fully exploited
34.3.4	Sardinellas	Ivory Coast	about 58 in average	68	52	44	...	Round sardinella recovering; fully exploited
34.3.6	Sardinellas	Congo	Unknown	8	6	6	...	Probably moderately exploited
	Bonga	Gabon, Ivory Coast, Sierra Leone	Unknown	38	34	64	...	Locally intensively exploited
TOTAL SOUTH:				327	648	698	...	
Oceanic								
34.1.2/34.2.8/34.3.2/34.4.1/34.4.2				185	54	134	...	
TOTAL OCEANIC:				185	54	134	...	
Tuna								
34.8(b)				197	272	258	...	
Unknown Area								
34.9.8				28	...	
Total Area: (a)				3858	3388	3413	3159	

(a) Source: CEEF Statistical Bulletins; 1981 data not available, regional total from Yearbook of Fishery Statistics.

(b) Catches in all sub-areas: See also Table 19

(c) Probably over-estimated, due to Nigerian reporting

(d) At present, possibly lower in the long run

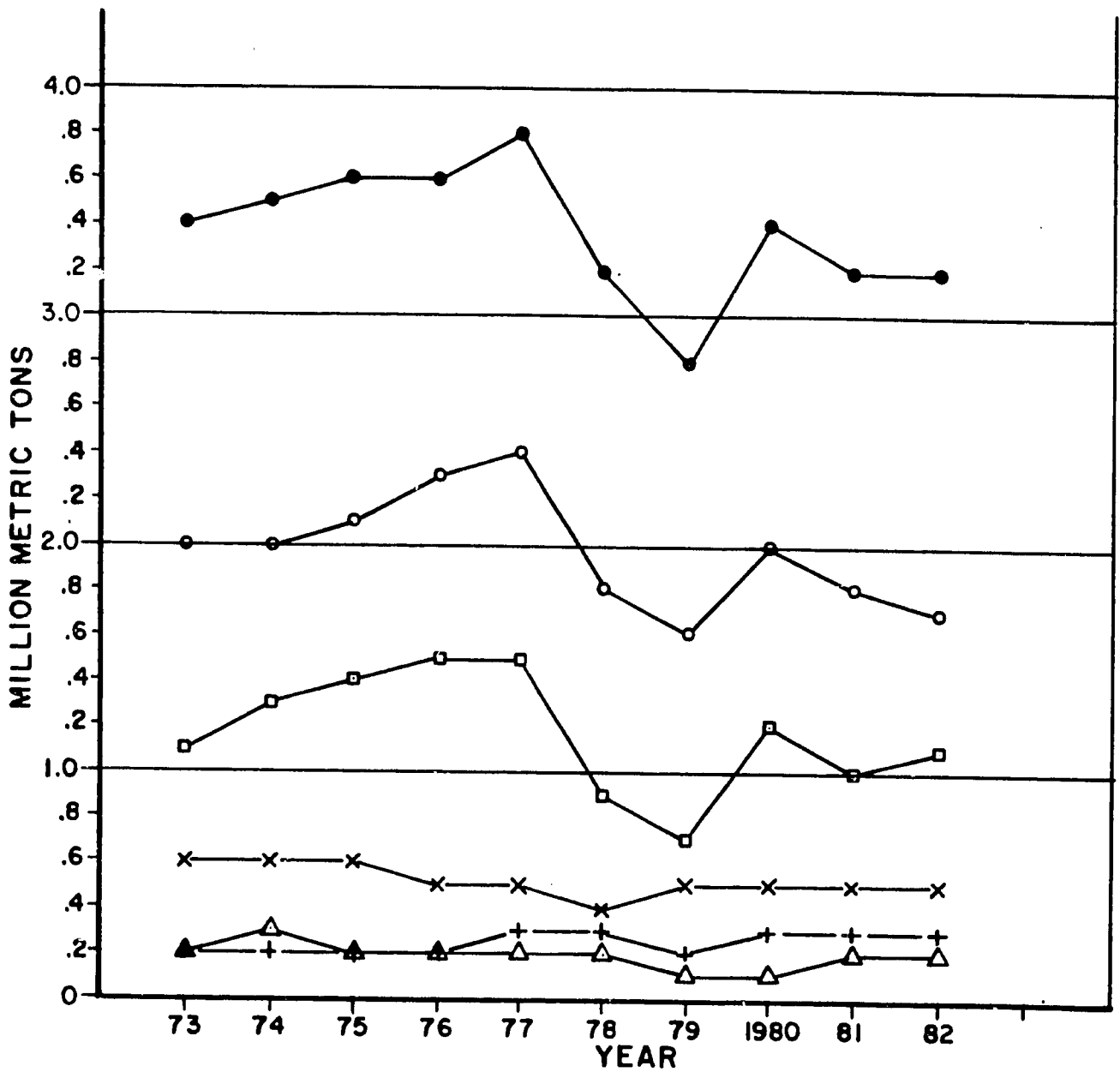
2.3.1 Catch Trends - General

The CECAF area catch base ranged from 3.6 mmt in 1976 to 2.6 mmt during the 10-year base period (Figure 10). Coastal pelagics are dominant, followed by demersals which are a poor second. The extremely valuable cephalopod catch is a relatively minor constituent of the total catch as is the tuna. These two high-priced groups between them roughly equal the demersal catch.

The Northern Subarea dominates the coastal catch with coastal pelagics again the leading "super group" (CECAF terminology). Though tuna are undoubtedly taken in the subarea, the CECAF system does not attempt to allocate the catches by subarea or division. Total catches during the 1973-82 decade ranged from a high of 1.8 mmt in 1976 to a low of 1.5 mmt in 1982. This latter figure is low in part, at least by Spain's failure to allocate its total 1982 catch by subarea or division.

The catch in the first 5 years averaged higher than in the second. The drop reflects a decrease in pelagic catches which was particularly noticeable in the Sahara Coastal Division. It simultaneously reflects a drop in reported Soviet catches.

Spain is the only Western European nation with significant catches. These have run in the 400,000 mt range over the years (444,000 in 1982). Japanese catches have dropped from the 100,000 mt range in the early 1970's to the 30-40,000 mt range in recent years. Korean catches peaked at 105,000 mt in 1976; they now are running 89-97,000 mt per year.



LEGEND:

- Total
- Coastal Pelagic
- +—+ Oceanic Pelagic (Principally Tuna)
- △—△ Mollusca (Principally Octopus and Squid)
- ×—× Demersal
- Total Eastern Block

Data from CECAF Stat. Bull. 4

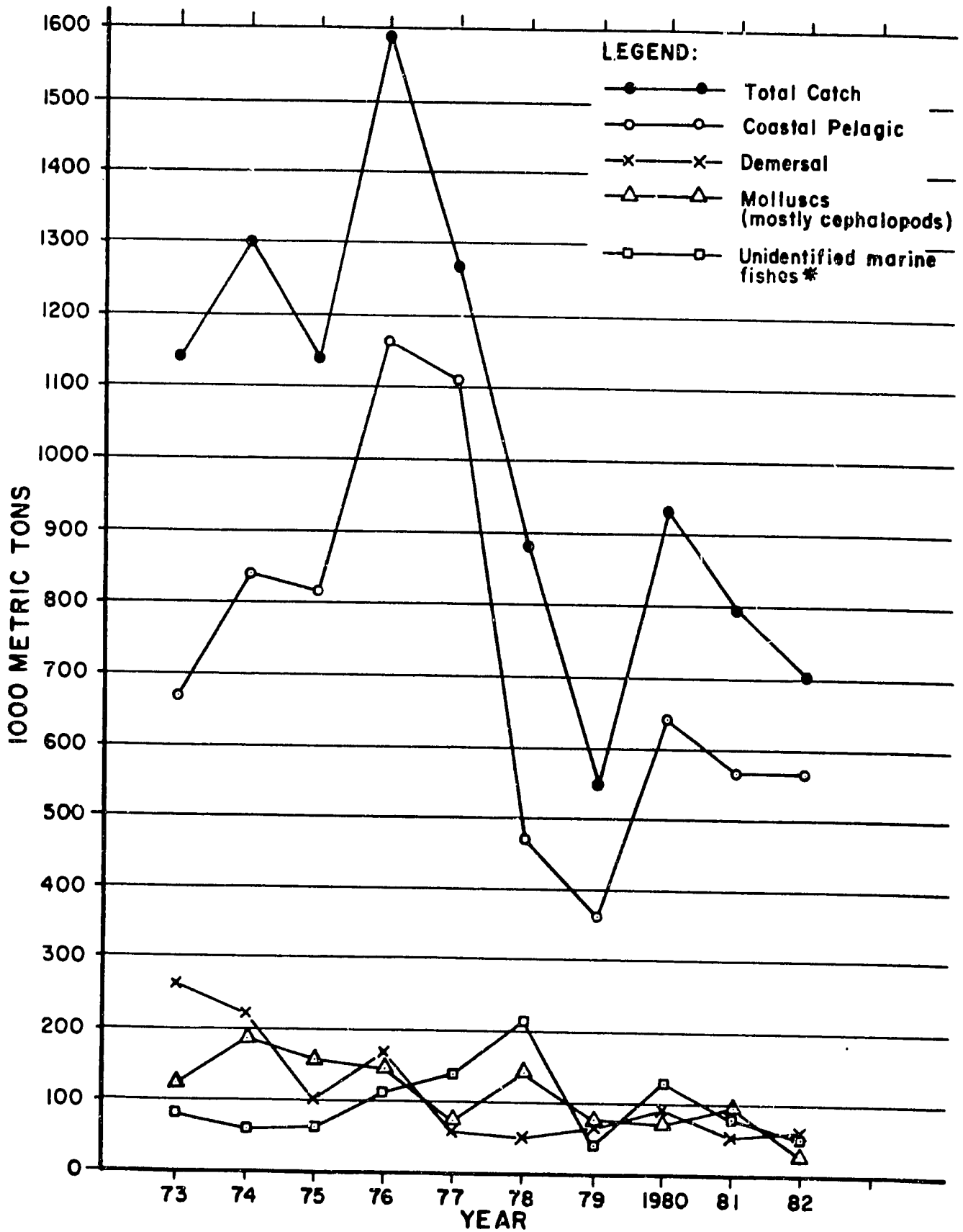
Figure: 10 THE CECAF AREA CATCH: KEY COMPONENTS

2.3.2 Sahara Coastal Division

The fishery in this division (Figure 11) is totally dominated by coastal pelagic species, principally sardines and mackerel. Demersal fishes have never played a major role and since 1977 have been at a low level (around 50,000 mt per year). During this same period, the unidentified catch was greater in 4 of the 6 years. The mollusc (cephalopod) catch is of the same magnitude as the demersal and the "unidentified" (marine fishes not elsewhere included) but is of considerable importance because of its value. The figures for 1977 and 1982 are artificially low because there are no Spanish data for these years.

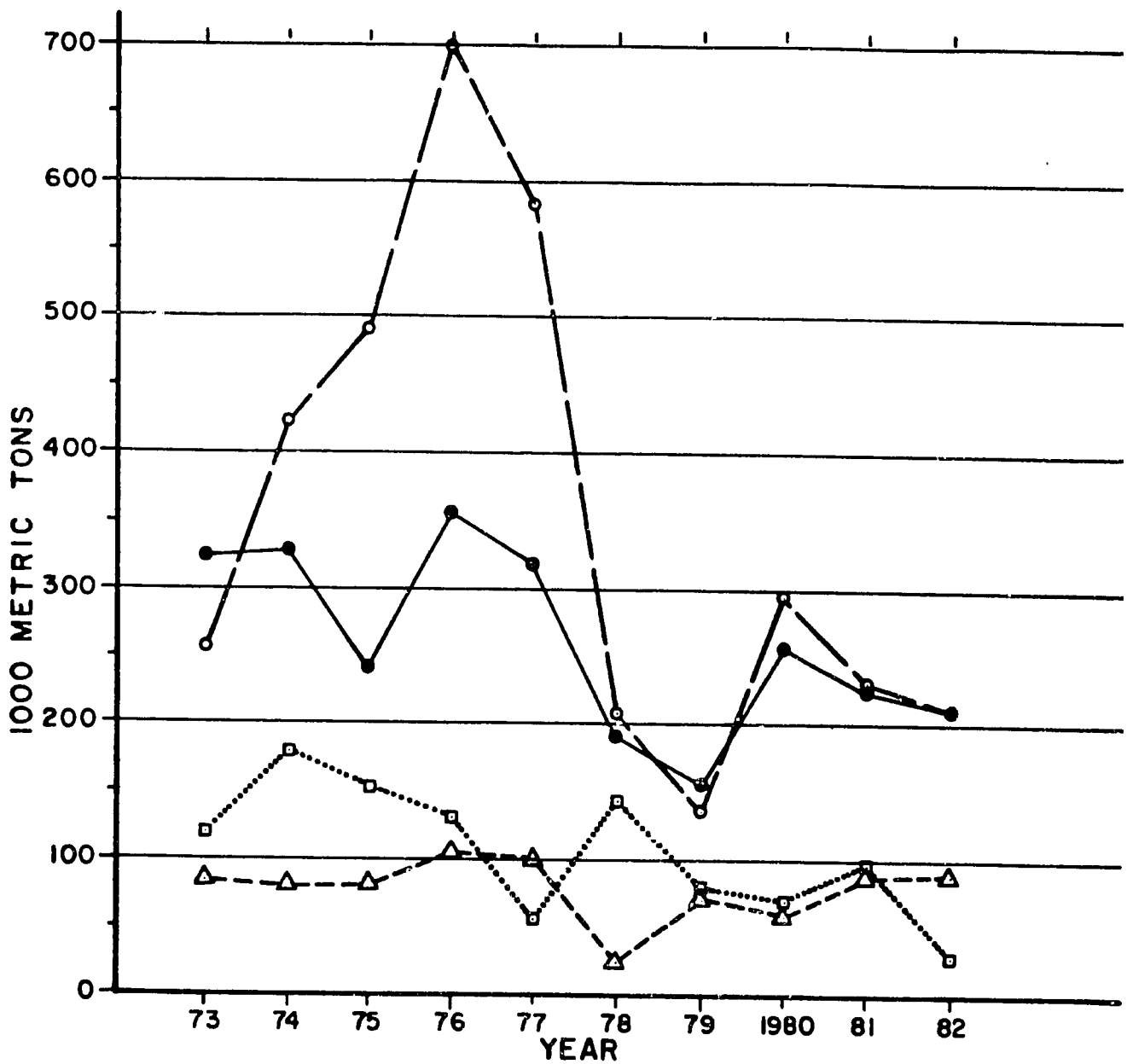
The principal species (Figure 12) are as one would expect coastal pelagics. Sardines dominated from 1974 through 1977. The catch dropped markedly in 1978 and has settled at the 200-250,000 mt level since 1980. The sardine accounts for from two-thirds to three-fourths of the clupeoid catch. The balance is recorded largely as sardinella (species unstated) but with anchovies (Engraulis) appearing in fair quantities in the Soviet catch since 1978.

The horse mackerel catch has trended downward over the years, but shows no decrease of the clupeoid magnitude. The valuable cephalopods make an important contribution to the catch despite the absence of Spanish data for 1977 and 1982. Mackerel is the only other significant contributor to the Sahara Coastal Fishery.



* This is the CEEAF category NEI -- not elsewhere included.
 Data from CEEAF Stat. Bull. 4

Figure: II SAHARA COASTAL CATCH



LEGEND:

- Clupeid (principally sardine)
- Carangid (principally horse mackerel)
- -△- -△- Mackerel
-□..... Cephalopod

Data from CECAF Stat. Bull. 4

**Figure: 12 SAHARA COASTAL DIVISION
CATCH BY PRINCIPAL SPECIES GROUPS**

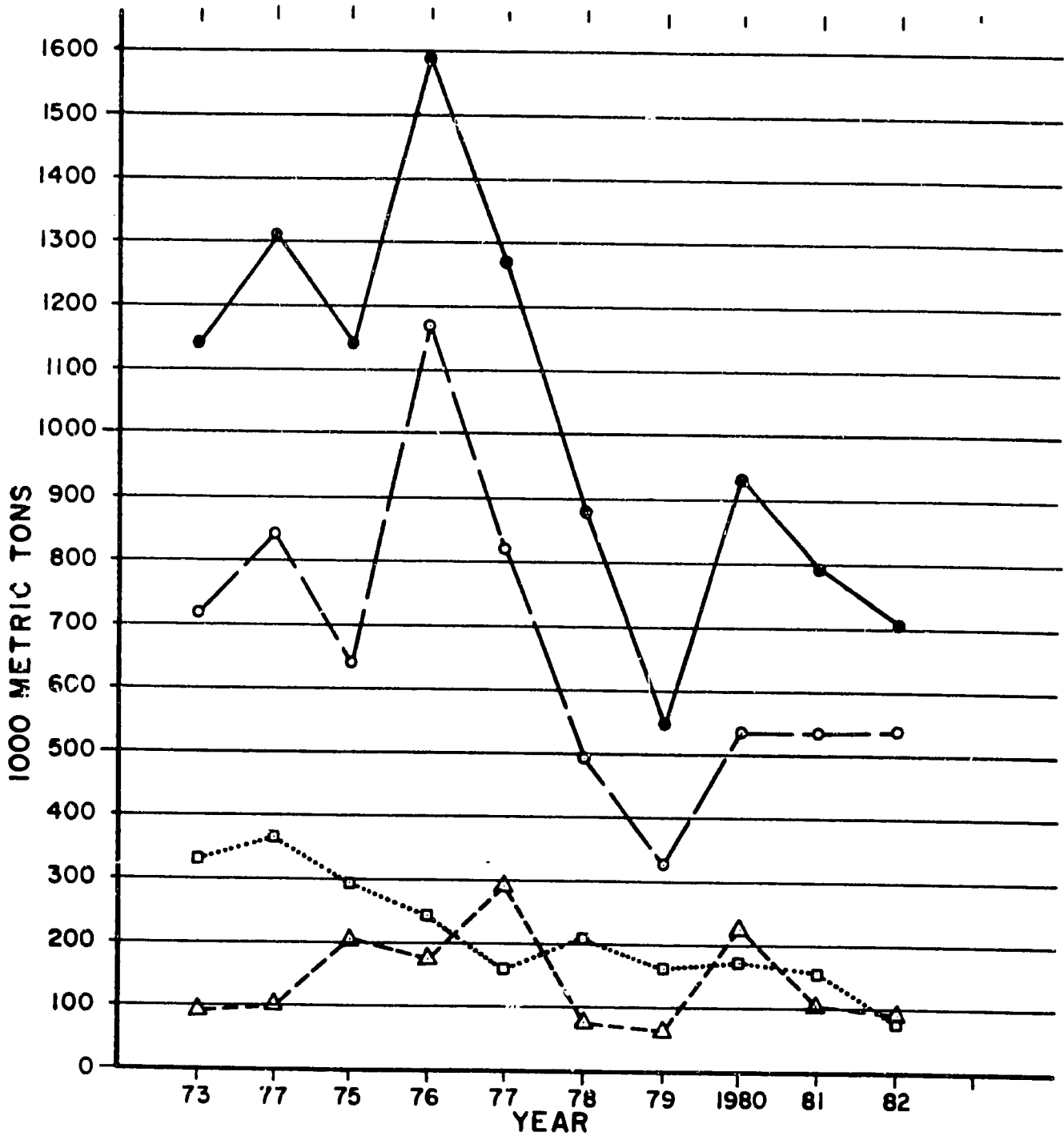
Prior to the mid-1970's, both the Spanish and the Soviets took appreciable quantities of hake. The hake catch is now very small and the resource is thought to be overexploited. These two nations also fished for sea bream (Sparids) but this catch too is now at a low ebb. There has been a modest fishery for croakers (Scaenids) throughout this period.

The cephalopod catch is chiefly octopus with the balance predominantly sepia (cuttlefish) and secondly squid. Spain dominates this fishery, though Japan fished heavily until 1979. Korea had appreciable catches in 1977, 1978, and 1982.

The USSR dominates the Sahara Division fishery (56-76% of the annual take) with much of the remaining catch taken by other Eastern Bloc nations (Figure 13). The catch for all other nations combined has been about the same as the "other Eastern Bloc" in the last three years, though it was generally greater through 1973-79. The "all others" took about 300,000 mt, one-third of the catch, in 1978, their best year. Spain is the principal fishing nation in this group. Mauritania is the only coastal nation reporting catches, and they are quite modest -- 20 to 30,000 mt per year.

Figure 14 illustrates the importance of the Sahara coastal division to the USSR. By far, the greatest portion of the Soviet catch has come from these waters. Their catch in the Cape Verde Coastal division is far less, but the two divisions combined account for 66% (1975) to 94% (1976) of the reported USSR catch in the CECAF area.

Interestingly, the Soviets reported significant catches in the Northern Oceanic Division, the southern portion of which is adjacent to the Sahara, in 1977, 1980 and 1982 (115 to 196,000 mt).

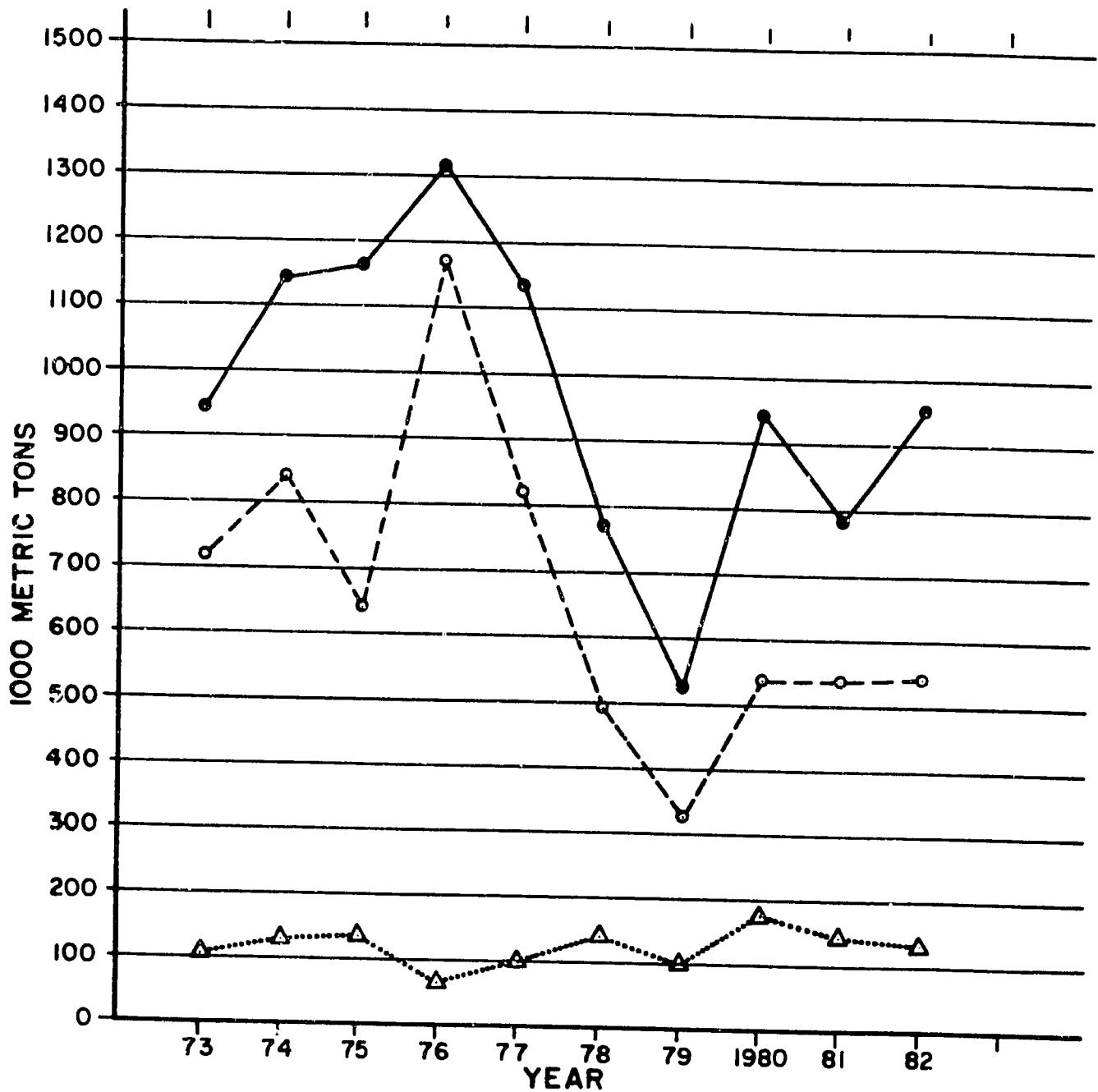


LEGEND:

- Total catch (all fleets)
- U.S.S.R. catch
- △—△ Other Eastern Block
- All others (no Spanish catch reported in 1977 and 1982. Spain predominant other years).

Data from CECAF Stat. Bull. 4

**Figure: 13 SAHARA COASTAL DIVISION
CATCH BY FLEET**



LEGEND:

- CECAF Total
- -○- Sahara coastal
- △---△--- Cape Verde coastal

Data from CECAF Stat. Bull. 4

Figure: 14 U.S.S.R. CATCHES IN THE CECAF AREA

The identified catch was predominantly horse mackerel and mackerel, but with sardines prominent in 1977 and with the hairtail or scabbard fish (Trichiurus) contributing heavily in 1980 and 1982. Total catches in this division were very low (maximum 18,000 mt) in all other years. One can speculate on the actual origin of these aberrant Soviet catches.

In the Coastal Sahara, the USSR fishes principally for sardines, horse mackerel and mackerel, (Figure 15) as do the other Eastern Bloc nations.

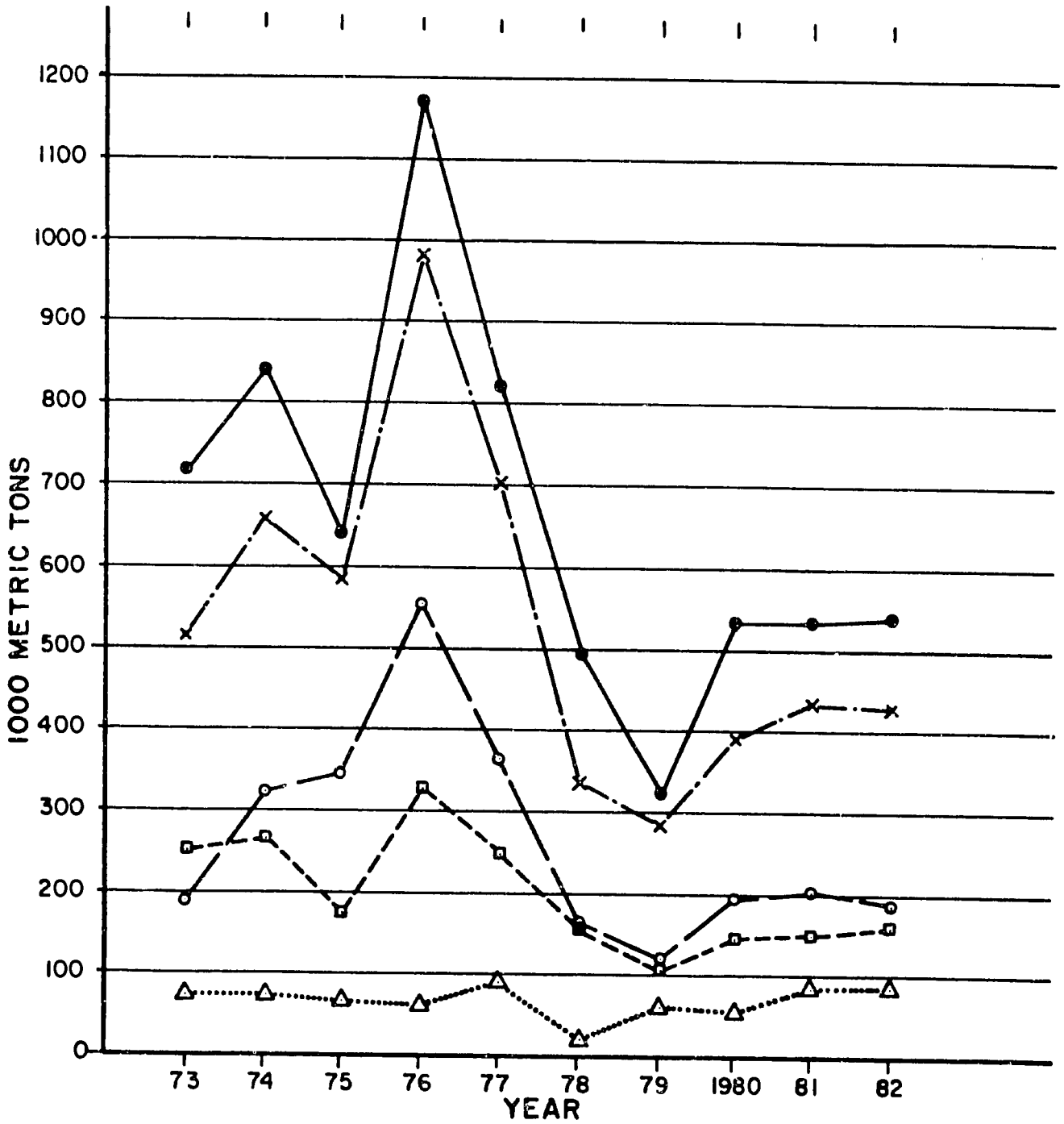
2.3.3 Cape Verde Coastal Division

As in the Sahara Division, coastal pelagic fishes dominate the catch but not as overwhelmingly as they do in the north (Figure 16). The percentage of pelagics ran in the high 50's and low 60's through 1980, except in 1977 when the proportion reached 68%. However, there was a marked drop in 1981 and 1982 to 53 and 52% with a drop as well in actual catches. Conversely, both catch and percentages increased for demersal fish in these two years and they accounted for 27 and 32% of the total catch. Between 1973 and 1980, the percentages ran from 16 to 22.

There is a simple explanation for this change: the triggerfish population explosion and the northward expansion of its range (see Map, Figure 8).

Cephalopods form a minor portion of the catch. The total mollusc catch ranged from 12,000 mt in 1982 to 27,000 mt in 1978 (Spain did not allocate its 1982 catches to divisions, so that number is artificially low).

The unidentified catch of marine fishes (listed in CECAF Bull 4 as NEI -- not elsewhere included) runs less than the demersal but unlike the cephalopods is visible on the graph.

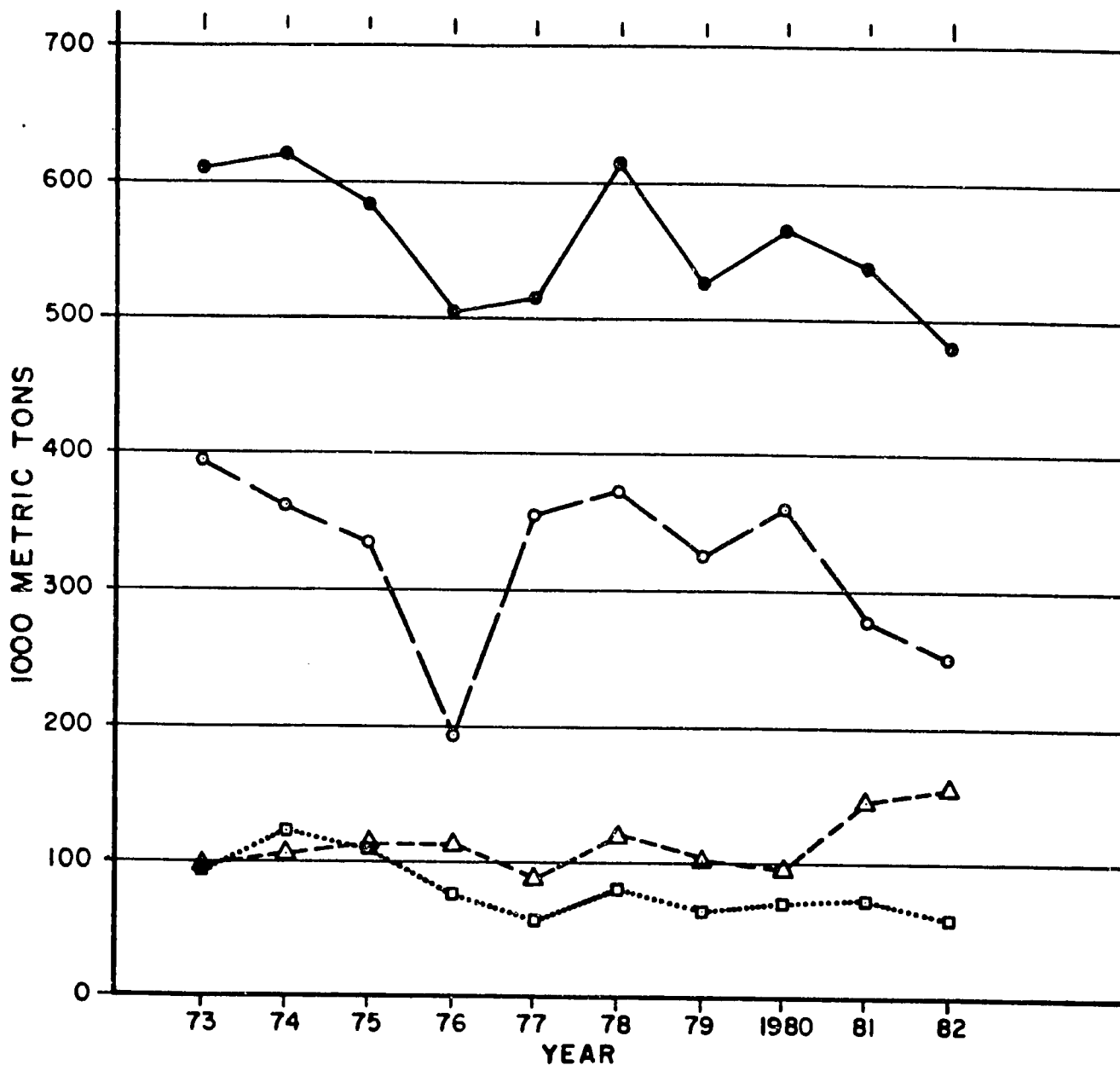


LEGEND:

- Total U.S.S.R.
- x- -x- 3 Category total
- Sardine
- -□- Horse Mackerel
- △.....△ Mackerel

Data from CECAF Stat. Bull. 4

Figure: 15 COASTAL SAHARA - U.S.S.R. CATCH BY PRINCIPAL SPECIES GROUPS



The rise in demersal catches in 1981 and 1982 reflects the U.S.S.R. catch of triggerfish.

LEGEND:

- Total catch
- Coastal Pelagic
- △—△ Demersal
- Unidentified marine fishes (NEI= not elsewhere included)

Data from CECAF Stat. Bull. 4

**Figure: 16 CAPE VERDE COASTAL DIVISION CATCH
PRINCIPAL COMPONENTS**

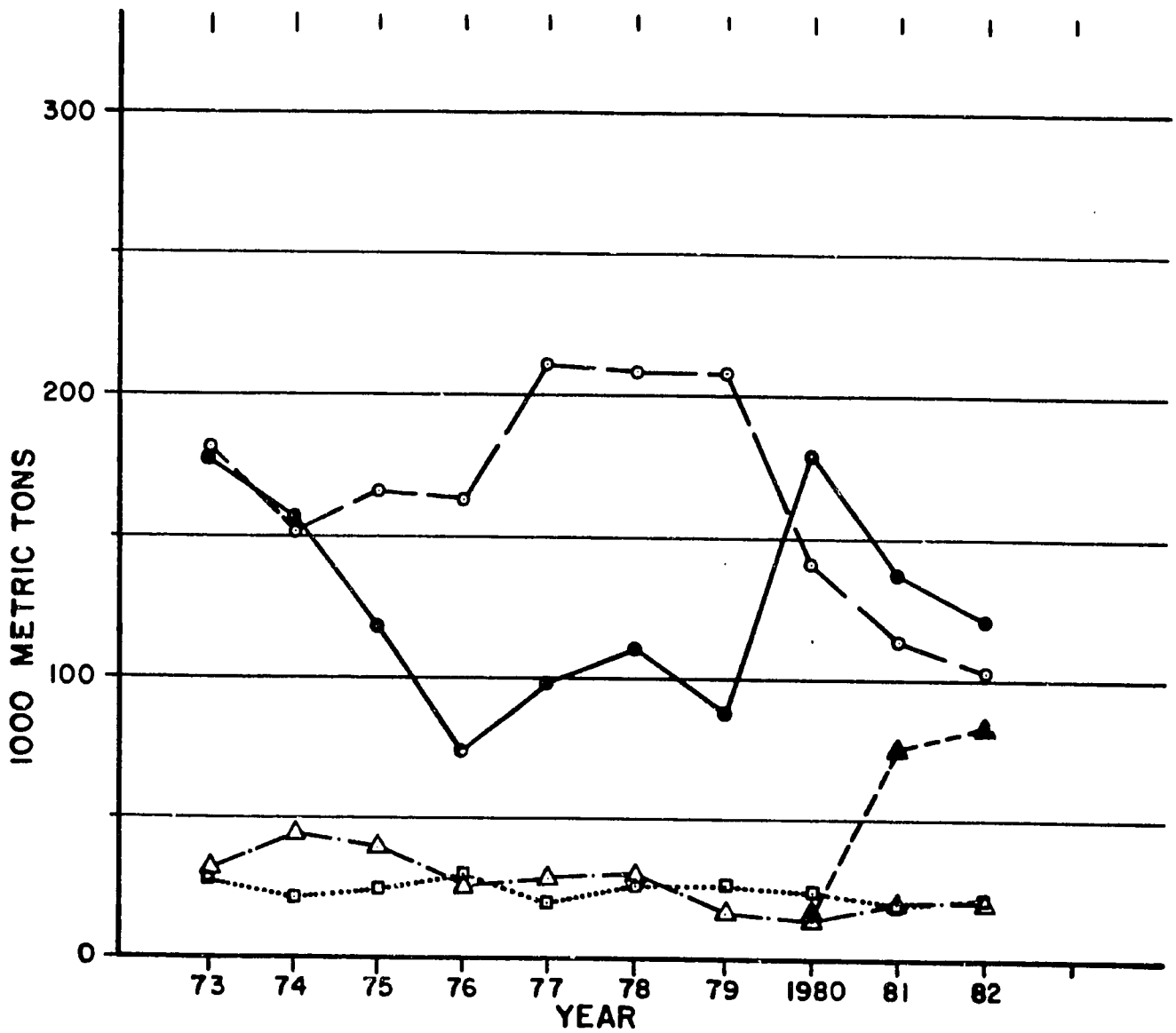
The principal species (Figure 17) are the horse mackerels (Trachurus) and sardinella (principally Sardinella aurita). The sardine, dominant in the Sahara Division, was taken in quantity in 1972, but did not figure significantly in the 1973-82 period.

Such bottom fishes as sea bream (Sparidae) and croakers (Sciaenidae) have been steady contributors to the demersal catch over the years, and until the rise of the triggerfish, dominated it.

Two nations take the bulk of the catch: Senegal and the USSR (Figure 18). Senegal, with its numerous small trawlers and its armada of fishing canoes, catches 39-68% of the total; the USSR has run from 13 to 31%.

The Senegal fleet takes a wide variety of fish but with sardinella making up a third or more (44% in 1977) of its catch. The general category of marine fishes NEI runs second with from 13 to 28% with sciaenids, sparids and carangids making up most of the balance.

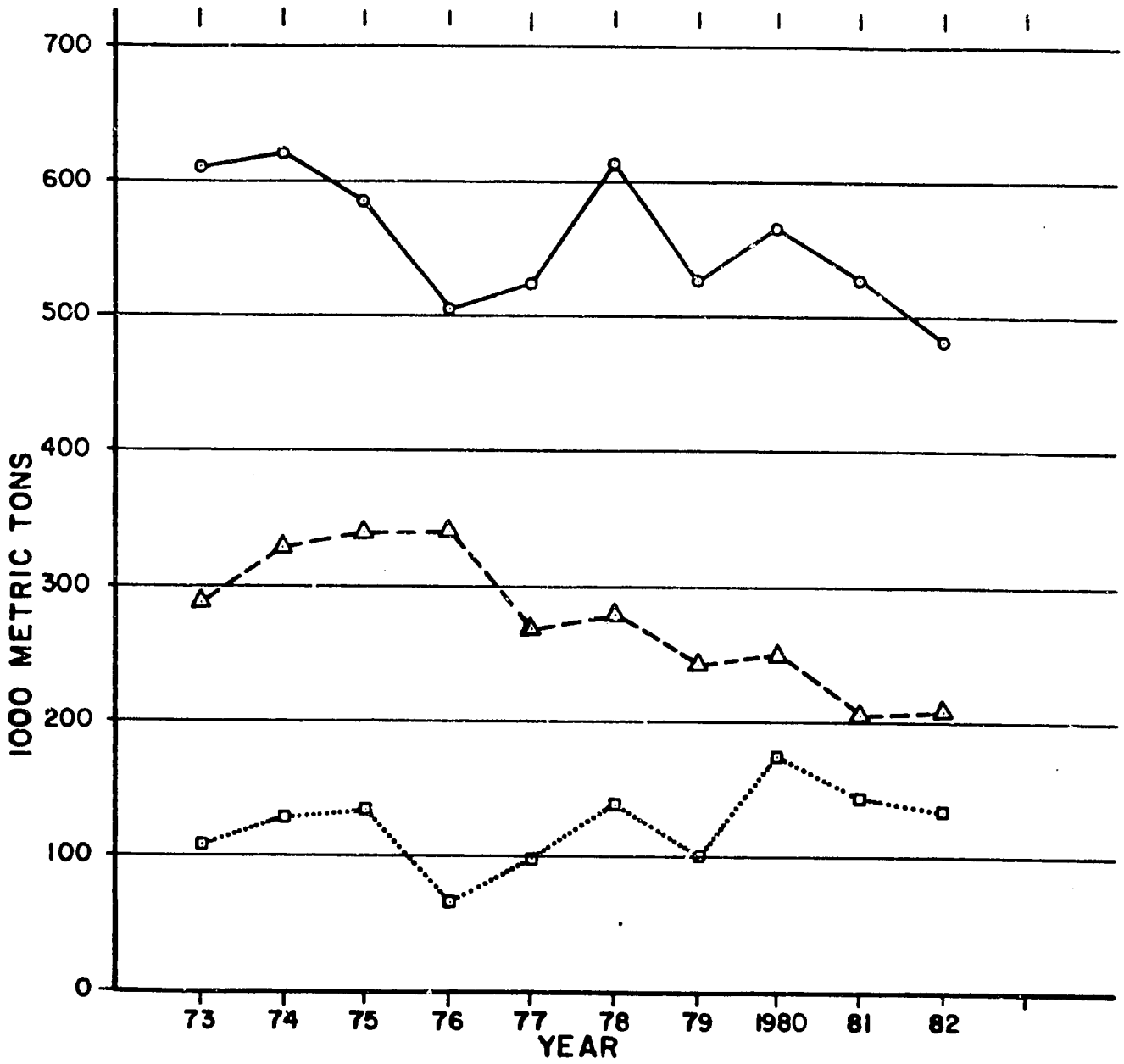
The USSR, prior to 1981, concentrated on horse mackerel but in 1981 and 1982, triggerfish took over as the principal species. The entire division catch is credited to the Soviets (Figure 19).



LEGEND:

- Clupeids (sardinella)
 - Carangids (horse mackerel)
 - ▲—▲ Balistes (triggerfish)
 - △—△ Sparids (sea bream)
 - Sciaenids (croaker)
- } demersal

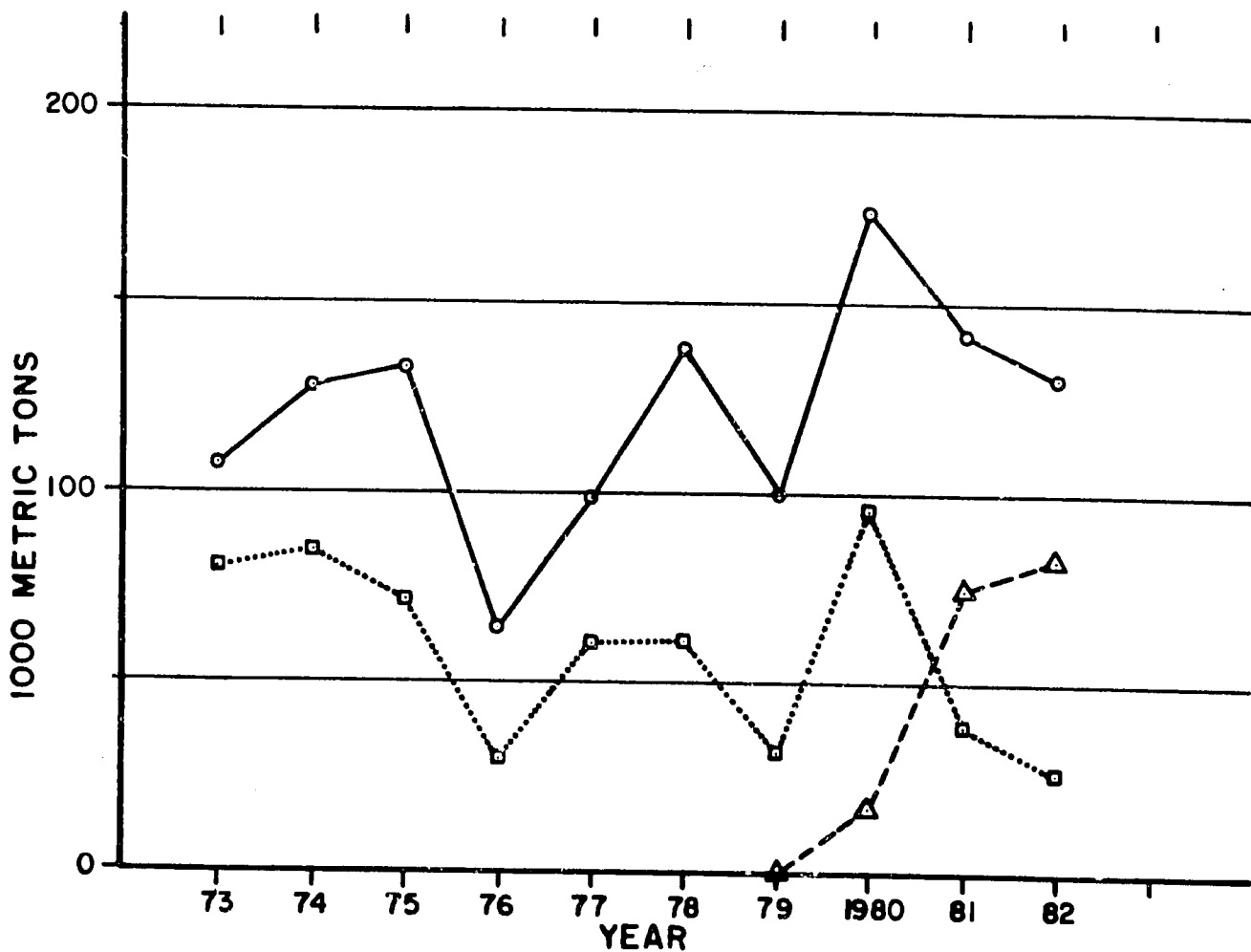
**Figure: 17 CAPE VERDE COASTAL DIVISION
CATCH BY PRINCIPAL SPECIES GROUPS**



LEGEND:

- Total from Division
- -△- -△- Senegal
- U.S.S.R.

**Figure: 18 COASTAL CAPE VERDE DIVISION
CATCH BY LEADING COUNTRIES**



LEGEND:

- U.S.S.R. Total
- △-△- Triggerfish
- Carangids (horse mackerel)

Figure: 19 COASTAL CAPE VERDE - U.S.S.R. CATCHES

2.4 Footnotes

1. UN 3rd Conf. LOS, doc. A/CONF. 62/L. 14, 1976.
2. Troadac J-P and S. Garcia, 1980. The fish resources of the easter central Atlantic, Part One: The resources of the Gulf of Guinea from Angola to Mauritania. FAO Fish. Tech. Paper 186.1
3. Trott, Lamarr B., 1984. Trip report - West Africa U.S. Agency for International Development.
4. Gerald Posner and Jon Sutinen, Overfished Stocks, Undernourished People, and Underbenefited Coastal States of Western Africa: Opportunities for Marine Fisheries Management and Development, (USAID, Washington, D.C., June, 1984), page 23.

3.0 REGULATION, CONSERVATION AND LAW ENFORCEMENT

Prior to 1976, no nation in Northwest Africa claimed sovereignty or exercised territorial control beyond the 12 mile "territorial sea" limit. Fleets from all countries of the world were free to fish as they wished on the high seas, in what were truly international waters. The fish they took were considered an international resource and relatively little attention was paid to the impact of harvesting activity on the stocks themselves. This situation began to change in the early 1960's with widespread introduction of a new class of fishing vessel, the large "factory ship", equipped to catch, process and store on-board large quantities of fish and able to operate independently at sea for extended periods of time. These vessels were both exceptionally efficient and unusually expensive. Nations that could afford the investment were clearly in an advantageous position regarding ability to harvest the sea, and this harvest ability became so great that, without some form of regulation, the marine fisheries resource could be seriously impacted. Recognition of this situation led to a series of international meetings and finally to the Convention on the Law of the Sea, which have changed substantially the international fishing rights and responsibilities of coastal and long-range fishing nations.

The waters off the northwest African coast are some of the richest in the world, and they were one of the first areas to be intensively fished by the so-called "distant water" fleets of the more industrialized nations. As shown earlier in Figure 10, the total harvest in this area increased steadily until 1977. In April of 1976, Senegal announced an extension in its territorial sea limit of from 12 to 150 miles, and in July declared a further 200 mile "fishing zone" within which it would manage and maintain control of all fishing activities. In 1978, Gambia followed with a

declared fishing zone of 200 miles, Guinea-Bissau and Cape Verde announced 200-mile Extended Economic Zone (EEZ) limits, and Mauritania established both a 70-mile territorial sea and a 200-mile EEZ limit, followed by Morocco in 1981 (Table 3.)

TABLE 3: MARITIME JURISDICTION IN NORTHWEST AFRICA

(Limits in nautical miles of Territorial Seas, Declared Fishing Zones, and Exclusive Economic Zones)

<u>State</u>	<u>Territorial Sea</u>	<u>Fishing Zone</u>	<u>EEZ</u>
Morocco	12 mi (1973)	N/A	200 mi (1981)
Mauritania	70 mi (1978)	N/A	200 mi (1978)
Senegal	150 mi (1976)	200 mi (1976)	N/A
Gambia	12 mi (1969)	200 mi (1978)	N/A
Guinea-Bissau	12 mi (1978)	N/A	200 mi (1978)
Guinea	12 mi (1980)	N/A	200 mi (1980)
Cape Verde	12 mi (1978)	N/A	200 mi (1978)

SOURCE: Coastal State Requirements for Foreign Fishing (Volume 1),
Legislative Study No. 21, Rev. 1, FAO, Rome 1983.

In December, 1982, 119 nations meeting in Jamaica signed a new United Nations Convention on the Law of the Sea (LOS). A key element of this Convention deals with the concept of coastal state jurisdiction over fisheries resources out to a 200-mile limit and the responsibility of the coastal state to manage those resources. The management responsibility becomes particularly important where the stocks themselves are migratory and may pass through zones controlled, or at least declared as a national jurisdiction zone, by more than one nation. These rights and responsibilities are summarized in Article 56 of the LOS Convention, which declares that:

"In the exclusive economic zone, the coastal state has:

- (a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds;
- (b) jurisdiction as provided for in the relevant provisions of this Convention with regard to:
 - (i) the establishment and use of artificial islands, installations and structures;
 - (ii) marine scientific research;
 - (iii) the protection and preservation of the marine environment;
- (c) other rights and duties provided for in this Convention."

Any nation can establish "authority" in a geographic area by decree.

The ability to exercise this authority is a totally separate matter.

Although the LOS Convention provides that coastal states declaring an EEZ must be responsible for "protection, preservation and management" of the fisheries resource, the states are not required a priori to demonstrate an ability to do so.

The impact of management by decree in the waters of Northwestern Africa in the late 1970's is clearly reflected in the total reported catch in the years following declaration of extended jurisdiction (see Figure 10). Distant water fleets fishing in these areas were required to pay fees to the coastal states as a function of fish volume and competition of the caught, number of vessels fishing in the area, size and fishing ability of the vessels or any combination of these. However, the coastal states had at that time, and have today, very limited ability to determine what is caught or who catches it within their 200-mile zones. They relied then, as they do now, primarily on reports provided by the fishing nations and vessels themselves. It should certainly be no surprise that the catch in the "CECAF" area, as reported by the fishermen responsible for paying these new fees, decreased by 25% immediately after the declaration of extended jurisdiction. It is interesting to note that this decline correlates directly with a 50% decrease in catch reported by the Soviet Union and the Eastern Bloc nations at this same time.

3.1 Legal Setting and Basis

The operating and reporting rules and conditions for vessels fishing in the EEZ's of Mauritania, Senegal, Gambia, Guinea-Bissau and Guinea are summarized in Table 4. Details regarding items of legislation and agreements reportedly in force in each of these countries up to 1983 are presented in Table 5. Similar information comparing license fees, nationality definitions and criteria are presented in Table 6.

It is apparent from even a cursory review of this material that laws and regulations applied to distant-water fleets vary substantially from country to country. What is perhaps not so apparent is that these laws are

not uniformly enforced within countries, even where the enforcement capability may be presumed to exist. Special agreements and individual protocols with certain nations make many fleets effectively exempt.

TABLE 4: LEGAL REQUIREMENTS, CONTROL AND REPORTING CONDITIONS FOR FISHING VESSELS OPERATING IN NORTHWEST AFRICAN WATERS

Mauritania

Vessel to board observers as required
Requirements concerning local landing and processing of catch
Requirements concerning protection of local fisheries and gear
Submit logbooks and catch reports on request

Senegal

Vessel to board observers as required
Vessel to post performance bond, guarantee or deposit
Requirements concerning local landing and processing of catch
Requirements concerning protection of local fisheries and gear
Submit logbooks and catch reports on entry into port

Gambia

Vessel to seek prior authorization for transshipments
Requirements concerning local landing and processing of catch
Submit logbooks and catch reports on request

Guinea-Bissau

Vessel to board observers as required
Requirements concerning local landing and processing of catch
Requirements concerning employment and training of coastal state
nationals in crew
Submit logbooks and catch reports every 90 days

Guinea

Requirements concerning protection of local fisheries and gear
Requirements concerning employment and training of coastal state
nationals in crew
Submit logbooks and catch reports on completion of voyage or at
end of permit

In at least three of these countries, vessels may be required to board observers who can monitor the catch by species and amount. This would imply that qualified observers are available. Unfortunately, this is seldom the case. As an example, while legislation currently in effect in Guinea-Bissau requires certain vessels to carry onboard observers, no such qualified observers are available in the country. Guinea-Bissau is presently preparing a request for foreign assistance in training observers and fisheries scientific and technical staff. It is expected that this request will be presented to the U.S. Ambassador and the USAID Representative in Bissau in June, 1985.

Some specific legislative items that might be of significant value to the coastal states appear to be either missing entirely or unclearly provided in existing law. These would include requirements for clear and unambiguous marking of vessels to permit effective identification at sea by patrol boats or aircraft; requirements for vessels to submit fishing plans in advance, stating species sought, gear employed, and area of intended operation; requirements to report on or prior to entering and leaving the EEZ; timely and periodic reporting of position, catch and effort, and similar items that would substantially assist the coastal states in their attempt to monitor and manage resources in their extended jurisdictional areas.

TABLE 5
COASTAL STATE REQUIREMENTS FOR FOREIGN FISHING

STATE	Foreign fishing vessel licence conditions (other than reporting requirements) [including observers, bonds, etc.]	Logbook and reporting requirements for foreign fishing
MAURITANIA	<p style="text-align: center;"><u>LEGISLATION</u></p> <p>- Same conditions with respect to conservation measures, mesh sizes etc. as for national vessels</p> <p style="text-align: center;"><u>AGREEMENTS</u></p> <p>*Many bilateral agreements concluded in the 1970's and early 1980's included provisions under which:</p> <ul style="list-style-type: none"> -permitted fishing areas were assigned to foreign vessels on basis of their size; -certain proportion of catch was required to be landed and or processed; -local fishermen were to be trained on board foreign vessels; -scholarships to be granted to Mauritanian citizens; -observers to be taken on board. <p><u>*Procès Verbal of 17 April 1980</u></p> <ul style="list-style-type: none"> -Tuna vessels allowed to operate only beyond 30 miles, nonetheless they may "pursue" fish past this line; -taking on board of 5 Mauritanian sailors and one observer; -minimum mesh size. <p><u>*Agreement with Spain, 1982 (effective 1 March 1982, valid 1 year)</u></p> <p>Up to 25 Spanish vessels to fish Octopus in Mauritanian waters from 6-mile from coast. Nets to be used must be 60 mm mesh. Vessels to have on board two Mauritanians as crew members.</p>	<p style="text-align: center;"><u>AGREEMENTS</u></p> <p>*Many bilateral agreements concluded in the 1970's required foreign fishing vessels to submit catch reports.</p>

TABLE 5
COASTAL STATE REQUIREMENTS FOR FOREIGN FISHING

STATE	Foreign fishing vessel licence conditions (other than reporting requirements) (including observers, bonds, etc.)	Logbook and reporting requirements for foreign fishing
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SENEGAL

LEGISLATION

- Zones reserved for national fishermen and for different types of fishery (sardine boats, purse seiners (fresh) up to 3 miles from the coast; freezer boats (Senegalese and countries with fishing agreement) outside 12 miles; where no agreement, outside 50 miles. Trawlers (fresh) and small freezer boats allowed outside 6 miles; big freezer trawlers; outside 12 miles; tuna boats allowed to fish for tuna and bait anywhere. (Arts. 18 and 20)
 - Prescription of the gross tonnage and/or the horse-power of the vessels allowed to fish in Senegalese waters (1500 GRT or less, in the case of refrigerated vessels fishing outside the 12-mile limit). (Art. 4)
 - Encouragement is given to landings and processing through the level of licence fees (double for catches not landed locally). (Arts. 19-23)
 - Bonds must be posted to guarantee performance obligations where no bilateral agreement is in force. Amount ranges from 1 500 000 CFA for vessels under 50 GT and less than 5 years old to 25 000 000 CFA for vessels over 200 GT and more than 10 years old. (Art. 24)
- (Act No. 76-89 of 2 July 1976 as amended 1979)

LEGISLATION

All licensed vessels to submit return of catch in form set out in Annex IV to the Act. Returns to be made to Dept. of Oceanography and Maritime Fisheries within 24 hours of arrival in port.
(Act No. 76-89 of 2 July 1976 as amended 1979, Art. 15)

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TABLE 5
COASTAL STATE REQUIREMENTS FOR FOREIGN FISHING

STATE	Foreign fishing vessel licence conditions (other than reporting requirements) (including observers, bonds, etc.)	Logbook and reporting requirements for foreign fishing
SENEGAL (Cont'd)	<p style="text-align: center;"><u>AGREEMENTS</u></p> <p><u>*Agreement with Spain, 16 February 1982</u></p> <ul style="list-style-type: none"> - Freezer trawlers and fresh fish vessels allowed to operate outside 12 miles from northern boundary until 14 27' N. latitude and beyond 25 miles from this point up to the Guinea Bissau boundary. Tuna freezer vessels allowed to operate in the whole Senegalese zone. - 60 mm minimum mesh size for fresh fish vessels. - Spanish vessels to embark up to 33% Senegalese crew. For freezer tuna vessels, Senegal will take into account the number of nationals of other countries that Spanish vessels operating in the same region have to take on board. - Vessels to carry one Senegalese observer. - Tuna vessels to land an average of 123 tons per year per vessel according to a pre-established schedule and a set of prices both to be agreed upon every 3 months. <p><u>*Agreement with EEC - with Protocol - 21 January 1982</u> valid through 15 November 1983</p> <ul style="list-style-type: none"> - Vessels to take one observer on board. (Vessel owners to reimburse the Senegalese Government at a flat rate of CFA 8 000 per day spent by the observer on board the vessel. Captain of the vessel to facilitate his work.) - EEC to provide 10 study and training grants for a five-year period in disciplines connected with fisheries. - Net trawlers and tuna boats obliged to land their entire catch in Senegal. <p><u>*Agreement with Ivory Coast, 11 June 1979</u></p> <ul style="list-style-type: none"> - Permits to be granted to 12 fishing vessels of less than 1 500 tonnes each. - Fishing vessels to take up to 30% Senegalese crew. <p><u>*Agreement with Poland, 17 March 1976</u></p> <ul style="list-style-type: none"> - Polish vessels to embark up to 30% Senegalese crew. 	<p style="text-align: center;"><u>AGREEMENTS</u></p> <p><u>*Agreement with Ivory Coast, 11 June 1979</u></p> <p>Ivory Coast administration to send to Senegalese authorities declaration of catch of authorized vessels of Ivory Coast.</p>

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TABLE 5
COASTAL STATE REQUIREMENTS FOR FOREIGN FISHING

STATE	Foreign fishing vessel licence conditions (other than reporting requirements) (including observers, bonds, etc.)	Logbook and reporting requirements for foreign fishing
GAMBIA	<p style="text-align: center;"><u>LEGISLATION</u></p> <p>Licence conditions may include:</p> <ul style="list-style-type: none"> - conditions concerning location, method and conduct of fishing operations, size of catch allowed and conservation measures to be adopted; - requirements concerning landing, marketing and processing of catch; - requirements concerning construction of shore based facilities; - requirements concerning transfer of technology, carrying out of research or survey programmes and employment and training of local fishermen; - protection of local and traditional fisheries; - no fish to be transhipped at sea unless expressly authorized by the Director; - fish to be landed only at authorized landing places. <p><u>(Fisheries Act 1977 S. 21)</u></p>	<p style="text-align: center;"><u>LEGISLATION</u></p> <p>Master of vessel to make such returns of catch at such times and in such form as Director may require. Master of vessel to make statistical returns as required.</p> <p><u>(Fisheries Act 1977 S. 15 and Fisheries Regulations, 1978, Reg. 10)</u></p>

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TABLE 5
COASTAL STATE REQUIREMENTS FOR FOREIGN FISHING

STATE	Foreign fishing vessel licence conditions (other than reporting requirements) [including observers, bonds, etc.]	Logbook and reporting requirements for foreign fishing
GUINEA BISSAU	<p style="text-align: center;"><u>LEGISLATION</u></p> <p>Licence required (Act No. 3-78 of 19 May 1978, Art. 4) Annual licences may be issued to foreigners if nationals not able to meet market demand. (Decree No. 209 of 1913 Art. 182)</p> <p style="text-align: center;"><u>AGREEMENTS</u></p> <p>*Agreement with EEC, 27 Feb 1980 (as extended 28 Mar 1983, valid until March 1986) Licence not transferable. Vessels may be obliged to land a proportion of catch at ports in Guinea Bissau. Trawlers may be obliged to employ nationals up to 25 per cent of the crew. Nationals to be employed either on board the tuna boats or in suitable positions ashore. Training grants to be given to nationals of Guinea Bissau in the Member States establishments. (Council Regulations (EEC) Nos. 2213/80 & 707/83)</p>	<p style="text-align: center;"><u>AGREEMENTS</u></p> <p>*Agreement with EEC, 1980 (as extended 28 March 1983, valid until March 1986)</p> <p><u>Reports</u> Vessel to send, at least once every three months, statement of catch to the national fisheries authorities; it should include date, name of vessel, nationality of vessel tonnage (G.R.T.) engine rating, fishing methods used, area, number of fishing operations, number of fishing hours, species caught and port of landing</p> <p><u>Logbook</u> Master to keep logbook on board vessel and supply following information to the national fisheries authorities on monthly basis: month, name of vessel, nationality of vessel, engine rating in H.P., gross registered tonnage, fishing methods used, port of landing, statistical table of catches. (Council Regulation (EEC) No. 2213/80) (Council Regulation (EEC) No. 707/83)</p>

53-A

TABLE 5
COASTAL STATE REQUIREMENTS FOR FOREIGN FISHING

STATE	Foreign fishing vessel licence conditions (other than reporting requirements) [including observers, bonds, etc.]	Logbook and reporting requirements for foreign fishing
GUINEA	<p style="text-align: center;"><u>LEGISLATION</u></p> <ul style="list-style-type: none"> - Maritime fishing by foreign companies or individuals not permitted without special authorization by Minister of Planning, Fish and Stock Farming. - <u>(Law No. 15/AL/77 of 1977 Art. 554 as amended by Decree No. 597/FRG, 1977)</u> <p style="text-align: center;"><u>AGREEMENTS</u></p> <p><u>*Agreement with ANOPESCA, 1 April 1980</u></p> <ul style="list-style-type: none"> - 6 vessels of a global tonnage of 4 518 allowed to operate; - fishing zones and minimum mesh size; - fishing vessels to embark at least 25 per cent Guinean crew (financial charges to be born by Anopesca) <p style="text-align: center;"><u>AGREEMENTS</u></p> <p><u>*Agreement with Spain, 1982 (Effective 1 November 1982 to 1 November 1983)</u></p> <p>A Spanish freezer trawler to undertake exploratory voyage in Guinea Waters for one month to determine state of marine resources, present levels and potentials for exploitation of Cephalopods and Crustacea. A Guinean scientist to be on board.</p> <p style="text-align: center;">Source: La Pêche maritime November 1982 and January 1983</p>	<p style="text-align: center;"><u>AGREEMENTS</u></p> <p><u>*Agreement with Anopesca 1980.</u></p> <p>Catch statistics to be reported on prescribed form at conclusion of each voyage. (Art. 6)</p>

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TABLE 6
LICENCE FEES, BILATERAL AGREEMENT OR JOINT VENTURE REQUIREMENTS AND NATIONALITY CRITERIA

STATE	Licence fees, royalties and other payments		Requirements concerning bilateral framework agreements or joint venture participation	Nationality criteria for fishing vessels
	Local currency	US\$ Equiv.		
MAURITANIA	<u>LEGISLATION</u>		<u>LEGISLATION</u>	
	<u>Export Fishing Fee</u>	<u>Amount</u> (% FOB value)	<u>Local fishing vessel -</u>	
	<u>Product</u>		(1) owned by nationals (at least 51% or	
			(2) owned by companies	
			(a) registered in Mauritania;	
			(b) Chairman of the Board and majority of Directors must be nationals;	
			(c) at least 51% of the share capital must be held by nationals, and (3) all members of crew and at least 75% of officers must be nationals (except special circumstances). (Code of Merchant Shipping 1978, Art. 10)	
	1) Demersal fish (fresh, chilled, frozen)			
	a) high-value species: seabasses, gilthead, common seabream, dentex, groupers and related, red mullets, halibuts, flat fishes, etc.			
	1 - shore processing	11 0		
	2 - processing aboard	17 0		
	b) other species: grey mullets, "tuyos", magres, drums, hakes etc.			
	1 - shore processing	8.5 0		
	2 - processing aboard	12.5 0		
	2) Cephalopods: octopus, cuttlefish, squid			
	1 - shore processing	11 0		
	2 - processing aboard	17 0		
	3) Pelagic fish			
	a) tunas and tunalike species			
	1 - shore processing	8.5 0		
	2 - processing aboard	17 0		
	b) other species: mackerels, horse mackerels, sardinellas			
	1 - shore processing	7.5 0		
	2 - processing aboard	10 0		
	4) Spiny lobsters	20 0		
	5) Salted, dried and smoked fish	5 0		
	6) Fish meal			
	a) not for human consumption	7 0		
	b) for human consumption			
	1 - shore processing	7 0		
	2 - processing aboard	10 0		

TABLE 6
LICENCE FEES, BILATERAL AGREEMENT OR JOINT VENTURE REQUIREMENTS AND NATIONALITY CRITERIA

STATE	Licence fees, royalties and other payments		Requirements concerning bilateral framework agreements or joint venture participation	Nationality criteria for fishing vessels
	Local currency	US\$ Equiv.		
MAURITANIA (cont'd)	7) Fish oil			
	1 - shore processing		7 0	
	2 - processing aboard		15 0	
	8) "Poutargue"		20 0	
	9) Canned preserves			
	1 - shore processing		5 0	
	2 - processing aboard		15 0	
	10) Semi-preserves			
	1 - shore processing		5 0	
	2 - processing aboard		15 0	
	11) Other fishery products (Art. 11 of Ordinance No. 60-011 of 26 February 1980)		8 0	

AGREEMENTS

*Agreement with Armateurs langoustiers français, Jan. 1982, for 1982, US\$ 400 per GRT for lobster-vessel. US\$ 400

*Agreement with Spain on octopus fishing, March 1982 (valid 1 year) (25 vessels) = US\$250 per GRT. US\$ 5.00

*Agreement with French tuna boats June 1982. - US\$1 000 per GRT. US\$1 000
 According to news paper reports
 2 vessels bought licences.

August 1982. - US\$500 per GRT US\$500
 According to news paper reports
 14 vessels bought licences valid
 3-4 months

*Probe-Verbal with Senegal of 17 April 1980
 -payment of a 2 CFA fee per kg
 of tuna catch. US\$ 0.005

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TABLE 6
LICENCE FEES, BILATERAL AGREEMENT OR JOINT VENTURE REQUIREMENTS AND NATIONALITY CRITERIA

STATE	Licence fees, royalties and other payments		Requirements concerning bilateral framework agreements or joint venture participation	Nationality criteria for fishing vessels
	Local currency	US\$ Equiv.		
SENEGAL	<u>LEGISLATION</u>		<u>LEGISLATION</u> Bonds must be posted to guarantee performance of obligations where no bilateral agreement in force. (Act No. 76-86 of 2 July 1976 as amended by Act No. 79-23 of 24 January 1979 Art. 24)	<u>LEGISLATION</u> Local fishing vessels - 1) owned by nationals (at least 51%) or owned by companies meeting following criteria: a) has head office in Senegal; b) Chairman of the Board and majority of Directors must be nationals; c) at least 50% of the share capital must be held by nationals. d) director general or manager must be national; 2) Crew and officers must be all nationals except where special provisional exemption granted by the maritime authority where it is impossible to recruit the necessary technicians locally. [Act No. 62-32 of 22 March 1962, (Merchant Shipping Code) as amended by Act No. 73-53 of 4 December 1973 Art. 15]
	- <u>Sardine freezer boats</u> CFA 1 500 000 per vessel	US\$ 4 054		
	- <u>Trawlers</u>			
	- if land all catch in Senegal = CFA 7 500 per G.T.	US\$ 20		
	- if not required to land all catch CFA 15 000 per G.T.	US\$ 41		
	- if from states not having concluded a fishing agreement with Senegal CFA 25 000 per G.T.	US\$ 68		
	- <u>Tuna vessels</u> - royalty payment per kilo of fish landed fixed annually by regulation			
	- vessels participating in Senegalese fishing operations = 1x basic rate			
	- vessels not participating in Senegalese fishing operations = 2x basic rate			
	- vessels from states not having concluded a fishing agreement with Senegal = 3x basic rate			
	(Decree No. 76-836 of 24 July 1976 Art. 2-4)			

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TABLE 6
LICENCE FEES, BILATERAL AGREEMENT OR JOINT VENTURE REQUIREMENTS AND NATIONALITY CRITERIA

STATE	Licence fees, royalties and other payments		Requirements concerning bilateral framework agreements or joint venture participation	Nationality criteria for fishing vessels
	Local currency	US\$ Equiv.		
SENEGAL (cont'd)	<u>AGREEMENTS</u>			
	*Agreement with EEC, 21 Jan. 1982 (renewable on tacit agreement)			
	Fees are set according to the following scale:			
	(a) trawlers landing their entire catch (licences to be issued for up to 2 150 GRT):			
		= CFA 8 500 per G.R.T. per year for shrimp boats;	US\$ 23	
		= CFA 7 500 per G.R.T. per year for fish boats;	US\$ 20	
	(b) trawlers not landing their entire catch and fishing throughout the year (up to 5 000 GRT for year)			
		= CFA 17 000 per G.R.T. per year for shrimp boats;	US\$ 46	
		= CFA 15 000 per G.R.T. per year for fish boats;	US\$ 41	
	(c) freezer trawlers not landing their entire catch and fishing for a four-month period between 1 Apr. and 30 September (up to 9 000 GRT additional to 5 000 GRT for year):			
	= CFA 10 500 per G.R.T.;	US\$ 28		
(d) tuna boats landing their entire catch (up to 3 000 GRT):				
	= CFA 2 per kg of fish caught	US\$ 0.005		
(e) tuna boats not landing their entire catch (up to 23 300 GRT):				
	= CFA 6 per kg of fish caught	US\$ 0.016		
<u>PLUS</u> financial compensation for the period 16 Nov. 1981 to 15 Nov. 1982 (Protocol with EEC, 21 Jan. 1982) of CFA 2 500 000 000 plus				
	CFA 100 000 000 contribution	US\$ 6 757 000		
	towards the financing of a Senegal-	US\$ 270 000		

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TABLE 6

LICENCE FEES, BILATERAL AGREEMENT OR JOINT VENTURE REQUIREMENTS AND NATIONALITY CRITERIA

STATE	Licence fees, royalties and other payments		Requirements concerning bilateral framework agreements or joint venture participation	Nationality criteria for fishing vessels
	Local currency	US\$ Equiv.		
SENEGAL (cont'd)	<u>*Agreement with Spain, 16 Feb. 1982</u> (valid two years)			
	-fees to be paid by shipowners:			
	-freezer trawlers - CFA 21 250 per G.R.T. per year.	US\$ 57		
	-fresh fish trawlers - CFA 9 375 per G.R.T. per year	US\$ 25		
	-tuna vessels - CFA 6 per kilo of fish caught;	US\$ 0.016		
	<u>-PLUS Financial grants to be paid by Spanish government:</u>			
	-freezer vessels = CFA 6 201 923 every 3 months for each vessel up to 15;	US\$ 16 762		
	-CFA 7 752 464 every 3 months for each of 24 supplementary vessels;	US\$ 21 000		
	-fresh fish vessels = CFA 88 461 538	US\$ 239 085		
	-tuna freezers = CFA 315 000 000 for 42 vessels	US\$ 851 350		
	-CFA 7 500 000 for each supplementary vessel up to maximum of 46 vessels	US\$ 20 270		
	<u>*Agreement with Ivory Coast 11 June 1979</u> - Ivory Coast vessels allowed to fish upon payment of fees laid down by national legislation			
	- Ivory Coast to allow duty-free imports of fishing products from Senegal up to 13 000 per year.			
	<u>*Agreement with Poland 17 March '76</u> valid for 5 years			
	- Poland to finance the construction of a fishing quay at Saint Louis amounting to US\$ 3 500 000	US\$ 3 500 000		
	-Poland to supply Senegalese authorities with			
	- 3 freezer vessels for transport			
	- 12 trawlers of 25 m. length			

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TABLE 6
LICENCE FEES, BILATERAL AGREEMENT OR JOINT VENTURE REQUIREMENTS AND NATIONALITY CRITERIA

STATE	Licence fees, royalties and other payments		Requirements concerning bilateral framework agreements or joint venture participation	Nationality criteria for fishing vessels
	Local currency	US\$ Equiv.		

GAMBIA

LEGISLATION

- Trawlers (other than shrimp)
 - 400 hp or more = D.250 per GT p.a. US\$ 99
 - less than 400hp = D.200 per GT p.a. US\$ 79
 - Lobster vessels = D.125 per GT p.a. US\$ 50
 - Factory vessels = D. 60 per GT p.a. US\$ 24
 - Tuna vessels = D.0.02 per Kg of (fees payable in advance) US\$ 0.08
 - Multipurpose vessels: US\$ 40
 - 400 hp or more = D.250 per GT p.a. US\$ 99
 - less than 400hp = D.200 per GT p.a. US\$ 79
 - Shrimp trawlers = D.100 per GT pa. US\$ 40
 - Seiners = D.100.50 per GT p.a. US\$ 40
 - Others = D.50 per GT p.a. US\$ 20
- (Fisheries (amendment) Regulations 1982.
 (ENTRY VERIFIED - FEBRUARY 1983)

LEGISLATION

- Local fishing vessel defined as a vessel -
- (1) wholly owned by one or more persons who are citizens of the Gambia; or
 - (2) wholly owned by companies established under the Gambian laws of which a) at least 51% of the shares are held by citizens; b) chairman and a majority of members of the Board are citizens. (Fisheries Act 1977 8.2)

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TABLE 6
LICENCE FEES, BILATERAL AGREEMENT OR JOINT VENTURE REQUIREMENTS AND NATIONALITY CRITERIA

STATE	Licence fees, royalties and other payments		Requirements concerning bilateral framework agreements or joint venture participation	Nationality criteria for fishing vessels
	Local currency	US\$ Equiv.		
GUINEA BISSAU	<u>LEGISLATION</u>		<u>LEGISLATION</u>	<u>LEGISLATION</u>
	<u>AGREEMENTS</u>		<u>AGREEMENTS</u>	
	<p>*<u>Agreement with EEC, 27 Feb. 1980</u> extended 1983 valid thru March 1986 -Bottom trawlers FF 420 per GRT pa. US\$ 57 (up to annual average of 3 500 GRT) - Freezer tuna boats FF 0.04 per kg US\$ 0.005 of fish caught; (up to annual average of 900 GRT) + ECU 1 425 000 compensation fee p.a. US\$1 217 949 + ECU 250 000 (for 3 years) to US\$ 213 675 finance scientific programme on improving information on resources in zone. <u>(EEC Council Regs. 2213/80, 707/83)</u></p>		<p>Licence required even if under bilateral agreement</p>	
	<p>*<u>Agreement with USSR, 11 Apr. 1975</u> Fees to be established annually after consultation through mixed commission (Art. 6) - USSR to give 5 fishing vessels of "medium tonnage" with fishing gear and spare parts USSR to send and bear financial expenses of a research vessel to evaluate Guinea's fish resources.</p>		<p>*<u>Agreement with Portugal of 20 May 1977</u> -Joint Portuguese/Guinean fishing operations and creation of joint ventures are provided for on a general basis.</p>	

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TABLE 6
LICENCE FEES, BILATERAL AGREEMENT OR JOINT VENTURE REQUIREMENTS AND NATIONALITY CRITERIA

STATE	Licence fees, royalties and other payments		Requirements concerning bilateral framework agreements or joint venture participation	Nationality criteria for fishing vessels
	Local currency	US\$ Equiv.		
GUINEA	<p style="text-align: center;"><u>LEGISLATION</u></p> <p style="text-align: center;"><u>AGREEMENTS</u></p> <p>*approx US\$ 200 per G.R.T. in recent agreements. US\$ 200 per G.R.T.</p> <p>*<u>Agreement of 1 April 1980 with Acopasca</u> provided for the following fees to be paid in kind for six vessels totalling 4 518 gross tons authorised to fish Guinean waters:</p> <p>a) vessels from 101 to 500 G.T. = 250 tons of fish per boat/year</p> <p>b) vessels from 501 to 800 G.T. = 350 tons of fish per boat/year</p> <p>c) vessel from 800 to 1 000 G.T. = 550 tons of fish per boat/year</p> <p>The right is reserved to adjust these payments according to international economic conditions.</p> <p>*Draft agreement of 1981 envisaged the following fees:</p> <p>-US\$ 7 920 per trawler per year to cover surveillance costs US\$ 7 920</p> <p>-US\$ 600 per vessel G.T. per year US\$ 600</p> <p>+ 166.92 tons of fish</p>		<p style="text-align: center;"><u>LEGISLATION</u></p> <p>-Bilateral agreements not necessary to obtain licence.</p> <p style="text-align: center;"><u>AGREEMENTS</u></p> <p>*<u>Framework agreement with Ghana, 18 Aug. 1978</u> provides for joint Ghanean/Guinean fishing operations and formation of one joint fishing enterprise.</p>	<p style="text-align: center;"><u>LEGISLATION</u></p> <p>Local fishing vessel defined as fishing vessel at least half owned by nationals or by company with head office in Guinea, and of which majority of Board of Directors, or supervisory Board chairman or sole administrator and the manager or managers must be nationals, and for collective name and limited liability companies at least half share capital must be held by nationals.</p> <p><u>(Act No. 15/AL/77 of 29 July 1977 Art. 10)</u></p>

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TABLE 6
LICENCE FEES, BILATERAL AGREEMENT OR JOINT VENTURE REQUIREMENTS AND NATIONALITY CRITERIA

STATE	Licence fees, royalties and other payments		Requirements concerning bilateral framework agreements or joint venture participation	Nationality criteria for fishing vessels
	Local currency	US\$ Equiv.		
GUINEA (cont'd)	<u>*Agreement with EEC of August 1982</u> valid 1 Jan. 1983 thru 31 Dec. 1985 Either 100 ECU per G.R.T. per year or delivery of part of the catch at Conakry; <u>PLUS</u> Non reimbursable financial compensation of 2 100 000 ECU and contribution of 200 000 ECU to a Guinean fish research project.		US\$ 85	
	<u>*Agreement with Spain 1 Nov. 1982</u> valid thru' 1 Nov. 1983 US\$ 2 000 per vessel per 3 months (20 vessels average of 120 GRT for pelagic fishing beyond 6 mi.) † technical assistance to Ministry <u>(ENTRY VERIFIED - JANUARY 1983)</u>		US\$ 2 000	

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3.2 Management Capability of Coastal States

In declaring a 200-mile Exclusive Economic Zone or any similar area of jurisdiction, a coastal state does more than announce its intention to collect access fees. It also asserts its intent to "protect, preserve and manage" the marine resource within this area. This responsibility is specifically recognized and referenced in Article 56 of the 1982 U.N. Convention on the Law of the Sea.

Management of any resource requires at least three things:

1. Information, regarding the nature, state, location, time-rate-of-change, and level of exploitation of the resource. This information must be statistically accurate, valid and reliable.
2. Trained personal, who can interpret, use, and act upon the available information, and who understand the consequences of alternative courses of action.
3. Institutions, both physical and legal, that provide a framework for the collection of information, the analysis task, and subsequent management action.

All three of these necessary and essential items are sadly lacking in the Northwest African coastal states examined by this study and in some cases, are totally absent.

Information regarding the nature, size, level of exploitation and rate of change of the principal marine fish stocks is exceptionally poor and unreliable. Catch data is derived primarily from reports provided by the fishermen themselves who have a significant economic incentive to under-report, misreport, or not report at all. The ability to independently check on or confirm reported catch rates is inadequate to the task where it exists.

The most complete and reliable source of fisheries information is the CECAF Project office in Dakar, Senegal. In many respects, this is the only reliable data source in the entire region. Even here, the CECAF office must rely on reports provided to it by the coastal states and by the distant water fleets themselves.

Trained personnel are in short supply in all technical fields throughout the developing world and Northwest Africa is no exception. The problem appears to be especially acute in the marine fisheries area. Each country has a few well trained and qualified people, but major assistance is required. Qualified on-board observers are significantly lacking. These people are basic to the collection of valid and reliable resource data, without which effective management is impossible.

Institutions, for the management of the resource and enforcement of the laws, exist in every state. Their effectiveness is an entirely separate matter. In some cases, they exist principally on paper. In others, reasonably good physical plant and equipment are available but government organization and communication is such that little can be effectively accomplished. Legal frameworks exist, but they are seldom uniform and often inadequate or inappropriate. Assistance in institutional development is required throughout the region, and physical equipment is required in most cases.

Senegal is perhaps the best equipped state in this region and appears to be better organized to manage the marine resource than any other nation. The Department of Fisheries (DOPM) has some well-trained and qualified personnel but is somewhat lacking in equipment and has little money for daily operation and upkeep. The CRODT laboratory is well equipped and competently staffed, and operates its own fisheries research vessel. This

laboratory is funded primarily by the French Government and should be capable of providing detailed and valuable information to the Senegalese Government regarding its marine resource. We presume that it does so. The Director of the CRODT laboratory was reluctant at best to provide information regarding the workings of CRODT and the quality and quantity of its output. In general, statistical data generated in Senegal should be considered reasonably valid, and certainly better than that provided by any other state.

A major problem in Senegal involves its artisanal canoe fishing fleet, estimated at 6,000 to 9,000 small vessels. Many of these canoes are exceptionally efficient at harvesting fish in the nearshore areas. Unrestricted fishing in these areas could significantly impact the resource over a much larger region by the taking of large quantities of prespawning juvenile fishes.

Mauritania has a Center for Fisheries Research, originally staffed jointly by teams of French and Russian scientists working primarily with Mauritanian counterparts. The French team is reported to have left the Center in July, 1984, and little information is currently available regarding present operations. Mauritanian statistical data is considered poor and unreliable.

The principal fleets active in Mauritanian waters are those of the Soviet Union and Spain. Available evidence indicates that catch rates from Soviet vessels are consistently underreported by factors of from 50% to 70% while many Spanish vessels may not report at all or report the catch as coming from a different area. Both problems are serious, and will require differing actions to resolve.

Guinea and Guinea-Bissau appear to be the least equipped nations to manage their marine resource. They are significantly lacking in both trained personnel and equipment, have relatively little information regarding the status of a large and valuable marine resource, and at the present time have only a limited enforcement capability. Statistical data from these nations is exceptionally poor. These waters are believed to be heavily fished by distant water fleets from the Soviet Union. Underreporting and nonreporting are believed to be major problems.

3.3 Enforcement Capability of Coastal States

Although they may differ significantly, all of the coastal states in Northwest Africa have national laws and bilateral agreements designed to limit or control fishing activity in their waters. Where a credible enforcement capability is absent, such laws are seldom observed. The present capability of those nations to enforce their maritime fishing laws and regulations varies widely, but in no case does it appear to be either adequate or credible.

3.3.1 Senegal

Among the countries examined during the course of the study, Senegal appears to have the best management and enforcement capability, at least on paper.

Fisheries regulations are established by the Department of Fisheries (Departement du Peche Maritime, DOPM). As of August, 1984, the Department listed six Inspectors and twenty onboard observers in its employment figure. These "Inspectors", however, were employed strictly in port at dockside to check catches as they were unloaded and to examine gear while the ships were in harbor. Under such circumstances, it is often common practice for vessels to carry two sets of gear - one which meets legal mesh

size restrictions, and one which is actually used. Further, since the inspectors do not go to sea, any vessel not unloading its catch in Senegal is not inspected. This includes almost all of the major foreign vessels fishing in Senegalese waters.

The DOPM has recognized the problem and at the present time, several of its inspectors are in Canada attending a three-month training course on fish and gear identification, sampling and at-sea procedures. It is hoped that when they return to Senegal they will spend some time at sea inspecting vessels on the fishing grounds. There is some reason to doubt this will happen. Operations at sea are the responsibility of the Senegalese Navy. As of August, 1984, no inspectors from DOPM had been or were allowed onboard Navy vessels. The DOPM hopes that the procedure will change in the future, but has no control over this situation. Presuming Navy cooperation, the DOPM plans on 120 inspector-days per year at sea, or 20 days per year per inspector.

The 20 observers also appear to be newly employed. They are reportedly spread over 50 major vessels. The extent and quality of their training is not known. Since the inspectors have not gone to sea, and the Navy has no competent inspectors among its crew, fishing vessels are not inspected at sea and there is no independent check on the accuracy of observer reports. Under such circumstances, it is quite common for observers to report whatever they are told to report by the crew of the fishing vessel.

As noted earlier, surface operations at sea are the responsibility of the Senegalese Navy. The Navy operates a total of seven patrol vessels - three Interceptor class boats, 87 x 19 feet, capable of 32.5 knots and mounting two guns; three P-48 class boats, 156 x 23 x 8 feet, 2,000 mile

range at 16 knots, mounting two 40 mm guns, and with a crew complement of 33; and one PR-72 sea boat, 189 x 25 x 7 feet, 2,500 mile range, mounting one 40 mm and one 76 mm gun, with a crew of 53. The vessels are reported as being clean and in good repair.

There is some disagreement as to the utility and effectiveness of these ships. The Navy maintains that these vessels spend "an average of 90% of their sea time on fisheries monitoring duties". Information received from the DOPM indicates that the three Interceptor class boats spend a total of 80 days per year at sea in the region out to 12 miles, the three P-48 class vessels are at sea 100 days per year out to 50 miles, and the PR-72 boat patrols 185 days per year in the region out to the 200-mile limit, for a total of 365 vessel days at sea per year.⁵ If all seven ships are indeed in operation, this equates to 27 days per year or 7% utilization for the smaller vessels, 33 days per year or 9% for the mid-size ships, and 51% utilization for the largest patrol craft. The first numbers appear to be low, and the last unusually high.

Separate and competent sources have indicated that these numbers may in fact be optimistic. CRODT personnel maintain that only four vessels⁶ operated in 1983 for purposes of fisheries monitoring, and Canadian Embassy personnel have suggested the number is closer to two.⁷ Given the absence of qualified inspectors among the crew, even the highest of these figures may not represent an effective capability.

Senegal does operate a twin-engine aircraft, based at Dakar, for fisheries surveillance purposes. The aircraft, provided by the Canadian CIDA program, is a DeHavilland Twin Otter, equipped with surveillance and navigation radar and Omega navigation equipment. The aircraft is maintained and operated by the Senegalese Air Force and reportedly has a seven-hour endurance capability. The aircraft was delivered to Senegal in

June, 1983. It's planned utilization was 1200 hours per year, with fisheries surveillance patrol its sole and only purpose. Given a typical mission flight time of five hours, this would equate to 20 patrol flights per month which would be a very respectable level.

Information obtained from the DOPM indicates that the aircraft did not actually start flying patrols until January, 1984, but that it has "been very effective" and a second aircraft (also to be provided by Canadian AID) is expected to enter into service early in 1985. It would appear that the aircraft, coupled with the Navy surface intercept capability and coordinated through the DOPM fisheries surveillance and monitoring program, should give Senegal a very effective fisheries monitoring program, and this impression is held in many places. This impression may be overly optimistic.

First, while it is true that the DOPM does have a "fisheries surveillance program", it can hardly be said to manage the program. The aircraft is operated exclusively by the Air Force, and is considered by them to be a "classified asset". As of August, 1984, no one from DOPM had been on board the aircraft. Although DOPM inspection personnel were, at that time, in training in Canada, DOPM had been advised by the Air Force that those personnel would not fly with the aircraft on their return to Senegal. Similarly, the surface patrol craft are operated exclusively by the Navy. No fisheries inspectors had been allowed on board prior to August of 1984, although DOPM had been led to believe this situation would change in the future. Communications and coordination appear to be poor. Although Navy vessels carry a VHF radio for surface-to-air communications, reportedly the only operational contact or coordination to or with the DOPM occurs when either the Air Force or Navy calls to ask if a specific fishing

vessel is licensed to be in a certain area. In this respect, the DOPM may operate an information service but can scarcely be said to manage a fisheries surveillance program.

Available statistics would seem to confirm this. In 1978, a total of 37 fishing vessels were arrested for fishing violations in Senegalese waters, with 12 more in 1979, 17 in 1980, 29 in 1981, and 30 in 1982 (21 Senegalese, 2 Spanish, 1 Japanese, 1 Korean, 1 French, 1 Italian, 1 Russian and 2 Greek). These data are summarized in Figure 20. In 1983, a total of 33 vessel arrests were reported.¹⁰ The surveillance aircraft arrived in Dakar in July, 1983, but did not begin patrol operations until January, 1984. In the period January-June, 1984, a total of 16 vessels were arrested. The aircraft has been said to have been "very effective" and "involved in at least 14" of these arrests. The arrest rate, however, is unchanged from the preceding three years. This would seem to indicate that either the aircraft is improperly utilized or there has been a marked decline in surface patrol activities.

Some interesting insights into the program were obtained from the Canadian Embassy in Dakar. The aircraft was provided to Senegal under a CIDA grant, and similar grant support has been supplied to the Senegalese Navy. The CIDA surveillance assistance project started in 1982, with a US\$ 12 million budget which included equipment, total aircraft operating costs, and a technical assistance contract to a Canadian firm. The present program is characterized by the Canadians themselves, as "poorly managed", "ineffective", and unlikely to continue. Despite DCPM hopes, "it is unlikely" that Canada will provide a second aircraft to Senegal.¹¹

NOMBRE DE CHALUTIERS ARRAISONNES PAR NATIONALITE

DEPUIS 1978 JUSQU'EN 1982

NATIONALITES	1978	1979	1980	1981	1982
Senegalais	16	08	09	16	21
Espagnol	09	Neant	03	02	02
Japonais	01	Neant	Neant	Neant	01
Coreen	Neant	Neant	01	02	01
Francais	05	02	01	02	01
Italien	Neant	Neant	02	03	01
Polonais	Neant	02	01	Neant	Neant
Russe	02	Neant	Neant	01	01
Grec	Neant	Neant	Neant	Neant	02
Chinois	Neant	Neant	Neant	01	Neant
Camerounais	Neant	Neant	Neant	02	Neant
Ivoirien	03	Neant	Neant	Neant	Neant
Ghaneen	01	Neant	Neant	01	Neant
TOTAL:	57	12	17	29	30

FIGURE 20

SOURCE: Draft CIDA report "Resultants Generaux de la Peche Maritime Senegalaise, 1982, Annexe 8".

Program management is a major problem. Since "Canada has a basic reluctance to finance anything that would be used for military purposes", the original grant agreement contained a condition precedent to disbursement that the aircraft be civilian registered.¹² It was felt that this would encourage control by DOPM. It did not. The aircraft is in the civilian registry, but is operated and controlled exclusively by the Air Force. Canada believes that the principal short-coming of their program was their failure to insist on a major and continuing technical assistance component as a condition precedent to disbursement. "Ideally, you should run the program yourself for the first one or two years, then gradually phase out" after capability and utility have been both demonstrated and documented,¹³ and trained counterpart personnel are available to continue the program.

3.3.2 Mauritania

Although Mauritanian law provides for some of the highest fines (up to US\$ 3 million)¹⁴ for illegal fishing of any country in the world, relatively little information is available regarding the extent to which these laws are enforced, or the enforcement capability that exists. It is reported that in 1981, the Mauritanian Navy had a total of nine patrol boats, some of which were presumably in operating condition and used for fisheries patrol. Articles in international fishing newsletters have variously referred to "aerial surveillance" aircraft in Mauritania as "two Cessna's" and/or "one Apache". Unconfirmed rumors circulate that one or more these aircraft have been equipped with machine guns.

"The overriding interest (in the Government of Mauritania) is in enforcement and surveillance. Mauritania clearly has a major problem and needs all the help it can get if it is to be able to control foreign

fishing in its zone of extended jurisdiction . . . The foreign fishery effort is intense, little of the revenue accrues to Mauritania, and violations of fishing agreements are believed rampant.

In Mauritania, the Fisheries Ministry does not have responsibility for enforcement and surveillance. Authority is in the Navy which has no fisheries experience or fisheries inspectors . . . The fisheries officials gave enforcement top priority in Mauritania's overall fisheries program." ¹⁵

3.3.3 Gambia

As of 1981, the Gambia had no "offshore" fishing fleet of its own, and all such fishing was carried out by foreign vessels under license. For enforcement at sea, the Gambia has "two fast boats", operated by the Inspector General of Police and the Managing Director of the Gambia Ports Authority. Aircraft surveillance has not been used, and no information is available regarding the effectiveness of the "two fast boats". As one report notes, "the patrol boat presence convinces (local artisanal) Gambian fishermen that their interests are protected". ¹⁶ This appears to be the primary purpose of these vessels.

3.3.4 Guinea-Bissau

In January, 1977, Guinea-Bissau signed a fishing agreement with France that allows French vessels to fish in the EEZ. Subsequent to that agreement, France provided funding for the purchase of two 60 foot "high speed vessels" and one light plane (reportedly a single-engine Cessna) to be used for fisheries surveillance and enforcement.

The Government of Guinea-Bissau feels that their surveillance and enforcement capability is inadequate and their system of fishing laws and regulations largely ignored by distant-water fleets. In 1984, assistance was requested from the World Bank to provide a technical expert to advise

the Government regarding upcoming negotiations with the Soviet Union for fishing rights in Guinea-Bissau waters. This assistance is continuing at the present time. As one result in 1985, Guinea-Bissau will approach the U.S. with a request for assistance to train onboard fisheries observers and otherwise assist in fisheries monitoring and control.

3.3.5 Guinea

Prior to 1984, surveillance at sea in Guinean waters was primarily limited to occasional boarding from "a small fishery service motorboat" operated by the Inspector General of Fisheries and the Merchant Marine. In 1984, agreement was reached between Guinea and the U.S. Government whereby Guinea will acquire two outboard-equipped 25-foot MonArk river patrol boats and one 65 foot Swiftships patrol boat. The larger vessel will carry a crew of six and mount two 7.6 mm and one 50 caliber machine gun. These vessels, to be delivered in early 1985, will be operated by the Guinean Navy. Their objective is to base a three-boat squadron on an island in Conakry Bay, operating independently from the existing Naval fleet.

3.4 Footnotes

5. Personal communication, Dr. Abou M. Toure', DOPM, Dakar, Senegal, August 14, 1984.
6. Personal communication, Dr. Jacqueline Lopez, Director, DRODT, Dakar Senegal, August 17, 1984.
7. Personal communication, Mr. Cook, First Secretary, Canadian Embassy, Dakar, Senegal, August 16, 1984.
8. Personal communication, Dr. Abou M. Toure', DOPM, Dakar, Senegal, August, 14 1984.
9. For example, see cable O715152, August '84, American Embassy, Dakar, to Secretary of Defense, Washington, D.C.
10. Personal communication, Dr. Abou M. Toure', op. cit.
11. Personal communication, Mr. Cook, First Secretary, Canadian Embassy, Dakar, Senegal, August 16, 1984.
12. Personal communication, Mr. Cook, ibid.
13. Personal communication, Mr. Cook, ibid.
14. Mauritanian Code of Merchant Shipping, Act No. 78-043 of 28 February, 1978, Article 206, as amended.
15. Cable O107092, May 80, American Embassy, Nouachott, to Secretary of State, Washington, D.C.
16. Report on the Consultation on Monitoring, Control and Surveillance, Freetown, 30 June-3 July, 1981, CECAF/TECH/81/35, October, 1981.
17. Lt. Robert Kirk, USN, OP-632D5, Trip Report to Guinea, Cameroon and Germany, 13-25 August, 1984.

4.0 ECONOMIC ASSESSMENT OF THE NORTHWEST AFRICAN FISHERIES

The living marine resources distributed along the northwestern coasts of Africa are both extremely abundant and very heavily exploited. A large part of the fish catch is taken by distant-water fishing fleets operating in the fishery conservation zones of the adjacent coastal states.

The growing pressure on fish resources in Northwest Africa and the economic importance of those resources for foreign and coastal countries underline the need for management and conservation as well as the monitoring of all activities in the fishery jurisdictional zones. The coastal states of Northwest Africa lack the capability to control these operations. Although surveillance, monitoring and enforcement systems are expensive, the benefits that might be realized from increased capability in this area are substantial.

An assessment of these benefits can be made through an economic analysis of the fisheries from the coastal and foreign users' perspective. However, any economic study of the Northwest African fisheries is severely affected by the lack of information, particularly in the area of statistical data related to fishing, processing and marketing activities. These difficulties are particularly severe in reporting the volume and value of fish catch. There are several factors that contribute to this problem:

1. Catch levels are almost always underreported and data on related harvesting activities are incomplete throughout the region. In some areas, statistics are not collected at all and only very rough estimates can be made in relation to catch or effort. Foreign fleets catch reports are often accepted without checking their accuracy either in terms of volume, composition of the

catch, or effort used. This problem is further compounded by the fact that the licensing systems provide strong incentives to underestimate that catch. In particular, one must be concerned about the excessive size and uncontrolled composition of the fleets employed by the various foreign countries. It is generally felt that the Soviet Union and Eastern Bloc nations underreport their catch levels by as much as 50%. The Spanish, Korean and other foreign fleets are also thought to substantially underreport their catch. This problem is considered to be less severe for the reported catch of the domestic fishermen, but in some countries (like in Guinea-Bissau), local fishermen reportedly smuggle their catches to Senegal in order to receive foreign currency.

2. It is extremely difficult to estimate the value of catch due to variations in price for a particular species and differences in price for fish within the same species group, local variations in price for fish according to landing area, processing, etc. It is also difficult to take into account local exchange rates and inflation when assessing the dollar value of the catch or final product.
3. Available data are often collected on a regional rather than a national basis while any surveillance and monitoring program must be national in character. It is, therefore, crucial to assess the impacts of foreign fleet on specific coastal countries. In Northwest Africa, the CECAF is the best storehouse of information on local fisheries, but the data are processed for regional needs and there is a lack of country analysis in CECAF studies.

However, country related data are available at CECAF and could be used for future project design.

Reluctantly, we use data reported by foreign fleets to estimate both the volume and value of their catch. In the case of the Soviet Union, the largest user of Northwest African fishery resources, independent estimates of catch have been made. This estimate is based on the size and composition of the Soviet fishing fleets operating in the CECAF area. Throughout this study, a distinction must be observed between "reported", "estimated" and actual (usually unknown) catch levels.

4.1 The Value of the Resources

In order to assess the value of catch, CECAF data are used. The CECAF valuation system is based on an average international price of fish and fish products. This method is based on two sets of price assumptions:

- a) Price calculation for tuna, shrimp and squid is based on internationally traded fish and fishfood commodity prices.
- b) Price calculation related to the demersal fish, mackerel, small pelagic and mixed species is based on domestic market trends in the coastal nations. Dakar wholesale prices are taken as representing the market value of fish. The same prices are also used to assess the value of foreign catches. It should be noted, however, that prices of fish in the northern sector of the CECAF region are lower than those prevailing in its southern part. The estimated prices (based on these assumptions) of selected fish and fish products are shown in Table 7.

The prices shown in Table 7 are an average figure reflecting both frozen and processed fish price as well as fresh fish values. The difficulties in assigning a price are stated by CECAF:

The problem is complicated by the fact that there is not a single price for fish. There are price variations between different species, at different times for the same species, and between different landing points within the same country. For instance, it is generally accepted that demersal species fetch higher prices than pelagic species. However, there are wide price variations within the demersal group. For example, sole have a higher value than groupers, although both are in the demersal group. Prices may also differ widely because of the end use and differences in market. For instance, sardinella meant for human consumption may have different prices from those meant for fishmeal. Prices may also depend on whether the fish product is frozen or fresh. When there is a bumper harvest of sardinella, for example, prices slump and the changes in price vary according to time and day of landing. Prices of frozen fish are expected to be higher than the fresh ones on account of the freezing process.¹⁸

Different price levels are reported in Senegal where the value of fish is estimated on the basis of fish which is frozen for export. In Table 8, Senegalese price trends during 1975-1982 are shown for the same species groups.

TABLE 7: CEEAF ESTIMATES OF INTERNATIONAL MARKET PRICES FOR FISH AND INVERTEBRATES FROM NORTHWEST AFRICAN WATERS (\$/MT)

Volume \$/mt	Tuna	Crustacea (Shrimp)	Cephalopods (Squid)	Mackerel	Small Pelagics	Demersal Fish	Mixed
1977	700	5,000	2,000	200	50	400	200
1980	850	5,000	2,000	250	100	450	250
1983	1,000	5,500	2,000	300	120	600	300

SOURCE: G. Everett, M. Ansa-Emmim and I Mizuishi. A Summary Overview of Fisheries in the CEEAF Region, Dakar, CEEAF Project, CEEAF/TECH/80/21, June 1980; G. Everett, M. Ansa-Emmim, M. Robinson and F. Roest, Recent Trends in CEEAF Fisheries, Dakar, CEEAF Project, CEEAF/TECH/82/42, July 82; and G. Everitt, et. al, Recent Trends in CEEAF Fisheries, Dakar, CEEAF Project, Draft only, August 1984.

TABLE 8: EVOLUTION OF PRICES FOR FISH AND INVERTEBRATES IN DAKAR, 1975-1982 (\$/MT)

<u>Year</u>	<u>Tuna</u>	<u>Crustacea</u>	<u>Cephalopod</u>	<u>Mackerel</u>	<u>Small Pelagics</u>	<u>Demersal</u>	<u>Mixed</u>
1975	290	4,664	2,856	580	170	135	580
1976	250	4,512	2,090	380	200	96	380
1977	280	4,380	2,236	410	220	129	410
1978	470	4,178	1,763	220	230	125	220
1979	660	6,816	2,273	780	330	171	780
1980	590	8,402	2,903	880	350	227	880
1981		7,264	2,883	750	330	241	750
1982		6,362	2,866	890	320	208	890

Note: Based upon the following exchange rates of Senegalese Franc's to US\$:

<u>Year</u>	<u>FCFA</u>
1975	214
1976	239
1977	246
1978	225
1979	213
1980	211
1981	271
1982	329

SOURCE: CECAF Project Documents Provided to Study Team, August, 1984.

The third source of data related to the prices of fish and fish products is the price list prepared by the Soviet Union (see Table 9) for species harvested and processed in the Guinea-Bissau's fishery conservation zone. These are ex-vessel prices, FOB Guinea-Bissau fishing ground, onboard Soviet factory trawlers and motherships (Table 9).

As can be seen, there are clear price differences in these three data sources. Because the CECAF valuation method is generally accepted in the region, this study will use the CECAF price list in its valuation of fish in Northwest African waters. It should be noted that the use of these data creates 'conservative' or low-end estimates of the value of the fishery.

TABLE 9: RUSSIAN PRICES OF FRESH AND PROCESSED FISH PRODUCTS: 1983

In \$/MT ton FOB EEZ
Guinea-Bissau

<u>SPECIES/PRODUCTS</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
1. <u>Fresh Fish</u>						
Horse Mackerel - Carapau						
- of more than 20 cm	260	300	330	350	375	330
- between 16-20 cm	210	210	270	293	330	250
- Spanish mackerel - Sarda 16/20 cm	-	-	-	-	-	235
Round Scad - Cavala						
- of more than 20 cm	270	320	330	350	375	-
- between 16-20 cm	220	230	230	235	260	215
Sea Bream - Dentao, Pargo						
- between 13-18 cm	-	-	425	430	430	430
- over 20 cm	290	450	-	-	-	-
- between 18-22 cm	-	-	460	470	470	470
- over 22 cm	-	-	40-	500	500	-
Atlantic Moonfish - Vomer Lichia, West African Croaker, (Corvina), Grunts (Cor-Cor)						
- smaller than 22 cm	310	320	320	340	380	340
- 22 cm to 35 cm	450	360	360	380	420	300
- larger than 35 cm	-	460	470	480	520	400
Plain pelamid - Pelamide	-	250	250	256	300	265
Hake - Pescadilha	-	-	-	-	-	300
Catfish - Bagre	-	220	220	220	240	220
Jack Crevalle - Xareu	285	330	300	315	335	315
Squid - Lula	-	300	300	320	350	320
Roundscad - Cavala	200	210	210	215	240	220
Sardina, Sardinela	160	225	225	260	300	260
Grunt - Otoperca	-	120	120	140	165	-

TABLE 9: (Continued)

SPECIES/PRODUCTS	In \$/MT ton FOB EEZ Guinea-Bissau					
	1978	1979	1980	1981	1982	1983
2. Processed Fish						
Horse mackerel - Carapau (dressed)	312	360	396	400	415	400
Horse mackerel - Carapau (fillets)	340	380	418	425	450	425
Round Scad - Cavala (dressed)	324	384	422	430	445	270
Round Scad (fillets)	352	405	440	450	500	-
Sea Breams - Dentao, Pargo (dressed)	348	540	594	600	600	500
Atlantic Moonfish - Vomer (dressed)	354	284	312	310	330	310
Lichia, West African Croaker (corirna)						
Grunts (Cor-cor) (dressed)	372	526	578	580	580	580
Tuna - Atun (dressed)	380	540	594	600	600	580
Tuna - (fillets)	390	900	990	990	1110	990
Jack Crevalle - Xareu (dressed)	392	360	396	400	415	400
Triggerfish - Balista (dressed)	-	120	132	120	140	120
Pelamid - Pelamide (dressed)	305	330	335	335	360	335
Sardine - Sardinela (headed)	192	270	297	305	330	305
Other Species all processed product forms	132	142	156	155	175	155
Fish meal	200	270	270	270	290	270
Marinated and salted fish (preserves)	210	210	210	220	250	220

SOURCES:

Sovhispan Price List - 1983
 State Secretariat for Fisheries Data - 1978-1982
 (from Kaczynski, 1984)

4.2 The Northwest African Fisheries (During 1977 - 1983)

4.2.1 The CEEAF Region

As Table 10 shows, the total catch in the CEEAF region decreased during 1977-1983 from 3,749,000 in 1977 to 2,952,000 metric tons in the 1983, i.e., by 21%. In spite of this substantial drop in catch, total ex-vessel value of the catch increased from USA \$1.18 billion to \$1.39 billion, i.e., by nearly 18% during the same period. This figure is based on an 'average' price, determined by CEEAF, which reflects frozen and processed fish, as well as fresh fish, prices. This increase is due to the growth of the world market prices of fish and fish products. As a result of these changes, the average value of one ton of fish caught in the CEEAF region increased from \$320/ton in 1977 to \$474/ton in 1983.

The most valuable is the cephalopod catch, valued at \$356 million in 1983, followed by the tuna and crustacea catch. In volume terms, the small pelagics make up the largest percentage of the total tonnage. This comparison between catch and value according to species groups is presented in Table 11.

TABLE 10: CATCH BY SPECIES AND COUNTRY IN CECAF REGION, 1977 - 1983

		Volume in Metric Tons							VALUE IN \$1000									
		TUNA	CRUSTACEA	DEMERSA	CEPHALPOD	MACKERAL	SMALL SPELAGIC	MIXED	TOTAL	TUNA	CRUSTACEA	DEMERSA	CEPHALPOD	MACKERAL	SMALL PELAGIC	MIXED	TOTAL	% TOTAL
SENEGAL	1977.00	15.00	4.00	80.00	1.00	40.00	100.00	42.30	262.30	10500.00	20000.00	32000.00	2000.00	8000.00	5000.00	64600.00	85962.00	.07
	1980.00	1.00	5.00	30.00	2.00	25.00	141.00	50.00	255.00	850.00	25000.00	13500.00	4000.00	6500.00	14100.00	12500.00	76450.00	.25
	1983.00	3.00	5.00	50.00	3.00	8.00	90.00	31.00	190.00	3000.00	27500.00	30000.00	6000.00	2400.00	10000.00	9300.00	89000.00	.06
MAURITANIA	1977.00	.50		4.50	6.00	2.00	7.00	1.10	21.10	350.00	.00	1100.00	12000.00	400.00	350.00	220.00	15120.00	.01
	1980.00	.50		4.50	6.00	2.00	7.00	1.20	21.20	425.00	.00	2025.00	12000.00	500.00	700.00	300.00	15950.00	.01
	1983.00	1.00	1.00	15.00	20.00	2.00	5.00	12.00	55.00	1000.00	5500.00	9000.00	40000.00	500.00	500.00	3500.00	60300.00	.2-
GAMBIA	1977.00		.50	.50			6.00	3.50	10.50	.00	2500.00	200.00	.00	.00	300.00	700.00	3700.00	.02
	1980.00		.50	.50			6.00	3.30	10.30	.00	2500.00	225.00	.00	.00	600.00	825.00	4150.00	.02
	1983.00		.50	.50			6.00	3.50	10.50	.00	2750.00	300.00	.00	.00	700.00	1050.00	4820.00	.00
GU. BISSAU	1977.00		.40					1.50	1.90	.00	2000.00	.00	.00	.00	.00	300.00	2300.00	.02
	1980.00		1.50	1.50				2.20	5.20	.00	7500.00	675.00	.00	.00	.00	500.00	8725.00	.21
	1983.00		1.50	1.50				2.50	5.50	.00	8250.00	900.00	.00	.00	.00	750.00	9900.00	.01
GUINEA	1977.00			4.00				4.10	8.10	.00	.00	1600.00	.00	.00	.00	820.00	2420.00	.00
	1980.00						12.50	5.00	17.50	.00	.00	.00	.00	.00	1250.00	1250.00	2500.00	.00
	1983.00						12.50	5.00	17.50	.00	.00	.00	.00	.00	1500.00	1500.00	3000.00	.00
USSR	1977.00																	.00
	1980.00	12.00		24.00	7.00	225.00	516.00	150.30	942.30	10200.00	.00	10600.00	14000.00	56250.00	51600.00	39575.00	102425.00	.14
	1983.00	10.00		30.00	5.00	200.00	650.00	55.00	950.00	10000.00	.00	10000.00	10000.00	60000.00	70000.00	16500.00	192500.00	.14
SPAIN	1977.00	65.00	12.00	70.00	85.00	5.00	130.00	75.00	442.00	45500.00	60000.00	20000.00	170000.00	1000.00	6500.00	15000.00	325000.00	.20
	1980.00	70.00	20.00	30.00	80.00	.00	150.00	77.00	427.00	59500.00	100000.00	13500.00	160000.00	.00	15000.00	19000.00	367000.00	.20
	1983.00	90.00	17.00	25.00	60.00	5.00	100.00	63.00	360.00	90000.00	93500.00	15000.00	120000.00	1500.00	12000.00	18900.00	350900.00	.25
OTHERS*	1977.00	196.10	20.00	250.00	51.50	024.50	1204.00	360.10	3004.20	137270.00	100000.00	103200.00	123000.00	164900.00	64200.00	72020.00	764590.00	.65
	1980.00	142.50	14.90	209.20	81.00	309.10	600.10	226.10	1750.90	121125.00	74500.00	94100.00	162000.00	97275.00	68810.00	56525.00	674375.00	.51
	1983.00	134.00	14.20	205.90	110.00	193.00	546.10	214.50	1418.50	134000.00	78100.00	123500.00	220000.00	58100.00	65532.00	64350.00	743662.00	.53
TOTAL	1977.00	276.10	36.90	412.50	147.50	059.50	1520.00	406.50	3743.00	193270.00	104500.00	163000.00	295000.00	173900.00	76000.00	97300.00	1104970.00	1.00
	1980.00	225.50	41.90	295.20	170.00	640.10	1513.60	522.50	3400.00	191675.00	209500.00	132000.00	340000.00	160025.00	151360.00	130625.00	1316025.00	1.00
	1983.00	237.00	38.20	312.90	178.00	406.00	1404.60	374.50	2952.00	237000.00	210100.00	107700.00	356000.00	122000.00	168550.00	112350.00	1393702.00	1.00
VALUE IN \$/TON	1977.00	700.00	5000.00	400.00	2000.00	200.00	50.00	200.00										
	1980.00	850.00	5000.00	450.00	2000.00	250.00	100.00	250.00										
	1983.00	1000.00	5500.00	600.00	2000.00	300.00	120.00	300.00										

*Others: Includes Other EEC, Eastern Europe, Korea, Japan, etc.

SOURCE: Everett et al., op.cit., 1980.
Everett et al., op.cit., 1982.
Everett et al., op.cit., 1984.

TABLE 11: THE CATCH VOLUMES AND VALUES ACCORDING TO MAIN SPECIES GROUPS IN THE CEEAF REGION, 1983

<u>Volume (in m. tons)</u>		<u>Value (in US\$)</u>	
1. Small Pelagics	1,404,000	1. Cephalopod	\$356,000,000
2. Mackerel	406,800	2. Tuna	\$237,000,000
3. Demersal fish	312,000	3. Crustacea	\$210,100,000
4. Mixed	374,500	4. Demersal fish	\$187,000,000
5. Tuna	237,000	5. Small Pelagic	\$168,552,000
6. Cephalopod	178,000	6. Mackerel	\$122,040,000
7. Crustacea	38,200	7. Mixed	\$112,359,000

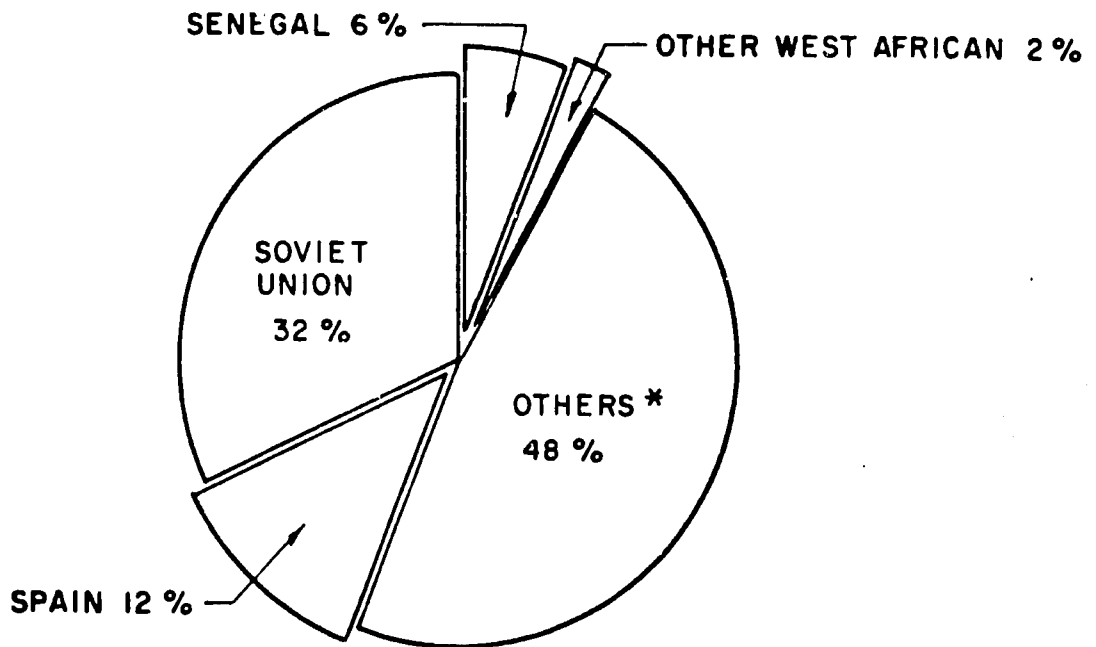
SOURCE: Table 10.

Since the Spanish fleet focuses on the high value species, such as cephalopod (primarily squid), crustaceans (primarily shrimp) and tuna, the value of Spain's harvest is the highest in the region. The value of Spanish catch in 1983 is estimated at \$351 million or about 25% of the total fishery. The Soviet catch in the same year is estimated to be worth about \$193 million or about 14% of the total fishery. By comparison, the Senegalese catch is estimated at \$89 million or 6% of the total and the Mauritanian catch is estimated at \$48 million or 4% (this reflects a recent increased catch of cephalopods). These figures are shown graphically in Figure 21.

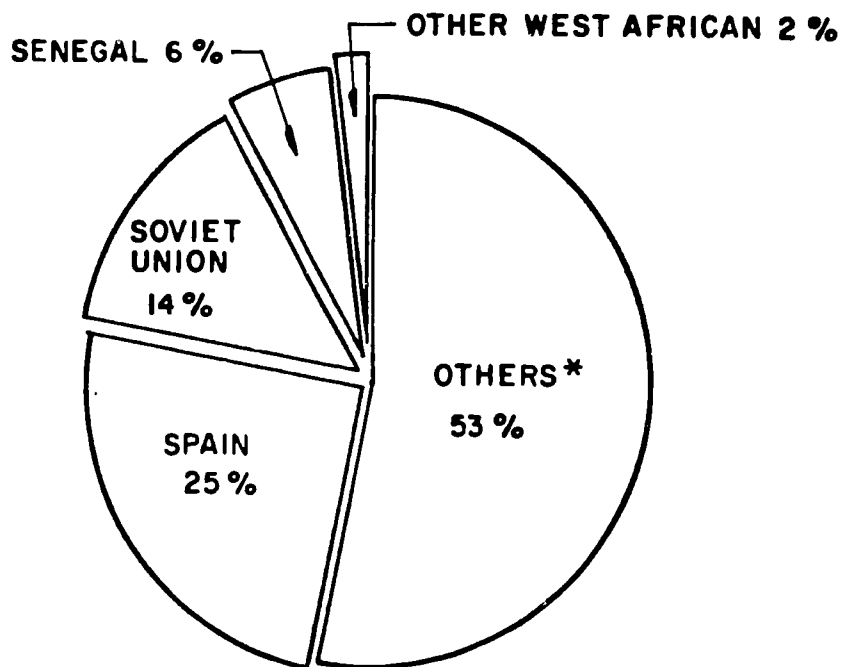
These numbers, when compared with trade statistics, suggest a number of important conclusions. Data for 1980 indicate that the value of fish imports by CEEAF countries was nearly \$765 million in that year. Of this total, nearly \$118 million was imported from the Soviet Union. This contrasts with a total estimated (by CEEAF) value of the Northwest African fishery to the Soviets of about \$193 million. On the other hand, the CEEAF

Fig: 21 CEECAF REGION

SHARE OF TOTAL CATCH BY VOLUME (1983)



SHARE OF TOTAL CATCH BY VALUE (1983)



* EEC, Eastern European, Korea, Japan, etc.

countries export nearly \$564 million worth of fish products of which only about \$5 million goes to the Soviet Union. If these numbers are at all accurate, this amounts to a positive Soviet trade balance in fish with the CECAF area of about \$113 million/yr. This clearly makes the region all the more important for the Soviet Union. On the other hand, most exports from the CECAF region go to France and other developed Western countries. These figures are summarized in Tables 12 and 13.

TABLE 12: CEEAF IMPORTS OF FISH AND FISHERY PRODUCTS,
1980, BY COUNTRY OF ORIGIN

'000 000 US\$

	EXPORTERS						TOTAL
	TOTAL CECAF 1/	FRANCE	OTHER DEVELOPED	USSR	OTHER EEUROPE	OTHER DEVELOPING	
IMPORTERS							
MOROCCO							.1
CANARY ISLANDS	3.9	.1	10.4	11.5	0.4	24.8	40.8
MAURITANIA							0.1
SENEGAL	1.1	15.5	0.4				17.0
GAMBIA	0.5		0.1				0.6
GUINEA BISSAU			0.5				0.5
GUINEA CONAKRY			1.1	3.9		0.1	5.8
SIERRA LEONE	0.8		0.1	3.2			4.1
LIBERIA	0.8		4.4	1.3		0.4	6.1
IVORY COAST	32.7	17.4	9.9	10.4	6.8	0.4	77.7
GHANA	2.2						2.2
TOGO	6.8	0.2	0.8	7.4			15.7
BENIN	0.7	0.1	0.4	2.8			4.1
NIGERIA	29.4		363.4	80.0	52.3	13.3	549.6
CAMEROON	1.8	0.8	3.9	5.3	2.3	0.2	14.3
GABON	6.2	2.7	5.0			0.5	14.4
CONGO	4.5	0.2	6.4	3.2	0.1	0.6	15.1
TOTAL	91.4	37.0	406.8	71.2	62.0	40.3	769.1

1/ Ivory Coast, Togo, Benin, Cameroon, Gabon, Congo, Cape Verde,
The Gambia, Guinea Bissau, Guinea Conakry, Sierra Leone,
Liberia, Ghana, Nigeria, Morocco, Canary Islands, Mauritania,
Senegal

Source: M. Robinson and A. Crispoldi, Estimated Trade and Consumption of
Fish and Fish Products in the CEEAF Area, Dakar, CEEAF Project,
CEEAF/TECH/84/35, March 1984.

TABLE 13: CECAF EXPORTS OF FISH AND FISHERY PRODUCTS,
1980, BY COUNTRY OF DESTINATION

'000 000 US\$

EXPORTERS	IMPORTERS						TOTAL	
	TOTAL CECAF 1/	FRANCE	OTHER DEVELOPED	USSR	OTHER EEUROPE	OTHER DEVELOPING		NON- SPECIFIED
MOROCCO	17.5	35.6	46.3	4.3	3.5	11.5	0.6	119.3
CANARY ISLANDS	27.1		108.1		3.5	18.0		156.7
MAURITANIA		2.8	6.8		7.5	25.9		43.0
SENEGAL	37.4	91.9	22.3			0.9	1.6	154.1
CAPE VERDE	0.2		1.9					2.2
GAMBIA	0.1		1.8					1.9
GUINEA BISSAU			3.9					3.9
SIERRA LEONE			1.0					1.0
LIBERIA		1.2	0.4					1.6
IVORY COAST	0.2	49.6	7.9	0.3		0.6	0.3	59.4
GHANA			5.8					5.8
NIGERIA	7.2		2.5				0.9	10.5
CAMEROON	0.5	0.9	1.4			0.9		3.7
GABON	0.1	0.5						0.6
TOTAL	90.2	182.8	210.3	4.9	14.5	57.9	3.4	563.9

1/ Ivory Coast, Togo, Benin, Cameroon, Gabon, Congo, Cape Verde,
The Gambia, Guinea Bissau, Guinea Conakry, Sierra Leone,
Liberia, Ghana, Nigeria, Morocco, Canary Islands, Mauritania,
Senegal

SOURCE: Robsinson and Crispoldi, Op. Cit., March 1984.

These figures show that the West African fishery is of substantial economic value and that the Spanish, and in particular Soviet fleets, are extremely active and important users of the West African fishery resources. These figures characterize, however, the whole CECAF region which covers a much wider range of countries than those which are of particular interest to this project, i.e., Mauritania, Senegal, Gambia, Guinea-Bissau, and Guinea (Conakry). What follows then is an analysis of two CECAF sub-regions--the Coastal Sahara and the Cape Verde Coastal sub-regions--in which the fishery resources of these countries are located.

4.2.2 The Sub-Regions

This section of the report analyzes two sub-regions of the CECAF region, the Coastal Sahara or 34.1.3 sub-region and the Cape Verde Coastal or 34.3.1 sub-region. The 34.1.3 sub-region extends from 26 degrees north to 19 degrees north and 20 degrees west. It covers primarily the coastal waters of Mauritania and the ex-Spanish Sahara, the disputed territory between Morocco and Mauritania. The Cape Verde sub-region extends from southern Mauritania (19 degrees north) to the border of Sierra Leone and Guinea (Conakry) at 9 degrees north. It also extends out to 20 degrees west.

Table 14 summarizes the composition, volume and value of the catch in the Coastal Sahara sub-region using CECAF price/value estimates. Figure 22 is a graphical representation of the data. Because data reported for 1982 is not complete, this discussion is based upon data from 1981. In that year, the value of the catch in this sub-region was about \$343 million of which \$193 million is attributed to the cephalopod catch, \$61 million to the mackerel catch, some \$40 million to the small pelagics and \$25 million to demersals.

TABLE 14: CATCH BY COUNTRY AND SPECIES IN CEEF SUB-REGION 34.1.3 - COASTAL SWAN

VOLUME IN METRIC TONS, 1980

VALUE IN US\$ 1980

		VOLUME IN METRIC TONS, 1980							VALUE IN US\$ 1980							% TOTAL		
		TUNA	CRUSTACEA	DEMERAL	CEPHALOPOD	MACKERAL	SMALL PELAGICS	MIXED	TOTAL	TUNA	CRUSTACEA	DEMERAL	CEPHALOPOD	MACKERAL	SMALL PELAGICS		MIXED	TOTAL
MURITANIA	1975.00	.00	.00	9.78	.58		6.53	5.28	22.09	.00	.00	.00	.00	.00	.00	.00	.00	.00
	1976.00	.00	.00	8.95	.47		5.96	4.82	20.20	.00	.00	3500.00	940.00	.00	250.00	964.00	5782.00	.01
	1977.00	.00	.00	11.14	.57	2.00	7.43	6.00	27.14	.00	.00	4456.00	1140.00	400.00	371.50	1200.00	7567.50	.03
	1978.00	.00	.00	10.64	.55		7.16	5.79	24.14	.00	.00	4256.00	1100.00	.00	350.00	1150.00	6872.00	.02
	1979.00	.00	.00	9.94	.51		6.63	5.36	22.44	.00	.00	4224.50	1020.00	.00	497.25	1206.00	6947.75	.03
	1980.00	.00	.50	8.90	.49	2.00	6.34	5.12	23.37	.00	2500.00	4014.00	900.00	500.00	634.00	1200.00	9900.00	.03
	1981.00	.00	.00	11.31	.56		7.27	5.87	25.01	.00	.00	5009.50	1120.00	.00	727.00	1467.50	8404.00	.02
	1982.00	.00	.00	10.91	.55		7.16	5.79	24.41	.00	.00	6000.50	1100.00	.00	787.60	1592.25	9400.35	.05
USSR	1975.00	.00	.25	35.72	6.47	174.41	414.09	6.33	638.07	.00	1225.00	14207.60	12936.00	34882.00	20774.50	1266.60	85341.70	.19
	1976.00	.00	.21	120.79	9.16	326.91	650.39	46.72	1170.17	.00	1025.00	51516.00	18324.00	65381.20	32919.50	9342.00	178500.70	.30
	1977.00	.00	.11	32.46	9.20	240.31	462.41	65.63	810.20	.00	570.00	12904.00	10534.00	49661.40	23120.65	13125.60	110015.65	.45
	1978.00	.00	.30	15.04	6.69	153.33	232.97	83.00	491.83	.00	.00	6732.43	13372.00	34499.93	17472.75	10674.55	90751.65	.22
	1979.00	.00	2.35	16.50	.02	104.47	105.69	13.15	322.26	.00	11725.00	7459.65	40.00	26117.50	10569.00	3200.25	67207.40	.25
	1980.00	.00	.00	43.33	3.11	141.07	279.92	50.54	526.77	.00	.00	19497.60	6212.00	35467.75	27992.00	14636.00	103005.35	.33
	1981.00	.00	.00	15.70	.10	140.29	307.52	56.70	520.47	.00	.00	0600.10	360.00	40770.65	33027.20	15593.05	99239.00	.29
	1982.00	.00	.00	32.35	3.02	150.04	317.01	27.61	530.02	.00	.00	19407.00	6040.00	47410.00	30041.60	0201.00	119101.20	.5
SPAIN	1975.00	.30	1.09	47.44	120.92	.76	2.32	9.01	102.34	.00	9400.00	10976.00	241032.00	152.00	116.00	1002.00	272329.60	.60
	1976.00	.00	.00	26.91	93.53	.00	.00	26.00	146.43	.00	.00	10762.40	107052.00	.00	.00	5200.00	203014.40	.43
	1977.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	1978.00	.00	.00	0.00	93.05	.00	.00	110.00	211.93	.00	.00	3434.05	107690.00	.00	.00	24750.00	215074.05	.51
	1979.00	.00	.31	30.26	65.02	.26	.00	20.00	116.35	.00	1545.00	13617.90	131030.00	64.75	.00	5000.00	151275.65	.57
	1980.00	.00	.62	17.63	66.31	.39	.00	60.00	144.95	.00	3095.00	7935.30	132624.00	96.50	.00	15000.00	150750.00	.50
	1981.00	.00	.17	11.01	06.72	.01	.00	16.00	113.90	.00	940.50	6054.40	173430.00	1.65	.00	4400.00	184034.55	.54
	1982.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
E. EUROPE	1975.00			2.56		53.39	143.49	6.44	205.07	.00	.00	1022.00	.00	10677.40	7174.35	1200.20	20162.75	.04
	1976.00			1.27		27.56	143.41	5.05	170.09	.00	.00	906.00	.00	5512.00	7170.25	1170.60	14359.65	.03
	1977.00			2.61		07.90	022.70	13.16	306.44	.00	.00	1042.00	.00	13595.00	11135.00	2631.00	20403.00	.11
	1978.00			4.57		34.44	41.39	1.61	82.01	.00	.00	1941.40	.00	7749.23	3104.25	362.93	13157.00	.03
	1979.00			.20		40.30	14.52	.54	63.72	.00	.00	127.00	.00	12094.25	1432.00	135.25	13009.30	.05
	1980.00			1.06		112.72	101.19	.32	215.20	.00	.00	475.20	.00	20179.00	10119.40	79.00	30052.60	.12
	1981.00			1.76		73.64	29.64	2.27	107.30	.00	.00	967.45	.00	20250.10	3260.73	622.00	25101.23	.07
	1982.00			5.12		50.09	31.69	.40	87.30	.00	.00	3070.20	.00	15026.70	3003.20	144.00	22044.10	.10
OTHER	1975.00	.00	1.90	3.92	25.45	10.31	0.02	34.93	04.54	.00	9590.00	1560.00	30090.00	2061.40	401.15	6906.00	71496.55	.16
	1976.00	.00	1.60	2.10	25.72	1.51	1.03	26.33	50.45	.00	0420.00	070.40	51442.00	302.00	51.70	6265.00	66351.10	.14
	1977.00	.00	1.54	6.00	44.71	.95	.66	52.76	107.43	.00	7700.00	2720.40	09410.00	190.40	33.20	10552.40	110614.40	.42
	1978.00	.00	.63	5.43	42.14	.50	.14	13.30	62.22	.00	3150.00	2300.10	04220.00	111.30	10.50	3011.40	92079.45	.22
	1979.00	.00	.22	1.13	11.79	1.17	.79	.05	15.95	.00	1115.00	509.40	23520.00	293.25	79.00	211.25	25707.90	.10
	1980.00	.00	.01	9.13	.00	.00	.09	3.00	13.06	.00	25.00	4106.70	94.00	.00	0.00	940.75	5103.25	.02
	1981.00	.00	.56	5.60	0.00	.54	.19	.00	15.70	.00	3000.00	3070.90	17704.00	140.23	20.46	.00	24112.41	.07
	1982.00	.00	.14	7.41	24.00	.44	.02	17.77	49.06	.00	770.00	4446.00	40160.00	132.60	2.20	5331.30	50042.10	.20

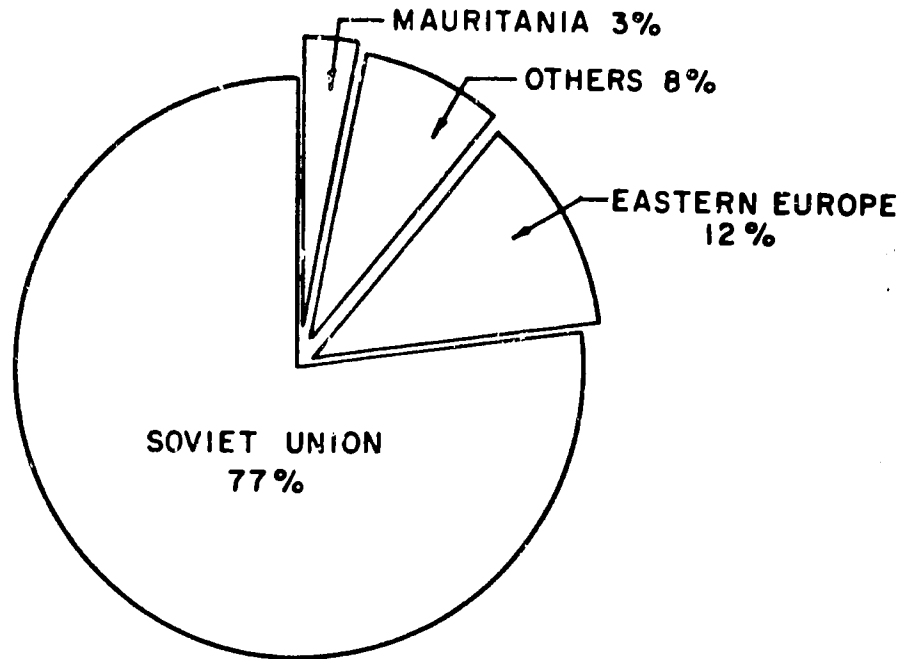
TABLE 14: CATCH BY COUNTRY AND SPECIES IN CEDAF SUB-REGION 3A.1.3 - COASTAL BIOMASS

	VOLUME IN METRIC TONS, 1980							VALUE IN US\$ 1000							% TOTAL	
	TUNA	CRUSTACEA	DEMERSAL	CEPHALOPOD	MACKEREL	SMALL PELAGICS	MIXED	TOTAL	TUNA	CRUSTACEA	DEMERSAL	CEPHALOPOD	MACKEREL	SMALL PELAGICS		MIXED
TOTAL	1975.00	4.05	99.42	155.33	238.87	575.25	61.99	1132.91	.00	20265.00	39767.20	305658.00	47773.60	20762.50	12390.00	455625.10
	1976.00	1.89	168.09	128.88	355.96	808.79	109.71	1573.34	.00	9445.00	67235.60	257758.00	71195.20	40439.45	21942.60	460015.85
	1977.00	1.65	53.01	54.56	319.23	693.21	137.50	1259.21	.00	8270.00	21202.40	109112.00	63846.00	34660.35	27509.00	264601.35
	1978.00	.63	44.56	143.23	188.27	281.66	213.79	872.13	.00	3150.00	18938.05	286450.00	42360.53	21124.50	48101.63	420125.50
	1979.00	2.00	50.20	77.84	154.28	207.63	59.90	540.72	.00	14385.00	26187.75	155678.00	30500.75	20763.00	9974.75	265558.25
	1980.00	1.12	80.00	69.96	256.97	307.54	127.78	923.43	.00	5620.00	36028.00	139910.00	64243.25	38754.20	31943.75	316500.00
	1981.00	.73	45.46	96.35	222.47	344.62	80.84	790.47	.00	4020.50	25001.35	192702.00	61170.70	37908.09	22231.00	343041.64
	1982.00	.14	55.78	27.65	208.57	355.89	51.65	699.67	.00	770.00	33459.20	55300.00	62570.10	42706.44	15494.10	210309.84
	1983.00															

SOURCE: CEDAF Statistical Bulletin No. 4, Minimal Catches 1972 - 1982, Fishery Committee for the Eastern Central Atlantic, FAO Rome, August.

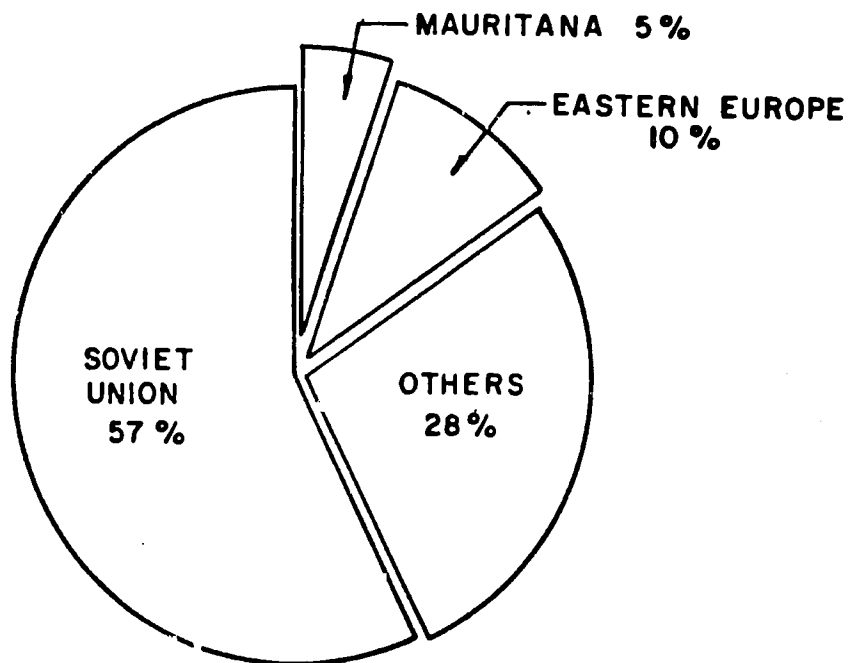
Fig: 22 COASTAL SAHARA SUB-REGION

SHARE OF TOTAL CATCH BY VOLUME (1982) *



* No 1982 data for Spain. In 1981 Spain accounted for 14% of total volume of the catch.

SHARE OF TOTAL CATCH BY VALUE (1982) *



* No 1982 data for Spain. In 1981 Spain accounted for 54% of total value of the catch.

Table 15 shows a comparison of species volume and value for the Coastal Sahara sub-region.

TABLE 15: CATCH BY VOLUME AND VALUE, COASTAL SAHARA SUB-REGION

		<u>Volume</u>			<u>Value</u>
1.	Small Pelagic	344,620 mt	1.	Cephalopod	\$192,702,000
2.	Mackerel	222,470 mt	2.	Mackerel	61,178,700
3.	Cephalopod	96,350 mt	3.	Small Pelagic	57,908,000
4.	Mixed	80,840 mt	4.	Demersal	25,001,000
5.	Demersal	45,460 mt	5.	Mixed	22,231,000
6.	Crustacea	730 mt	6.	Crustacea	4,020,500

The cephalopod catch is clearly the most valuable fishery in this region, and as such, the Spanish catch has the greatest value in the area, estimated at \$184 million, or 54% of the total value of the fishery in 1981. The Soviet catch is valued at \$99 million or nearly 29% of the total value of the fishery. By contrast, Mauritania is credited with about 2% of the value or \$8.4 million in 1981. The Soviet Union is obviously employing the fleet with the greatest presence in these waters, mainly Mauritanian, due to its focus on the small pelagic and mackerel catch. The Soviets, in fact, were responsible for about 76% of the total volume of non-cephalopod species caught in this sub-region. This will become more important when the study looks at the fisheries of the individual CECAF countries, most importantly that of Mauritania.

The Cape Verde Coastal Sub-region (number 34.3.1) includes fisheries in Southern Mauritania, Senegal, Gambia, Guinea-Bissau and Guinea (Conakry). Tables 16 and 17 summarize the catch in this sub-region. Table 16 covers the foreign and coastal nations and Table 17 summarizes the activities of the coastal countries. Figure 23 graphically present this data. Because data is again incomplete for 1982, data for 1981 is used for estimation purposes. The total catch in this sub-region is valued at

approximately \$225 million of which demersal and crustacea species are most important. Table 18 summarizes the value and tonnage taken in this area during 1981.

TABLE 16: CATCH BY COUNTRY AND SPECIES IN CEDRF SUB-REGION 34.3.1 - COPE VERDE CORRAL - FOREIGN FLEET

		VOLUME IN METRIC TONS 1,000							VALUE IN US\$ 1000							
		TUNA	CRUSTACEA	DEMONSAL	CEPHALPOD	MACKERAL	SMALL PELAGICS	MIXED	TOTAL	TUNA	CRUSTACEA	DEMONSAL	CEPHALPOD	MACKERAL	SMALL PELAGICS	MIXED
USSR	1975.00	.02	30.84	.04	72.20	25.95	1.18	62.61	.09	98.00	12336.00	76.00	14439.48	1347.58	236.00	28525.70
	1976.00	.01	9.06	.02	30.00	22.18	1.26	62.61	.00	78.00	3624.48	32.00	6015.48	1109.00	252.60	11103.40
	1977.00	.00	3.50	.01	60.19	31.49	2.00	97.98	.00	.00	1400.00	18.00	12037.00	1574.58	559.40	15588.90
	1978.00	.00	16.45	.07	60.75	50.51	0.23	136.01	.00	.00	6992.53	144.00	13452.98	3780.25	1851.30	26445.00
	1979.00	1.35	10.18	.02	31.98	41.64	12.32	97.52	.00	6725.00	4582.00	156.00	7974.25	4164.00	3094.25	26696.30
	1980.00	.00	29.84	.08	95.81	39.84	0.01	172.77	.00	.00	13428.45	152.00	23952.25	3904.00	2001.25	43437.95
	1981.00	.00	81.67	.09	38.85	13.64	5.59	139.84	.00	.00	44918.50	170.00	10683.20	1500.40	1530.00	50810.10
	1982.00	.00	90.30	.01	25.19	0.70	3.56	128.76	.00	.00	54100.00	10.00	7857.60	1044.00	1060.30	64159.90
SPAIN	1975.00	3.79	2.77		.00	.00	6.56	.00	10950.00	1100.00	.00	.00	.00	.00	.00	20050.00
	1976.00	4.97	12.74		.00	.92	18.62	.00	24025.00	5956.00	.00	.00	.00	.00	103.20	30104.20
	1977.00	.00	.00		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	1978.00	7.64	13.97		.00	.00	15.21	36.02	.00	30215.00	5937.25	.00	.00	.00	3421.50	47573.83
	1979.00	4.23	15.47	5.02	.10	.00	6.00	31.62	.00	21135.00	6961.50	11630.00	25.25	.00	1500.00	41299.75
	1980.00	6.07	8.16	2.49	.05	.00	10.00	26.77	.00	30355.00	3672.00	4982.00	11.75	.00	2500.00	41526.75
	1981.00	3.79	5.84	6.10	.20	.00	12.00	27.93	.00	20020.50	3213.65	12204.00	55.55	.00	3300.00	39601.70
	1982.00	.00	.00		.16	.00	.00	.16	.00	.00	.00	.00	47.40	.00	.00	47.40
E. EUROPE	1975.00	.00	.62		.21	1.65	2.48	.00	.00	240.00	.00	.00	10.50	329.00	500.00	
	1976.00	.00	.21		1.79	3.42	5.43	.00	75.00	84.00	.00	.00	89.50	603.20	931.70	
	1977.00	.10	.00		36.35	3.65	40.10	.00	490.00	.00	.00	.00	1017.50	730.00	3030.30	
	1978.00	.10	.00		41.57	3.55	45.22	.00	510.00	.00	.00	.00	3117.75	790.53	4426.20	
	1979.00	5.10	3.66		51.40	1.91	62.07	.00	25405.00	1647.00	.00	.00	5140.00	477.25	32749.25	
	1980.00	.10	.00	1.50	4.66	3.63	9.09	.00	510.00	.00	3000.00	.00	466.00	906.25	4002.25	
	1981.00	1.46	.22		10.26	2.65	14.58	.00	0002.50	110.25	.00	.00	1120.60	727.30	9976.73	
	1982.00	1.63	.15		10.40	1.65	21.03	.00	0954.00	91.00	.00	.00	2200.00	495.00	11740.00	
OTHER	1975.00	.00	16.72	0.00	23.05	39.74	2.23	90.54	.00	.00	6687.20	19992.00	4771.60	1905.05	446.00	29003.65
	1976.00	.00	11.91	1.66	13.03	34.60	2.03	64.12	.00	.00	4764.00	3320.00	2766.00	1734.00	406.00	12999.60
	1977.00	.00	16.66	6.20	23.49	33.99	2.25	86.60	.00	.00	7463.60	12562.00	4650.60	1799.70	450.00	26973.90
	1978.00	.00	23.15	13.60	23.55	27.16	4.70	92.16	.00	.00	9037.05	27196.00	5297.63	2037.23	1050.10	45426.00
	1979.00	.00	15.09	2.94	39.27	20.90	4.70	83.99	.00	.00	7240.05	5006.00	9017.50	2090.19	1175.75	26217.49
	1980.00	.00	7.86	.00	63.07	13.93	4.70	89.56	.00	.00	3534.75	.00	15767.00	1393.20	1175.75	21070.70
	1981.00	.00	12.46	3.04	02.92	13.67	4.70	116.79	.00	.00	6052.45	6006.00	22002.10	1503.26	1393.33	30537.21
	1982.00	.00	15.01	5.27	71.22	10.65	4.70	106.05	.00	.00	9006.00	10530.00	21366.30	1270.00	1410.90	43591.20
TOTAL CORRAL NATIONS	1975.00	.00	6.02	61.90	2.01	21.62	150.32	90.03	341.57	.00	30100.00	24792.00	5612.00	4322.00	7515.90	19765.20
	1976.00	.00	4.81	78.26	3.81	29.69	159.63	64.27	340.47	.00	24060.00	31302.00	7620.00	5937.00	7901.60	12053.20
	1977.00	.00	5.22	64.39	2.66	14.00	151.24	44.49	282.09	.00	26100.00	29756.40	5320.00	2016.40	0090.00	76453.75
	1978.00	.00	5.69	66.17	2.32	26.11	141.93	43.44	265.66	.00	20430.00	20122.60	4640.00	5075.65	10644.53	07407.30
	1979.00	.00	9.40	55.23	2.55	16.47	123.71	40.40	247.92	.00	47390.00	24052.15	5100.00	4110.00	12370.00	103951.46
	1980.00	.00	5.70	50.10	4.09	19.73	122.53	51.66	253.01	.00	20500.00	22540.00	0100.00	4931.50	12252.00	09325.60
	1981.00	.00	6.19	45.02	1.79	13.61	104.77	46.73	210.12	.00	34050.50	24761.55	3500.00	3743.50	11525.14	90510.97
	1982.00	.00	7.32	40.61	2.07	23.20	92.93	40.01	222.93	.00	40232.50	29164.20	4140.00	6959.70	11151.24	106291.54

TABLE 16 (Continued): CATCH BY COUNTRY AND SPECIES IN CECAF SUB-REGION 34.3.1 - OCEANIC COASTAL - FOREIGN FLEET

	VOLUME IN METRIC TONS 1,000									VALUE IN US\$ 1000							
	TUNA	CRUSTACEA	DEMERAL	CEPHALOPOD	MACKERAL	SMALL PELAGICS	MIXED	TOTAL	TUNA	CRUSTACEA	DEMERAL	CEPHALOPOD	MACKERAL	SMALL PELAGICS	MIXED	TOTAL	
TOTAL	1975.00	.00	9.85	112.93	10.84	117.67	217.22	109.77	578.28	.00	49235.00	45172.00	21600.00	23534.00	10060.75	21954.00	172436.55
REPORTED	1976.00	.00	9.80	112.18	5.49	73.60	218.20	75.72	495.06	.00	48975.00	44872.00	10900.00	14720.00	10914.10	15143.00	145604.10
CATCH	1977.00	.00	5.00	35.35	8.95	97.76	253.00	35.78	509.11	.00	48975.00	44872.00	10900.00	14720.00	10914.10	15143.00	145604.10
	1978.00	.00	14.55	119.74	15.93	110.41	261.17	79.04	601.78	.00	72750.00	50089.50	31900.00	24042.25	19507.75	17964.00	210013.50
	1979.00	.00	10.55	100.63	11.39	87.74	237.73	62.96	511.00	.00	52750.00	45203.50	22700.00	21935.00	23773.00	15739.75	182261.25
	1980.00	.00	11.84	95.96	8.16	178.65	100.16	69.09	544.66	.00	59200.00	43102.00	16320.00	44662.50	10075.00	17472.50	190053.00
	1981.00	.00	9.20	145.21	11.02	135.50	142.34	72.23	515.50	.00	50600.00	79064.40	22040.00	37204.50	15657.40	19063.25	225309.55
	1982.00	.00	5.90	154.07	7.34	120.77	130.60	57.66	476.40	.00	32450.00	92442.00	14600.00	36231.00	15661.24	17290.00	225034.40

SOURCE: Cefac Statistical Bulletin No. 4.

TABLE 17: CATCH BY COUNTRY AND SPECIES IN CEEAF REGION 34.3.1 - COPE VERDE COASTAL SUB-REGION - COASTAL WATERS ONLY

		VOLUME IN MT 1000							VALUE IN US\$ 1000							\$ TOTAL
		TUNA	CRUSTACEA	GENERAL	CEPHALOPOD	MACKEREL	Pelagics	MIXED	TOTAL	TUNA	CRUSTACEA	GENERAL	CEPHALOPOD	MACKEREL	Pelagics	
SENEGAL	1975.00	5.84	68.93	2.01	21.65	133.41	93.51	318.02	.00	29185.00	24371.60	5612.00	4323.00	6678.70	18781.40	88864.50
	1976.00	4.61	77.21	3.81	29.69	145.32	57.38	318.02	.00	23878.00	30854.40	7520.00	5937.00	7265.90	11476.00	86254.10
	1977.00	4.44	57.79	2.66	14.88	137.35	35.89	251.42	.00	22280.00	23117.20	5320.00	2816.40	6867.70	7818.00	67339.30
	1978.00	5.28	61.21	2.32	26.11	128.99	35.19	259.11	.00	26385.00	26814.60	4648.00	5875.65	9674.55	7917.75	88587.63
	1979.00	4.26	51.58	2.55	16.47	188.92	33.87	217.65	.00	21290.00	23209.65	5180.00	4118.00	18892.00	8467.50	73877.15
	1980.00	4.65	44.74	2.59	19.61	185.85	48.83	217.48	.00	23278.00	28134.35	5180.00	4982.75	18585.20	18887.50	74879.00
	1981.00	4.72	39.13	1.79	13.41	87.88	39.38	186.32	.00	25982.00	21521.50	3588.00	3688.83	9667.00	18829.50	75268.05
	1982.00	5.68	44.81	2.87	23.84	76.90	42.46	194.16	.00	31229.00	26484.00	4148.00	6912.30	9228.12	12738.00	98652.22
	1983.00	3.00	58.00	3.00	8.00	90.00	31.00	187.00	.00	27588.00	38888.00	6888.00	2488.00	18888.00	9588.00	85888.00
GAMBIA	1975.00	.18	1.85			7.32	1.44	18.00	.00	915.00	421.20	.00	.00	366.20	288.00	1998.40
	1976.00	.18	1.85			7.32	1.44	9.99	.00	915.00	418.40	.00	.00	366.20	288.00	1987.60
	1977.00	.68	6.68			7.30	3.58	18.28	.00	3418.00	2539.20	.00	.00	374.95	788.00	7124.15
	1978.00	.31	4.96			5.88		11.15	.00	1535.00	2182.00	.00	.00	441.23	.00	4884.23
	1979.00	.12	3.65			1.74		5.51	.00	615.00	1642.58	.00	.00	173.81	.00	2431.31
	1980.00	.94	5.36		.12	3.72	3.32	13.45	.00	4728.00	2412.45	.00	26.75	372.68	825.00	8358.88
	1981.00	.61	5.89		.28	3.94		18.85	.00	66.00	2248.85	.00	53.55	433.62	.00	3742.22
	1982.00	.81	4.68		.16	3.88		7.64	.00	49.58	2759.48	.00	47.48	369.12	.00	3225.42
	1983.00	.58	.58			6.00	2.58	18.58	.00	2758.98	382.00	.00	.00	728.00	1858.00	4828.00
G. BISSAU	1975.00	.00	.00			.00	1.65	1.65	.00	.00	.00	.00	.00	.00	329.00	329.00
	1976.00	.02	.00			.00	2.42	2.42	.00	73.00	.00	.00	.00	.00	683.28	758.28
	1977.00	.18	.00			.00	3.65	3.75	.00	498.00	.00	.00	.00	.00	738.00	1228.00
	1978.00	.00	.00			.00	3.25	3.65	.00	518.00	.00	.00	.00	.00	798.53	1388.53
	1979.00	2.16	.00			.00	1.91	7.81	.00	25485.00	.00	.00	.00	.00	477.25	2592.25
	1980.00	.18	.00	1.58		.00	3.63	5.23	.00	518.00	.00	3888.00	.00	.00	986.25	4416.25
	1981.00	1.46	.00			.00	2.85	4.18	.00	882.58	.00	.00	.00	.00	727.38	879.88
	1982.00	1.63	.00			.00	1.65	3.28	.00	8954.00	.00	.00	.00	.00	493.00	9443.00
	1983.00	1.58	1.58			.00	2.58	3.58	.00	8258.00	988.00	.00	.00	.00	758.00	9988.00
GUINEA	1975.00	.00	.00			9.58	2.23	11.81	.00	.00	.00	.00	.00	479.00	446.00	925.00
	1976.00	.00	.00			6.99	2.83	9.82	.00	.00	.00	.00	.00	349.58	486.00	755.58
	1977.00	.00	.00			6.39	2.25	8.64	.00	.00	.00	.00	.00	319.58	458.00	769.58
	1978.00	.00	.00			7.65	4.78	11.75	.00	.00	.00	.00	.00	528.75	1858.18	1586.93
	1979.00	.00	.00			12.85	4.78	17.75	.00	.00	.00	.00	.00	1385.00	1175.75	2488.75
	1980.00	.00	.00			12.95	4.78	17.65	.00	.00	.00	.00	.00	1295.00	1175.75	2478.75
	1981.00	.00	.00			12.95	4.78	17.65	.00	.00	.00	.00	.00	1424.58	1293.33	2717.83
	1982.00	.00	.00			12.95	4.78	17.65	.00	.00	.00	.00	.00	1354.00	1418.98	2964.98
	1983.00	.00	.00			12.58	5.00	17.58	.00	.00	.00	.00	.00	1588.00	1588.00	3888.00

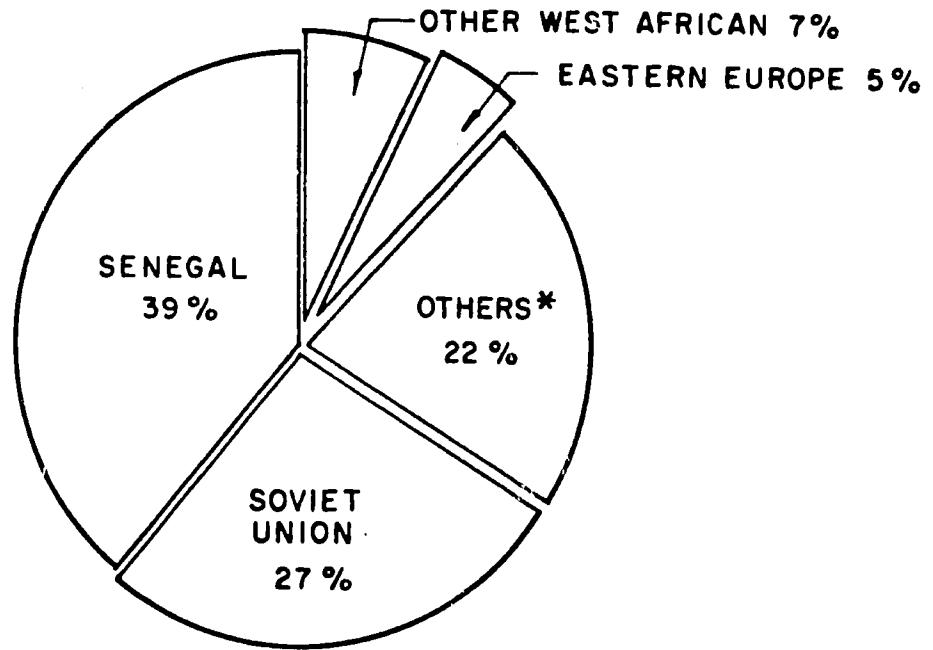
TABLE 17 (Continued): CATCH BY COUNTRY AND SPECIES IN CECAF REGION 3A.2.1 - CAPE VERDE CONINTAL OLD-REGION - CONINTAL WATERS ONLY

	VOLUME IN MT 1992								VALUE IN US\$ 1992							
	TUNA	CRUSTACEA	GENERAL	CEPHALOPOD	MACKERAL	SMALL PELAGICS	MIXED	TOTAL	TUNA	CRUSTACEA	GENERAL	CEPHALOPOD	MACKERAL	SMALL PELAGICS	MIXED	TOTAL
TOTAL	1975.00	6.02	61.90	2.01	21.62	130.31	116.97	341.40	.00	30100.00	24792.00	5612.00	4323.00	7515.90	19765.20	92109.70
	1976.00	4.81	70.26	3.01	29.69	139.63	64.27	340.46	.00	24060.00	31302.00	7620.00	5937.00	7901.60	12053.20	89755.40
	1977.00	5.22	64.39	2.66	14.00	151.24	44.49	292.09	.00	26100.00	25736.40	5320.00	2016.40	7562.15	8090.00	76453.75
	1978.00	5.69	66.17	2.32	26.11	141.92	43.44	285.66	.00	20430.00	20122.60	4640.00	5075.65	10644.53	9774.46	87407.32
	1979.00	9.40	55.23	2.35	16.47	123.71	40.40	247.92	.00	47390.00	24052.15	5100.00	4110.00	12370.01	10120.50	103951.46
	1980.00	5.69	50.18	4.09	19.73	122.53	51.66	253.01	.00	20500.00	22546.00	0100.00	4931.50	12252.00	12914.50	89325.60
	1981.00	6.19	45.02	1.79	13.61	104.77	46.73	210.12	.00	34050.50	24761.35	3500.00	3743.50	11525.14	12050.21	90510.90
	1982.00	7.32	40.61	2.07	23.20	92.93	40.11	222.93	.00	40232.50	29164.20	4140.00	6959.43	11151.24	14643.90	105291.54
	1983.00	7.00	52.00	3.00	0.00	100.50	42.00	220.50	.00	30500.00	31200.00	6000.00	2400.00	13020.00	12500.00	103720.00

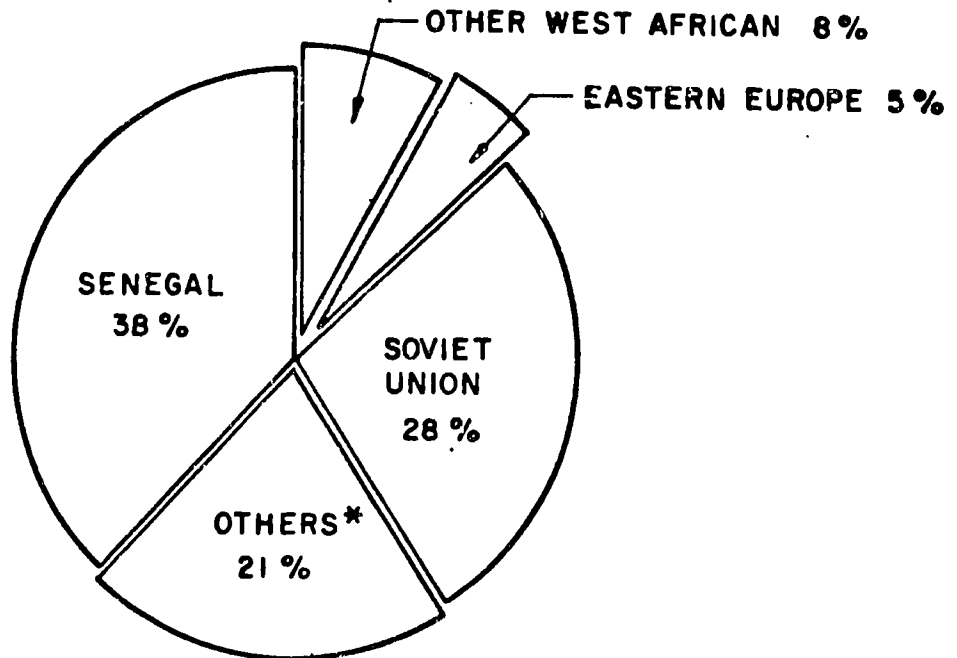
SOURCE: CECAF Statistical Bulletin No. 5, op. c.t.

Fig: 23 CAPE VERDE SUB-REGION

SHARE OF TOTAL CATCH BY VOLUME (1982) **



SHARE OF TOTAL CATCH BY VALUE (1982) **

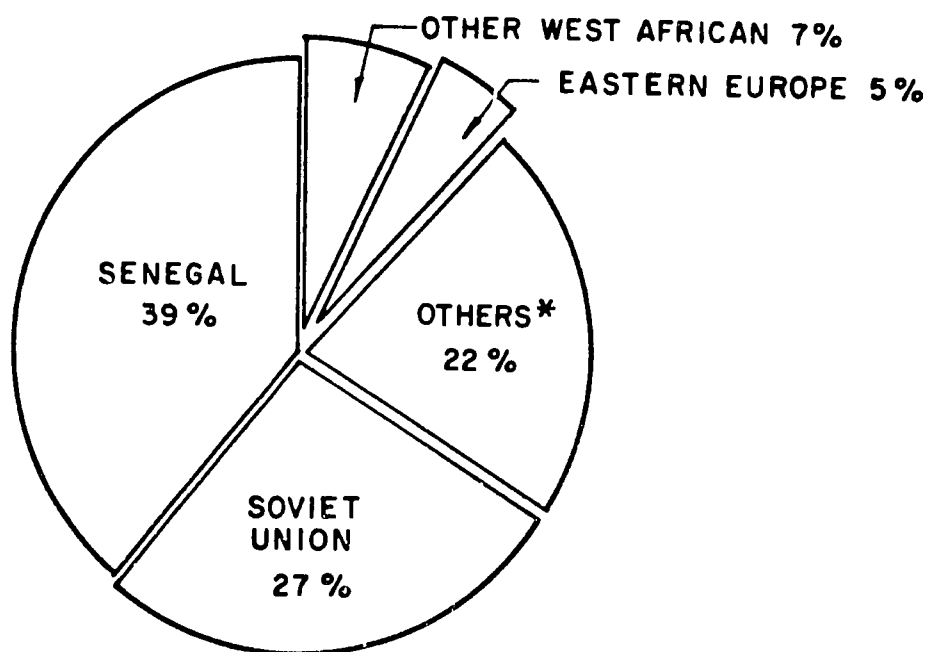


* Japan, EEC, Korea, Thailand, etc.

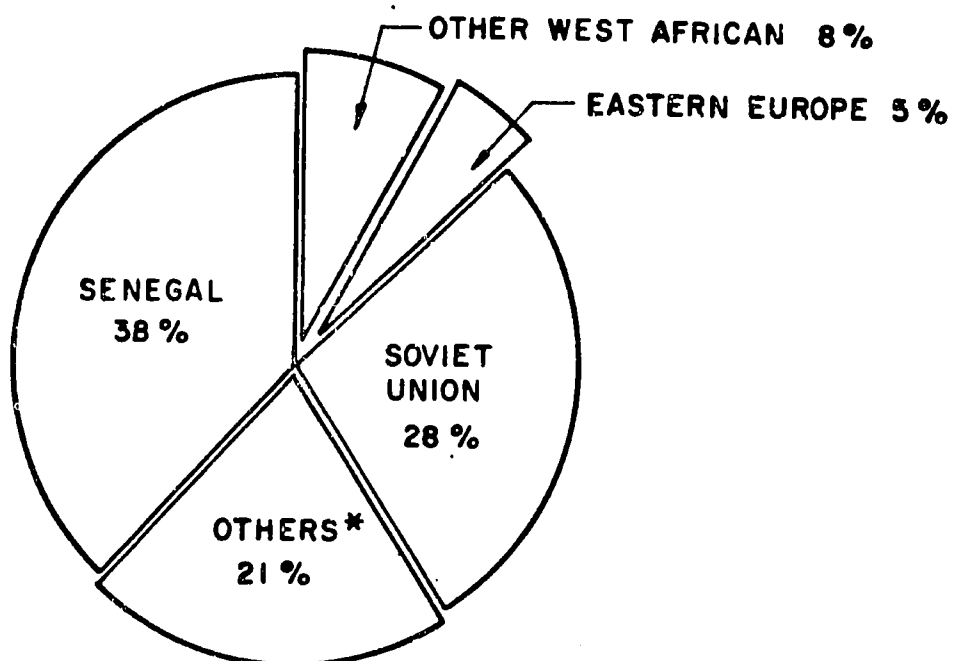
** Spain did not report catch data in 1982.

Fig:23 CAPE VERDE SUB-REGION

SHARE OF TOTAL CATCH BY VOLUME (1982) **



SHARE OF TOTAL CATCH BY VALUE (1982) **



* Japan, EEC, Korea, Thailand, etc.

** Spain did not report catch data in 1982.

TABLE 18: COMPARISON OF SPECIES VOLUME AND VALUE FOR THE CAPE VERDE COASTAL SUB-REGION, 1981

	<u>Tonnage</u>		<u>Value</u>
1. Demersal	145,210 mt	1. Demersal	\$ 79,864,000
2. Small Pelagic	142,340 mt	2. Crustacea	50,600,000
3. Mackerel	135,380 mt	3. Mackerel	37,284,500
4. Mixed	72,230 mt	4. Cephalopod	22,040,000
5. Cephalopod	11,200 mt	5. Mixed	19,863,250
6. Crustacea	9,200 mt	6. Small Pelagic	15,657,400

SOURCE: Table 11

In contrast to the Coastal Sahara Sub-region, in the Cape Verde Coastal region, demersal fish, which make up the greatest catch, are the species of greatest value. Crustacea and cephalopods are also of substantial value despite their limited catch levels. Mackerel make up an important part of the catch in this region as well.

Of the overall (\$225 million) value of the fishery in this sub-region the Coastal nations themselves take about \$90.5 million. The Soviet Union takes almost \$60 million, Spain nearly \$40 million, and Eastern European countries close to \$10 million. Of the coastal nations, Senegal is by far the largest fishing country, taking nearly \$75 million in value or over 80% of the total catch taken by coastal nations. It is worth noting that, because the Soviet Union does not fish in Senegalese waters (they presently have no valid agreement with Senegal), most of the Soviet catch comes from Guinea-Bissau and Guinea (Conakry) waters. In 1981, the Soviets reported catching a total of about 140,000 metric tons. It is widely believed that in this region they are substantially underreporting their catch statistics. This will be taken up in greater detail in the following sections on the individual coastal nations.

If the Soviets, Eastern Europeans and Spaniards are underreporting their catch by 50% (i.e., if they report half of their actual catch), then the value of their catch more than doubles because they do not pay any fees on the unreported catch. In the Coastal Sahara sub-region, this would mean that the Soviet catch would be valued at close to \$200 million, the Spanish catch at about \$375 million and the Eastern European catch at about \$50 million. In effect, the value of the fishery in this sub-region would increase by approximately \$300 million. In the Cape Verde Coastal region, this would mean an overall increase in the value of the fishery of nearly \$110 million, with about \$60 million attributed to the Soviet Union, \$40 million to Spain and \$10 million or so to Eastern Europe. Obviously, if underreporting is of such a large magnitude, then the consequent underestimation of the total value of the CECAF fishery is enormous.

In addition, it should be noted that we have not taken into account, except to mention it in passing, that the price/value estimates used by CECAF are very conservative. As such, if one used a more "liberal" figure for the price/value of the fish and fish products in the region, it would further increase the value of the CECAF fishery.

This section now proceeds to look at the various CECAF countries in as much detail as is possible given limited data. This section looks further at the problems of underreporting of catch and underestimation of price with regard to valuing fish catch in the region.

4.2.3 The Coastal Countries

This project's focus is in the fisheries of Mauritania, Senegal, Gambia, Guinea-Bissau, and Guinea (Conakry). Data on these countries are very uneven, however, and much of it resides in the various government agencies involved and in CECAF archives. One could pull together a much

more detailed set of information, but it would require several months of work in the West African area.

4.2.3.1 Senegal

Fisheries are an important part of the Senegalese economy, now contributing nearly as much to Senegal's GNP as the peanut crop. Senegalese exports of fish and fish products total around \$80-90 million (in 1979), this out of a total export of \$500 million. In view of the rather poor agricultural harvests of 1980-81, fishery exports were in fact greater than agricultural exports in those years. Senegal's fishery is also very important to the local employment situation, and artisanal fishermen account for over 30% of the total Senegalese catch. This suggests, that the artisanal fishery in Senegal is very healthy, a situation somewhat unique among coastal West African nations. Finally, in addition to the freezing, processing and distribution industry in Dakar, Dakar Marine (a ship repair and servicing facility in Dakar) has become an integral part of the fishing industry in Dakar, servicing over 200 ships a year (of which half or more are Soviet).

According to CECAF project estimates, Senegal caught nearly 190,000 mt of fish in 1983. Of this, small pelagics make up almost 50% (90,000 mt), and demersals nearly 25% (50,000 mt). Senegal also catches some 30,000 mt of mixed species and a small amount of crustacea, tuna and cephalopods. In value terms, using CECAF estimates, the value of the Senegalese fish catch is \$89 million, of which the demersals make up \$30 million, the crustacea (despite limited tonnage) make up \$27.5 million, and small pelagics and mixed species another \$20 million.

Data from the Department of Marine Fisheries (DOPM) in Senegal provide a different picture of the Senegalese fishery. Data for 1981 and 1982,

summarized in Table 19, show that the total catch in Senegalese waters is around 243,000 mt (for 1982) of which Senegalese boats account for about 207,455 mt, with foreign vessels capturing the remainder. This compares with a total Senegalese catch in 1983, as reported by CECAF, of 190,000 mt and of 255,000 mt in 1980. The value of the total catch in Senegalese waters is estimated by the DOPM to be CFA 33 billion or about \$100 million. This compares with the CECAF estimate of \$89 million.

One gets an interesting look at the value of the value-added industry in Dakar in the estimates of Senegalese exports and export value. The DOPM estimates Senegalese exports to be on the order of 90,000 mt in 1981 and 91,000 mt in 1982. The value of these exports is estimated at \$146 million in 1982, \$138 million in 1981, \$153 million in 1980. This contrasts with CECAF estimates of export value of the Senegalese fishery of \$80 million in 1979 (CECAF 1982 Everett, 1982 Document) and over \$154 million in 1980 (CECAF document 84/55 Robinson and Crispoldi). Table 20 provides an overview summary of Senegalese fish exports (these are also based on CECAF project estimates). The value of the fishery is further underscored by these trade figures which show a positive trade balance in fish and fish products of over \$70 million (1980 data).

TABLE 19: THE VOLUME AND VALUE OF CATCH IN SENEGALFSE WATERS IN 1981 AND 1982 BY COUNTRY

	<u>1981</u>		<u>1982</u>	
	<u>Catch</u>	<u>Value</u>	<u>Catch</u>	<u>Value</u>
SENEGAL				
Artisanal	148,528 mt	cfa 12 billion	141,231 mt	cfa 11 billion
Industrial	52,359 mt	cfa 11 billion	66,224 mt	cfa 14 billion
FRANCE				
	15,666 mt	cfa 3.3 billion	18,224 mt	cfa 3.8 billion
	9,598 mt	cfa 2 billion	14,035 mt	cfa 2.9 billion
GREECE				
	1,598 mt	cfa .32 billion	1,600 mt	cfa .33 billion
ITALY				
	1,604 mt	cfa .33 billion	2,033 mt	cfa .33 billion
TOTAL:	229,317 mt	cfa 28 billion	243,255 mt	cfa 33 billion

SOURCE: CECAF Project Documents Provided to Study Team, August, 1984.

TABLE 20: SENEGAL EXPORTS OF FISH PRODUCTS, OTHER THAN FROZEN (IN MT AND 1000 CFA)

	<u>Canned Tuna</u>	<u>Canned Sardines</u>	<u>Fish Meal</u>	<u>Fish Oil</u>	<u>Other Products</u>	<u>TOTALS</u>
1974 mt:	8,864	353	3,664	9	409	13,299
CFA:						-0-
1975 mt:	8,567	308	2,099	8	38	11,020
CFA:						-0-
1976 mt:	9,693	162	2,138		39	12,032
CFA:						-0-
1977 mt:	10,500	116	4,377		627	15,620
CFA:						-0-
1978 mt:	12,199	194	5,960		5,960	24,313
CFA:						-0-
1979 mt:	11,860	201	7,896		7,896	27,853
CFA:			848,295		848,295	1,696,590
1980 mt:	12,981	104	6,646	67	2,459	22,257
CFA:	7,887,987	197,657	664,460	4,350	904,840	9,659,294
1981 mt:	15,161	67	5,037	247	2,216	22,728
CFA:	10,973,338	11,190	572,168	19,481	873,160	12,449,337
1982 mt:	16,244	15	2,741	-0-	3,309	22,309
CFA:	13,339,989	12,016	411,150	-0-	1,130,775	14,893,930

SOURCE: CEECAF Project Documents Provided to Study Team, August, 1984.

4.2.3.2 Mauritania

Mauritania has dramatically changed its fisheries development policy over the last decade, deciding in 1978 to phase out the issuing of fishing licenses and to emphasize joint ventures in their place. The Soviets are now deeply involved in a joint venture in Mauritania called Mausov and other countries are also involved in joint ventures with the Mauritanian Government. This has made the collection of catch data all the more questionable and as such, catch data reported here is quite sketchy. In addition, the government is making an effort to establish Noadibou as a landing and processing facility along the lines of Dakar and Las Palmas. The Chinese are also constructing a port in Nouakchott in order to provide easy access to the Dakar market and to Mali.

Mauritania reported that they caught around 25,000 mt of fish in 1982, valued at over \$9,000,000. This catch level has remained fairly constant during the last decade. CEECAF project estimates for 1983 show an enormous increase in the demersal and cephalopod catch which would increase the value of the catch to over \$60 million. Obviously, this tremendous increase in catch should be better understood. It may well come from the reporting of new joint ventures, however, this is not clear in the project documents.

Mauritania is a net exporter of fish and fish products generating a trade surplus of almost \$20 million in 1979 and over \$40 million in 1980. This compares to a total trade deficit of \$127 million in 1979, thus making it an extremely important part of Mauritania's economy.

We have tried to estimate the total landings of fish in Mauritania waters using a methodology developed by Doucet, Peerse and Troadec in their study "Mauritania: Fishery Development and Management Policy in the

Exclusive Economic Zone". This methodology is based on estimates of Mauritanian continental shelf area as a percentage of the shelf area in CECAF statistical reporting sub-regions.

Using percentages of shelf area, catch data is interpolated to provide rough estimates of catch in the EEZ of Mauritania. Table 21 is an effort to illustrate this methodology for 1982. Table 22 summarizes our estimates, using this methodology, for 1975-1982.

TABLE 21: CATCH ESTIMATES IN NUTRITIONAL WATERS, 1982.

A) Coastal Sahara	1	2	3	4	5	6	7	8	TOTAL	NOTES:
	Table 25 Coastal Sahara	Table 35 Mor + Sahara	.54 *2	Table 26 Mor + Sah + CV	.3 *4	Table 37 Sah + CV	.4 *6	1 + 3 + 5 + 7	.22 *8	
Demersals	68,199	33	17.8	9,218	2,765	9,127	2,638	86,632	14,639	(1) Morocco Coastal 62,163 km ²
Coastal Pelagics	564,444	898,988	188,888	53	15.9	3	1.2	672,451	147,381	(2) Sahara Coastal 72,188 km ²
Mixed	51,647	26	19.4	2,889	686	25,187	18,874	62,346	12,716	(3) Cape Verde Coastal 116,188 km ²
Crustaceans	148			1,888	368	414	165.6	666	146	(4) Nutritional Part of Sahara Division 16,188 km ²
Molluscs	27,638			4	388	27,288	18,883	28,833.2	8,344	(5) Nutritional Part of Cape Verde Division 19,688 km ²
										(4) = .22 (5) = .18
B) Cape Verde Coastal	1	2	3	4	5	6	7	8	9	(2) = .3 (2) = .54 (2) = .4
	Table 27				.4		.6 * 6	1 + 5	.18 * 8	(1+2+3) (1+2) (1+3)
Demersals	154,886				4,148		5,476	163,698	36,612	(3) = .45 (3) = .6
Coastal Pelagics	231,448				24		1	231,473	55,384	(1+2+3) (1+2) (1+3)
Mixed	26,888				989		15,112	32,821	16,218	
Crustaceans	1,472				34		246	2,238	1,472	
Molluscs	12,254				453		16,325	28,631	6,387	
C) Total Catch in EEZ	9a	9b	10 Near Catch		12 9a + 9b + 10					
Demersals	14,639	36,812	11		58,682					
Coastal Pelagics	167,381	55,384	7		222,633					
Mixed	12,716	16,218	5		29,931					
Crustaceans	146	1,472			1,618					
Molluscs	8,344	6,387	1		14,932					
					325,616					
Unreported Landings and Tonn					188,888					
					425,616					

SOURCE: Adapted from F. Bourcet, P. Pearce and J. Truedec, Nutritional Fishery Development and Management Policy in the Exclusive Economic Zone, Rome, FAO Program, 1981.

TABLE 22: TOTAL CATCH IN MAURITANIA'S EEZ DURING 1975-1982

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
<u>Foreign Catch:</u>								
Demersal	51,131	66,987	36,771	41,469	30,966	26,364	47,664	50,671
Cephalopod	272,452	330,117	325,594	208,620	174,533	243,666	209,249	202,826
Other Marine								
Fish	45,369	49,083	50,977	73,155	28,949	27,573	39,412	29,926
Crustacean	3,388	2,981	3,504	3,924	3,610	3,247	2,436	1,618
Molluscs	45,608	43,574	25,895	46,316	29,820	28,176	32,443	14,931
<u>Mauritania's</u>								
<u>Catch:</u>	23,350	21,350	26,570	25,620	23,720	22,690	26,010	25,620
TOTAL CATCH								
IN EEZ:	441,299	541,092	469,312	399,103	300,599	351,716	357,214	325,992

Obviously the methodology used produces a very rough order of magnitude approximation. Doucet, Pearse and Troadec add the following caveats to estimates of landings in Mauritanian waters.

This procedure does not make allowance for geographic differences in productivity and distribution of effort. Moreover... this method seems reasonable for demersal stocks but is much more arbitrary for pelagics. This system may slightly under-estimate catches from Mauritania's EEZ because this area, richer than southern sectors, attracted a greater effort before the reduction of fishing licenses. It is difficult to know how biased they are. Hopefully, these approximations will result in no greater errors than those caused by the absence of declarations, incomplete statistical coverage of artisanal fisheries or incorrect identification of species.¹⁹

In addition, it is extremely difficult to estimate the catch of foreign vessels operating out of Mauritanian ports under joint venture agreements and landing their catch in Mauritania, as opposed to foreign vessels operating in Mauritanian waters under license agreements or illegally.

Another CEECAF source estimates that in 1983, a total of 41,060 mt of demersal fish and 471,200 mt of pelagic fish were caught in Mauritania waters, for a total tonnage of over 500,000 mt. Either the 426,000 mt estimate or the 500,000 mt estimate provides an order of magnitude estimate of fishing activity in Mauritania.

Applying the same methodology as above, one can estimate that the Soviet catch in Mauritania's waters contributes in at 22% to the Soviet harvest in the Coastal Sahara region + 18% of Soviet harvest in the Cape Verde region. This assumption produces the figures in Table 23.

TABLE 23: ESTIMATED SOVIET CATCH IN MAURITANIA EEZ

	(1) Coastal Sahara	(2) <u>.22 * 1</u>	(3) <u>Cape Verde</u>	(4) <u>.18 * 3</u>	(5) <u>2 + 4 (Total)</u>
1975	640,222	140,849	133,140	23,965	164,814
1976	1,170,704	257,555	64,948	11,691	269,246
1977	818,737	180,122	98,918	17,805	197,927
1978	495,464	109,002	138,480	24,926	133,928
1979	323,316	71,147	99,593	17,927	89,074
1980	532,876	89,074	174,499	31,709	120,483
1981	532,677	117,189	141,937	25,549	142,738
1982	537,664	118,286	130,691	23,524	141,810

These numbers should be kept in mind as we move toward Section 5.0 which focuses on fishing effort in the EEZ's of various countries, and Section 8.0 which discusses license fisheries and fees, as these estimates are based only on reported Soviet catch, and are, therefore, very low estimates. These figures also may not include all of the catch from joint venture agreements which would report catch under Mauritanian waters.

4.2.3.3 Guinea-Bissau

According to CECAF estimates, Guinea-Bissau caught a total of 5,500 metric tons in 1983 at a total value of \$9,900,000. This catch is made up of crustacea, demersal and mixed species. This total has varied only slightly since 1975. Guinea-Bissau is, however, a net fish exporter. In 1979, Guinea-Bissau exported about \$1,725,000 worth of fish and fish products while importing only \$154,000 for a net trade surplus of about \$1.4 million. In 1980, according to CECAF estimates, exports dropped to \$397,156 and imports to \$56,000 for a net surplus of only \$340,000. Data on overall imports and exports is not available for Guinea-Bissau for this time period.

Data on total catch (including license fishing) within the EEZ of Guinea-Bissau is sketchy at best. Epler provides data for 1978-80 which suggests that total catch dropped from around 94,000 metric ton in 1978 to 64,000 metric ton in 1980. Epler's data is summarized in Table 24. This varies substantially from estimates provided by Kaczynski. He reports that the Soviets were delivering their own catch statistics to the Government of Guinea-Bissau as follows:

1978	69,900 mt
1979	87,900 mt
1980	90,900 mt
1981	136,900 mt
1982	132,000 mt
1983	70,300 mt (estimate)

Given Kaczynski's proposition that this catch is underreported by a factor of 2 or 3, it seems clear that catch within the EEZ of Guinea-Bissau is, at best, not well known. One could use the methodology applied for Mauritania to estimate catch in Guinea-Bissau's EEZ if it was known how much of Guinea Bissau's continental shelf is within CECAF's Cape Verde Coastal Region.

**TABLE 24: LANDINGS BY COUNTRY WITHIN GUINEA-BISSAU'S EEZ 1978 TO 1980
(IN M. TONS)**

Country	1978	1979	1980
USSR	70,823	35,274.4	60.204
Japan	1,125.5	148.9	47.2
South Korea	2,446.0		
Holland	19,284.4		
France		1,409.0	193.7
Portugal		432.8	
EEC			3,977.7
TOTALS	93,678.9	37,265.1	64,422.7

SOURCE: B. Epler, The Fisheries of Guinea Bissau,
ICMRD, University of Rhode Island, June, 1983.

According to the recent data from the state Secretariat of Fisheries in Guinea-Bissau, the total catch of foreign fleets in 1983 was equal to 71.17 metric tons.

Table 25 summarizes this data by country and species harvested.

TABLE 25: ANNUAL CATCH OF FOREIGN FLEETS IN THE GUINEA-BISSAU'S 200 MILE EEZ (LICENSE FISHING) 1983 (IN METRIC TONS)

Species	USSR	EEC Countries	Senegal	Total (mt)
Triggerfish	42,241	3,126		42,241
Horse Mackerels	3,283	-	-	3,283
Catfishes	1,886	230	-	2,096
Sea Breams	1,014	152	-	1,166
Croakers	1,776	42	-	1,818
Swordfish	1,192	-	-	1,192
Sharks	760	-	-	760
Grunts	647	-	-	647
Flatfish	201	377	-	578
Crab	3	-	-	3
Clams	3	317		320
Shrimp	134	124		258
Other	14,563	1,884	364	1,682
TOTAL	67,683	3,126	364	71,174

SOURCE: Secretariat for Fisheries of Guinea-Bissau, 1984.

The domestic catch is reported according to two main production sectors: industrial and artisanal fisheries. Industrial fishing is carried out exclusively by two joint fishing ventures: the Soviet - Guinean Estrela do Mar joint venture, and French - Guinean company SEMAPESCA. Their harvest levels in 1983 are presented in Table 26.

TABLE 26: DOMESTIC, INDUSTRIAL CATCH (JOINT VENTURE) DURING 1983

Species	USSR J.V.		French J.V.	Total
	Local Market	Exports		
Barbo	257	-	-	257
Flounders	24	-	-	24
Catfish	180	-	-	180
Swordfish	30	-	-	30
Tuna	12	-	-	12
Crabs	-	29	-	29
Clams	-	4	-	4
Shrimp	138	309	13	460
Other	171	167	-	342
TOTAL	1,148	509	13	2,479

The artisanal fishery sector, which is entirely supported by international aid programs (SIDA and EEC), harvested only 763 tons of fish in 1983.

It should be noted that the Soviet-Guinean joint venture in fisheries is the main exporter of Guinea fishery resources, (which are processed mostly onboard Russian ships). For example, in 1983, the total exports of the venture were reported to be US \$2,427,200. This value is used to build the national exports statistics for a given year. However, in the same year, the joint venture generated costs in hard currency equal to US \$2,589,000. This sum was paid to the Soviet Union by Guinea-Bissau to cover the costs of operation of Soviet vessels involved in the joint venture. During the period of 1978 - 1984, this venture therefore produced

a chronic debt to the Soviet Union equal to US \$3,600,000. In this way, the Soviet partners are able to extract hard currency from the Guinean National Bank - money not produced by the joint venture. The fallacy of fish export statistics in Guinea-Bissau is therefore obvious: when showing exports, there are no hard currency costs being reported. These costs are greater than exports.

During 1978 - 1984, the Estrella do Mar supplied an average of 1,200 metric tons of fish for the domestic market of Guinea-Bissau per year. During the 6 year period, deliveries were equal to 7,200 tons. The total debt to the USSR is currently 3.6 million dollars. One might consider this debt as the cost of these 7.2 thousand metric tons of fish. The unit price of this fish to be paid by the Guinea Government for the USSR is therefore, US \$500 per ton. This is twice as high as the average price of frozen fish used by the USSR to calculate license fees for the same species.

4.2.3.4 Guinea (Conakry)

We have little data on the catch within the EEZ of Guinea. Guinea's own fishing activities have gradually increased from a total tonnage of 11,810 metric tons in 1975 to 17,650 metric tons in 1982 and 17,500 metric tons in 1983. This catch is valued by CECAF at \$3,000,000, of which half is made up of small pelagics and half of mixed species. Another estimate suggests that around 20,000 mt of fish were taken in 1980. In 1980, Guinea had no exports while importing almost \$6 million in fish and fish products in 1980. In general, most of the catch in Guinea waters is made by Soviet vessels. In fact, the Soviets provided almost 70% of Guinea's fish imports in 1980.

In order to estimate catch levels in Guinea's EEZ, one could use the methodology developed above for estimating catch in Mauritania's EEZ, if

data on the amount of Guinea Conakry's coastal shelf lying in the Cape Verde sub-region were known. This figure is not known at this time.

4.2.3.5 Gambia

Gambia caught on the order of 10.50 metric ton of fish in 1983 which is valued by CECAF at \$4,820,000. The level of catch by the Gambian fishing industry has not changed much since 1975 although the mix of the catch has. Currently, Gambia catches primarily small pelagic fish. In 1980, Gambia imported around \$570,000 worth of fish and fish products while exporting about \$1.8 million for a net surplus of \$1.2 million. In 1979, Gambia exported \$1.7 million and imported \$157,000 worth of fish and fish products for a surplus of \$1.55 million. Gambia had a net trade deficit in 1979 of \$5 million, so that the surplus from fisheries trade is significant.

4.3 Footnotes

18. G. Everett, et. al., Recent Trends in CEEAF Fisheries, Dakar, CEEAF Project, CEEAF/TECH/82/42, July, 82.
19. Doucet, et. al., op. cit., 1981.

5.0 FOREIGN FLEET ACTIVITIES IN NORTHWEST AFRICA FISHERIES: AN ESTIMATION OF FISHERY EFFORT IN SENEGAL, MAURITANIA, GAMBIA, GUINEA AND GUINEA BISSAU.

5.1 Senegal

Estimates of fishing effort in Senegalese waters are sketchy. CEEAF estimates that the number of industrial fishing vessels operating in Senegalese waters rose from 143 in 1975 to a high of 264 in 1980 and to 251 in 1982. Of these (for 1982) there were 19 sardine seiners, 186 trawlers and 46 tuna boats. By nationality, the Senegalese accounted for 151 boats, the French 42, Spain 43, Greece 7 and Italy 8.

It is important to note here that the artisanal sector in Senegal makes up an extremely important part of the overall fishery in Senegalese waters. It is estimated that there are currently over 9,000 canoes (motorized and non-motorized) operating in Senegalese waters.

Table 27 shows the trend in number of boats fishing in Senegalese waters, in comparison to the amount of fish catch in those same waters. Table 28 provides a very rough order of magnitude estimate of "catch per unit of effort" where the effort is expressed in number of boats. It would appear that the Senegalese sardine fishery is heavily exploited since the catch per boat (sardine seiners) has dropped from a high of 4,165 mt/year in 1975 to 1,205 mt/year in 1982. For trawlers, the peak catch per boat was reached in 1980 at 634 mt/year.

TABLE 27: SENEGAL INDUSTRIAL FISHERIES TRENDS

Year	Number of boats operating in Senegal:			Total	Landings in Senegal in metric tons:			
	Sardine Seiners	Trawlers	Tuna Boats		Sardine Seiners	Trawlers	Tuna Boats	Total
1959		8	27	33				
1960		11	57	68				
1961		20	67	87		3,285	13,924	17,209
1962	1	26	51	78	410	5,013	12,064	17,077
1963	1	23	63	87	3,984	3,204	11,078	15,472
1964	1	33	63	97	2,740	2,623	10,360	16,304
1965	1	36	46	83	2,570	2,563	10,619	15,812
1966	2	39	36	77	2,980	2,280	5,735	11,278
1967	3	34	46	83	5,000	2,280	8,728	16,008
1968	3	38	78	119	12,761	3,120	9,392	25,273
1969	4	70	44	118	15,614	5,570	12,228	33,412
1970	5	72	50	127	18,153	6,457	11,555	36,165
1971	5	83	46	134	14,776	8,946	12,020	35,742
1972	5	83	46	134	13,299	10,334	18,461	42,094
1972	10	92	48	150	21,870	12,299	17,210	51,379
1973	16	92	44	152	45,036	14,879	16,642	76,557
1974	16	86	42	144	50,098	14,761	19,366	84,225
1975	11	90	42	143	45,821	15,691	12,656	74,168
1976	12	80	42	134	44,125	19,100	10,986	74,211
1977	12	168	32	212	34,398	77,483	11,902	123,783
1978	13	183	34	230	26,063	66,392	15,032	107,487
1979	14	184	32	230	26,063	66,392	15,032	107,487
1980	17	192	55	264	18,359	74,700	9,115	102,174
1981	14	175	67	256	15,452	121,766	24,407	161,625
1982	19	186	46	251	18,425	42,895	19,469	80,789
1983	19	186	46	251	22,901	52,965	26,158	102,024

SOURCE: CEEAF Project Documents Provided to Study Team, August, 1984.

TABLE 26: SENEGAL INDUSTRIAL FISHING TRENDS

Year	<u>Number of Boats</u>		
	Sardine Seiners	Trawlers	Tuna Boats
1970	5	72	50
1971	5	83	46
1972	10	92	48
1973	16	92	44
1974	16	86	42
1975	11	90	42
1976	12	80	42
1977	12	168	32
1978	13	183	34
1979	14	184	32
1980	17	192	55
1981	14	175	67
1982	19	186	46

Year	<u>Catch Per Boat</u>		
	Sardine Seiners	Trawlers	Tuna Boats
1970	2995	124	240
1971	2660	125	401
1972	2187	134	359
1973	2815	162	378
1974	3131	172	461
1975	4166	174	301
1976	3677	239	262
1977	2867	461	372
1978	2005	363	442
1979	1311	406	285
1980	909	634	444
1981	1316	245	291
1982	1205	285	569

TABLE 28: SENEGAL INDUSTRIAL FISHING TRENDS (CONTINUED)

<u>Total Landings in MT</u>		
Sardine Seiners	Trawlers	Tuna Boats
14776	8946	12020
13299	10344	18461
21870	12299	17210
45036	14879	16642
50098	14761	19366
45821	15691	12656
44125	19100	10986
34398	77483	11902
26063	66392	15032
18359	74700	9115
15452	121766	24407
18425	42895	19469
22901	52965	26158

SOURCE: Table 27

The catch decreased in 1981 and 1982 to under 300 mt/year (the meaning of these figures is admittedly open to question since some of these trawlers are fishing for shrimp as well as demersals). Per year catch for tuna boats fell substantially in 1981 to 290 mt/year, rebounding in 1982 to over 568 mt per year. Because of the mobility of the tuna stocks, however, these numbers do not clearly indicate whether the stock is overexploited in Senegalese waters or in fishing grounds of neighboring nations. These figures would seem to corroborate the data on catch shown earlier. Those figures showed that the Senegalese catch of small pelagics in the Cape Verde Coastal sub-region was substantially down from 1977 to 1983. Demersal catch moved down until 1981 and now seems to be coming back. Mackerel catch was diminishing until 1982 when overall catch sharply increased. Whether or not this suggests that the demersal fisheries are rebounding is open to question as data from several more years will be required to adequately assess any of these trends.

5.2 Mauritania

Data on fishing effort in Mauritania waters is somewhat more limited than that available for Senegal . Table 29 summarizes, on the basis of CECAF project estimates, the types of locally based vessels fishing in Mauritania waters in 1976, 1979 and 1981. The appearance of distant water trawlers is due to the change in government policy away from licenses and toward joint ventures.

TABLE 29: APPROXIMATE NUMBER OF LOCALLY BASED VESSELS

	<u>Distant Water Trawlers</u>	<u>Trawlers</u>	<u>Purse Seiners</u>	<u>Gillnetters</u>	<u>Canoes</u>
1979	0	10	10	10	145
1981	57	15	10	10	132

Our most up-to-date information on vessel activity in Mauritania is based upon CECAF research and project estimates for the year 1983. Nine key joint venture companies now have shore facilities at the key landing port of Noudibou. Table 30 lists the parties in the key joint ventures and the number and types of industrial boats each company has been allocated.

TABLE 30: MAJOR JOINT VENTURE COMPANIES IN MAURITANIA, 1983

<u>Company Name</u>	<u>Partners</u>	<u>Vessel, Number & Type</u>
Salimaureu	(Libya)	4 Freezer Trawlers 5 Ice Trawlers (+3)
Sofrima	(None)	16 Ice Trawlers (6 Japanese, & 10 French) 2 Freezer Trawlers (Cuban)
MSP	(None)	3 Ice Trawlers 3 Spanish Trawlers Chartered
Samip	(Iraq)	4 Pelagic Trawlers (Soviet- (Iraq Co.) All fish sold to Iraq @ \$320/ton
Mausov	(Soviet Union)	13 Super Atlantiks 7 Atlantiks 8 BMRT 6 SRTM

Further information, presented in Table 31, for the year 1983 suggests the following breakdown by country and types of vessels fishing with licenses in Mauritanian waters.

TABLE 31

	<u>Trawler Pelagic</u>	<u>Trawler Demersal</u>	<u>Purse Seiner</u>	<u>Tuna</u>	<u>Shrimps</u>	<u>Lobster</u>	<u>Other</u>
Soviet Union	62	17					79
Mauritania		74					74
Spain	1	10	4		2		17
Korea		19					19
Bulgaria	5						5
Romania	12						12
E. Germany	16	6					11
Other	11	12					1 24
France						10	10
TOTAL	107	138	4		2	10	1 262

This shows a substantial increase in the number of foreign vessels licensed to fish in Mauritanian waters. Clearly, better data is required.

Table 31 shows that the total number of Soviet vessels fishing is only slightly higher than the number for Mauritania. Table 32, however, presents the comparison of the fishing fleet by nation, the number of vessels and percentage of vessels, with the total GRT of the vessels and % of GRT. These data show that while the Soviet bloc provides only 45% of the total number of fishing vessels in Mauritanian waters, they make up over 75% of the total GRT.

TABLE 32: COMPARISON OF FOREIGN FLEETS OPERATING IN MAURITANIA'S EEZ DURING 1983

	<u>Number of Vessels</u>	<u>% of total Vessels</u>	<u>GRT</u>	<u>% GRT</u>
Soviet Union	79	30%	179,037	51%
Mauritania	74	28%	24,343	7%
F. Germany	22	8%	40,589	11.6%
Spain	17	6.5%	4,352	1%
Romania	12	4.6%	36,952	10.5%
Bulgaria	5	2%	12,049	3%
<u>Other</u>	<u>53</u>	<u>20%</u>	<u>52,833</u>	<u>15%</u>
	262		350,155	

As shown in Section 4.0 the Soviets reported catch in Mauritanian waters was on the order of 140,000 mt in 1982. If, however, one estimates catch based on the number and size of Soviet vessels licensed to fish in that area for the joint venture Mausov, one gets a starkly different picture.

We know that of the 34 Soviet vessels to be chartered by Mausov in 1984, 13 are Super Atlantiks, 7 are Atlantiks, 8 are BMRT's and 6 are SRIM's. The harvesting capacity of these ships is as follows:

Super Atlantiks	> 80 mt/day
Atlantiks	60 - 80 mt/day
BMRT's	50 - 80 mt/day
SRIM's	~ 40 mt/day

If we assume only 150 fishing days per year for these ships and the minimum catch rates, yearly catch would be:

13 Super Atlantiks @ 80 mt/day for 150 days	= 156,000 mt
7 Atlantiks @ 60 mt/day for 150 days	= 63,000 mt
8 BMRT's @ 50 mt/day for 150 days	= 60,000 mt
6 SRIM's @ 40 mt/day for 150 days	= 36,000 mt
TOTAL	= 315,000 mt

This is a rough estimate, but stands in stark contrast to the estimates of reported Soviet catch (about 140,000 MT) in Mauritania's EEZ. A further estimate can be generated based on data obtained at CECAF regarding ships licensed to fish in Mauritanian waters and estimates of catch in these waters for 1983. Tables 33 and 34, combining total data on the size and power of vessels licensed with total catch, suggest that the Soviet Bloc catch is approximately 430,000 mt.

TABLE 33: ESTIMATED CATCHES IN MAURITANIAN WATERS IN 1983, ALL VESSELS ACCORDING TO ENGINE POWER

<u>Engine Power</u>	<u>Demersal</u>	<u>Engine Power</u>	<u>Pelagic</u>
	<u>MT</u>		<u>MT</u>
<900 hp	18363	1000 - 1999 hp	9287
900 - 1499 hp	8958	2000 - 2999 hp	164030
>1499 ph	13742	>2999 hp	297883

TABLE 34: NUMBER OF BOATS LICENSED IN MAURITANIAN WATERS IN 1983

	<u>Demersal Trawlers</u>			<u>TOTAL</u>
	<u><900 hp</u>	<u>900-1499 hp</u>	<u>>1500 hp</u>	
Mauritania	42	17	15	74
Soviet Bloc	6	13	4	23
Others	17	12	12	<u>41</u>
				138

	<u>Pelagic Fish Vessels</u>			<u>TOTAL</u>
	<u><900 hp</u>	<u>900-1499 hp</u>	<u>>1500 hp</u>	
Soviet Bloc	20	32	43	95
Others	3	5	4	<u>12</u>
				107

SOURCE: CECAF Project Estimates, Dakar, Senegal, 1984.

If one takes simple percentages of boats licensed in Mauritanian waters, the Soviet Bloc catch estimate is as follows:

Demersal Catch = 1695 mt (<900 hp) + 2773 mt (900 - 1499 hp)
+ 1773 mt (>1500 hp) = 6241 mt

Pelagic Catch = 8075 mt (<1999 hp) + 141864 mt (2000 - 2999 hp)
+ 272531 mt (>3000 hp) = 422470 mt

This provides a total estimated Soviet catch of around 430,000 mt. This would suggest that reported Soviet catch is quite low compared with estimates made on the basis of Soviet fishing power.

5.3 Guinea-Bissau

Data on the number of vessels fishing in Guinea-Bissau's waters is shown in Table 35 for the years 1974-1980. Data for the years beyond 1980 is not available. The number of vessels fishing in Bissau waters peaked in 1978 at 203, of which 92 were Soviet. In 1980, the total number of vessels was 86 of which only 33 were Soviet.

Table 36 provides data for 1982 for the catch of the Soviet fleet. This table suggests that an average of 17 Soviet vessels fished in Guinea Bissau waters at any given time and caught a total of 131,908 mt of fish. These numbers are based on Soviet Trip Reports.

TABLE 35: NUMBERS, TYPES AND ORIGINS OF VESSELS FISHING WITHIN GUINEA BISSAU'S EEZ 1974 TO 1980

Vessel Types and Origins	1974	1975	1976	1977	1978	1979	1980
Tuna Seiners:							
France				24	24	24	
Bottom trawlers							
France				1	2	7	6
USSR					43	29	24
Portugal				3	4	4	1
Italy				5	9	6	2
Japan							1
Senegal					3	3	
Panama					6	6	
South Korea				2	2		
Ghana				1	1		
Holland							4
Greece							2
Sweden							1
EEC							8
Sub-totals				12	70	55	49
Seiners							
France				1	4	3	
USSR					42	27	9
Ghana				3	3		
Holland		14	14	14	14		
Sub-totals		14	14	18	63	30	9

TABLE 35: (Continued)

Vessel Types and Origins	1974	1975	1976	1977	1978	1979	1980
Pelagic trawlers							
France					2	3	1
Mixed (shrimp & fish) trawlers							
Guinea-Bissau	7	14	14	14	5	4	9
France				2	3	9	8
USSR		2	1	7	7	8	
Japan					1	3	
Sub-totals:	7	16	15	23	16	24	67
Shrimp trawlers							
France				12	15	7	7
Portugal				1	1		
Senegal				8	12	9	
EEC							3
Sub-totals				21	28	16	10
TOTALS (all vessels)	7	30	29	98	203	152	86

SOURCE: Monoyer, Ph. J, Prosper M'Fina and M. Lamin Sarr
Rapport de Mission En Guinea-Bissau, Project Copace,
INT/79/019 CE. No. 124, Dakar, Senegal

TABLE 36: USSR OFFSHORE FLEET: TRIP SHEET SUMMARIES OF CATCH AND EFFECT (1), 1962

Months	# of Vessels	# of Fishing Days	Posano/Jack Lichia spp.	Tigerfish	Horse Mackerel (Carau)	Moonfish	Horse Mackerel (Cavala)	Tuna	Sardines	Catfish	Croakers	Threadfin	Sole	Cutlassfish	Shrimp	Shark	Sardines	Posano/Jack	Others	TOTAL
January	18	253	7	2926.5	3,293.5	81	58.5	8	1,178	4							66	188	37	9,965.2(2)
February	27	396	44	821	11,822.2	161	16	6	494								78	74	537	14,829.2(2)
March	35	146	113	1231	8,411.4	41	3	7	367					15	58		162	235	584	11,229.4(2)
April	21	291	12	8911	889.8	83	7	12	1,381					63			28	45	289	11,552.8(2)
May	14	224	12	8899.5	482.5	68.5	25.5	6	668					74.5			18	46		18,284.5(2)
June	7	157	13	8888	76	38	44		35		1			86	168			47	188	9,584.8(2)
July	18	129		5895	25	3	4	3								767		22	1,133	7,852.8(2)
August	11	194		1589	27	3	14	1	198	166.5	185.8		6.3	55.6	924		38.5	2,887.4		5,976.8(2)
September	16	371	6	6283	23.5	42.2	28.4	9	453	175	75	133.7	2.5	56.4	221		9.5	98.4	2,782.5	18,382.1(2)
October	22	421	6	8849	156.6	185.5	4.7	2	188	212.1	171.9	247.2	4	54.8	538.4		6	98.5	4,888.5	13,929.2(2)
November	21	488	15.4	6898.5	42	89.6	18	9	118	123	114.2	84.3	6.1	69.6	186			112.2	6,627.5	14,489.4(2)
December																				12,686.8(1)

(1) On the average vessels fished 9 hours and fifty minutes per day and made 3.8 trawls.

(2) 80% sample

(3) Trip sheets were not available for December so the catch was estimated from reports submitted by the Russian Fisheries

SOURCE: Compiled from Soviet trip sheets

Kaczynski suggests that while the Soviet fleet reported catch data of 132,000 mt in 1982 (and only 70,000 mt in 1983), when operating at a normal level of effort the fleet should be expected to catch on the order of 2 to 3 times that amount. This would suggest that a total of 256,000 - 512,000 tons of fish is being taken by Soviet ships in Guinea-Bissau waters every year. This underreporting has a tremendous effect on the collection of license fees as discussed in Section 8.0.

5.4 Guinea (Conakry)

At this time, our information on Guinea (Conakry) is very limited. In 1980, it was reported that some 80 foreign vessels, 10 local industrial and 200 artisanal vessels, were operating in Guinean waters. No further information is available at this time.

5.5 Gambia

At this time, our information on Gambia is very limited. In 1983, however, 1 Greek, 6 Ghanaian and 8 Senegalese vessels were licensed to fish in Gambian waters.

5.6 Fishing Strategy of Eastern Bloc Long-Range Fleets in the CECAP Region

Discussion in the preceding sections of this study indicates the dominant role and impact on the CECAP region fisheries of Soviet bloc distant-water fleets. This area of distant-water fishing operations is an important part of an overall ocean expansion of Soviet Bloc fisheries fleets, starting in the mid 1960's.

Initially, only Soviet and Polish trawlers were directed to South Sahara, Mauritanian and Senegalese waters in search of demersal fish, mostly hake, mackerel and herring-like species (sardine, anchovy). During the period of 1965-1967, individual trawlers were sent to operate to the extent of their own endurance, i.e., until fish holds were full and

packing material, fuel, and fresh water were depleted. Increasingly, however, these ships began to resupply in Dakar, mainly with fuel, fresh water and some fresh food.

With growing catches and experience gained in the area, Soviet bloc fleet operators introduced a new form of fleet management, using motherships (usually converted cargo vessels) to support CEEAF area fishing activities. This allowed them to greatly increase fishing time, extend the harvest season and to operate in more coastal grounds than ever before. By adding motherships, fishing operations could be carried out for up to 150 days without returning to such distant land support bases like Murmansk, Kaliningrad, Odessa, Gdynia Szczecin or Rostock. The use of motherships allowed trawlers to unload at least once for each trip, thus increasing the fishing capability of these boats by a factor of two each fishing season.

The task of motherships is relatively simple: to supply fuel, fresh water, food, packing material (boxes, barrels, bags), and receive fish or fish products from the catcher trawlers. With time, motherships began to reprocess some fish into more familiarized products such as dressed fish, fillets, fish meal and oil. After the mothership is fully loaded with the fish cargo, she can return home, with all of the catcher trawlers.

When stern trawlers with freezing and processing capabilities were introduced at the beginning of the 1970's, the total catch in Northwest African waters grew and support operations expanded by adding newer, specially designed motherships to assist in large-scale operations in the area.

To improve overall efficiency of fishing activities, Soviet bloc operators have chosen a so-called expeditionary fleet method of operation in which one mothership supports a certain number (usually 6-12 vessels) of

trawlers. This fleet operates as one-unit, with a fleet Commander onboard the mothership coordinating the work of all vessels.

In the early 1970's, 6 Communist bloc nations were already developing fishing activities in the CECAF region. Based on an autarchic system of operation, Soviet bloc fleets enjoying the freedom of fisheries conditions, were free to operate in any area and use any vessels or mode of operation. This resulted in quick growth of catch in the period preceeding 200 mile economic zone as shown in Table 37.

TABLE 37: CATCH OF COMMUNIST BLOC FLEETS IN CECAF REGION 1973 - 1982

<u>Country</u>	<u>1973</u>	<u>1977</u>	<u>1980</u>	<u>1982</u>
Bulgaria	10.0	48.5	50.0	6.6
Cuba	10.6	20.7	9.3	7.1
East Germany	--	18.8	87.0	95.0
Poland	34.3	203.5	78.8	--
Romania	44.0	78.4	77.5	84.4
U.S.S.R.	<u>942.7</u>	<u>1,134.4</u>	<u>942.3</u>	<u>955.8</u>
TOTAL:	1,041.6	1,504.3	1,244.9	1,148.9

In the mid 1970's, the Soviet Union introduced specialized motherships for fishmeal production with increased processing and extended support capabilities. The most dramatic example of this effort was the commissioning of the largest factory mothership in the world, the 44,000 GRT "Wostok" with 14 Nadjezhdia type catcher boats onboard. This floating factory is used in the northwest and southwest African waters supporting the pelagic (primarily) and the demersal fishery. This ship can process up to 400 tons of fish daily into canned fish, fillets, dressed fish, salted, smoked products, or fish meal and oil. As Table 37 shows, Soviet bloc

countries had increased their catch in that area up to 1,500,000 m. tons in 1977.

With growing numbers of fishing vessels used (in mid 1970's, there were approximately 300 Soviet bloc vessels employed in the area) in the CECAF area, some fleets were unable to secure sufficient support to keep operations going without interruption. This led to extended cooperation between individual Soviet bloc fleets. Specifically, Soviet motherships have provided support to Polish, East German and Bulgarian catcher boats. In exchange, they unload some part of fish catch to Soviet vessels, thus paying in kind for fuel, fresh water and other supplies.

Another important step in Soviet bloc long-range fisheries was the introduction of refrigerated fish carriers. These vessels took fish products from motherships and delivered the cargo back to Soviet bloc home ports as well as to the western ports, for export.

Factory trawlers unload fish both to the mothership and to transport vessels. These trawlers also deliver fish to their home ports or to foreign ports for export, frequently the case when these transport ships are chartered from foreign countries. These are usually Danish, Greek, French, Swedish, or other vessels on voyage or time charter arrangements. Because of the size of the fleet involved, and the tremendous cost of operation, Soviet bloc fleets must work continuously with the highest possible daily catch rates, utilizing the whole fishing season. Since fishery resources in the CECAF region are highly migratory (such as sardine, hake, jack mackerel and others), it is necessary for the Soviet bloc vessels to follow these migrations and thus operate in a variety of fishing grounds during one expedition.

Ideally, they begin operations in Mauritanian waters, and following the migration patterns of the target species, they operate through Senegalese, Gambian, and Guinea-Bissau's fishing grounds. Within the new ocean regime, these fleets are restructuring their operation methods and vessels used.

During a recent meeting with the Soviet delegation in Bissau (August, 1984), it became clear that it is in the Soviet Union's interest to employ older ships in CEEAF waters, since newer ones are working in grounds where high engine power and seaworthiness is needed (antarctic and open ocean fisheries). Older BMRT's can still be efficient in African waters and there are about 500 of these vessels in Soviet bloc fleets. It is, therefore, extremely important for the Soviet Union to have these grounds accessible in the near future, both for older vessels as well as for newer ones currently built for the Soviet Union in East German and Polish shipyards.

Figure 24 shows the general framework of Soviet bloc fleet activities in the CEEAF area:

SOVIET BLOC FLEET ACTIVITIES IN THE CECAF AREA.

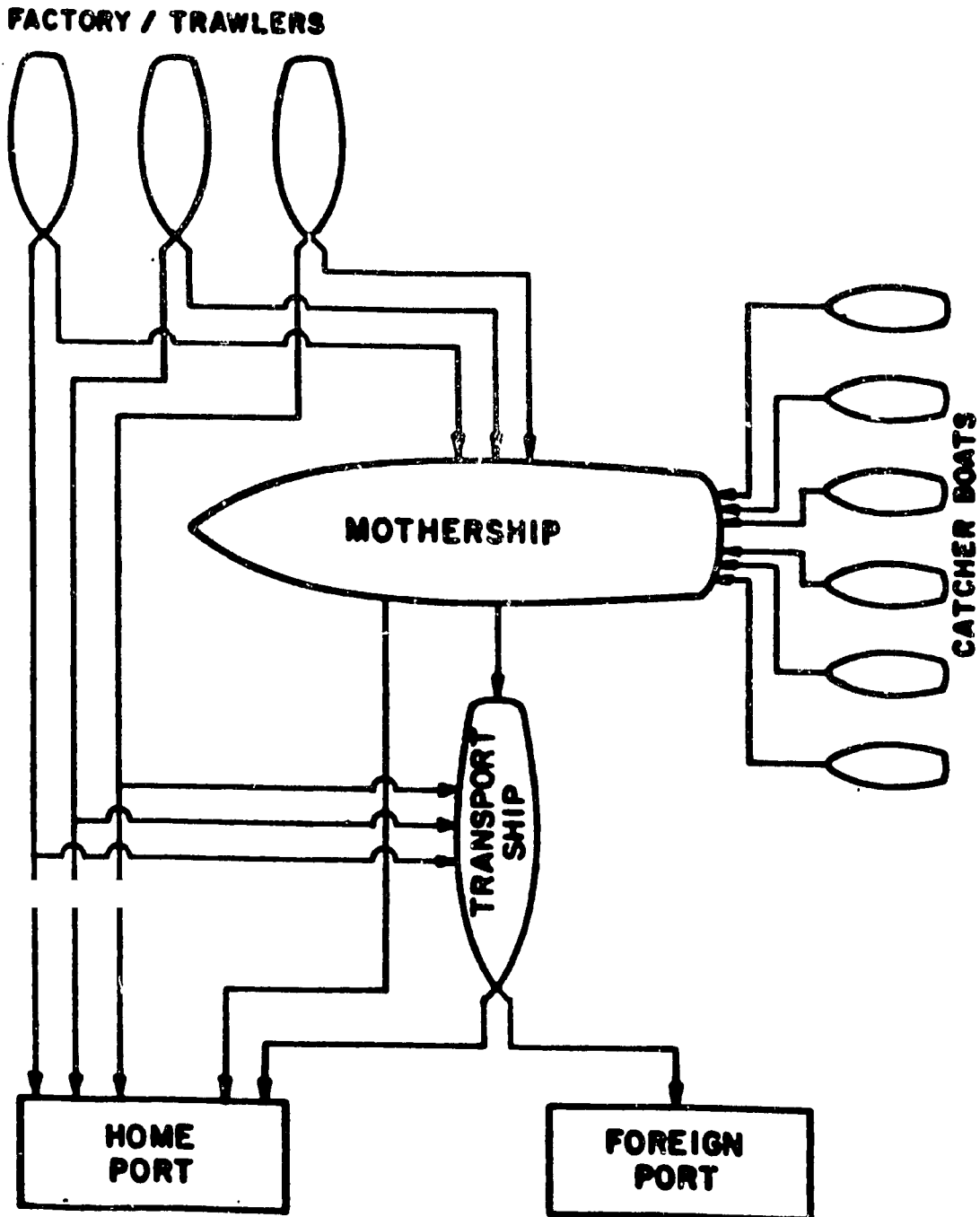


FIG: 24 ORGANIGRAM OF THE SOVIET BLOC - DISTANT-WATER EXPEDITIONARY FLEET OPERATION SYSTEM

5.7 Footnotes

20. Data on Mauritania was obtained from very preliminary CEEAF Project Documents provided to the Study Team in August, 1984. Report drafts had not even been developed yet by CEEAF on the basis of the information provided here.

6.0 ECONOMIC IMPORTANCE OF THE NORTHWEST AFRICAN FISHERIES FOR THE SOVIET UNION

6.1 Distant-Water Fisheries of the Soviet Bloc: Their Global and Regional Significance

In the past three decades, there has been a tremendous expansion of Soviet Bloc ocean fisheries. From 1952-1983, the nominal catch of the Communist Countries grew from 2 to nearly 11 million metric tons. These developments were in accordance with the centrally planned nature of the Soviet bloc economies and their massive investment in their fishery industries. The spur to this expansion was the Communist countries' need to meet the continuing short-fall between existing protein requirements and agricultural production.

A measure of their success can be taken from the fact that fish and fish products are an established part of the average Russian's and other Communist societies' diet and that in the Soviet Union, the fishing industry provides around 1/3 of the total annual consumption of animal protein. Eastern bloc countries, such as the Soviet Union or Poland, are also among the most advanced distant-water fishing nations as measured by technology range, engaged capital and manpower.

Both the growing demand for marine originated protein and large investments in the harvesting/processing capabilities, contributed to the increased dependence of the Soviet Union and other Eastern countries on the overseas resources currently within the fishery conservation zones of other nations.

The worldwide operations of the Eastern fleets and their continuous access to all ocean areas make it an important part of the Soviet bloc's relations with both developed and developing nations in the international political arena.

Although the 200 mile economic zone initially affected these countries total harvest levels, its adverse impact on catch volumes has already been largely neutralized. Table 38 shows that the current Soviet marine catch is slightly higher than before the global extension of national jurisdiction (1977-78). Also, Romania and Cuba take more now (1982) than in 1976. The Soviet Union participates in 87% of the total Eastern bloc marine catch, Poland being the second largest fishing country in the Soviet bloc contributing 6% to the total catch of this group of nations.

One of the significant features of the Soviet bloc's fishery activities is high dependance on overseas fishery resources. Table 39 shows that the Soviet Union, in 1982, took nearly 4 million metric tons of fish and other marine organisms in waters located beyond its own coastal zone.

The Russian distant-water fleet operations have expanded to new ocean areas and new species thus assuring continuous growth of supplies to the domestic fish consumption market and exports.

**TABLE 38: TOTAL MARINE CATCH OF THE SOVIET BLOC, BY COUNTRIES, 1976-1982,
(IN M. TONS)**

Country	1976	1979	1981	1982	% of Total (1982)
U.S.S.R.	9,360,134	9,049,666	8,739,022	9,428,717	87
Poland	726,307	601,153	606,291	604,896	6
GDR	266,115	221,866	228,988	235,767	2
Romania	76,913	179,087	136,648	235,653	2
Cuba	194,100	153,799	164,500	195,300	2
Bulgaria	159,176	89,515	93,445	115,607	1
TOTAL	10,782,745	10,295,224	9,968,914	10,815,940	100

SOURCE: Yearbook of Fisheries Statistics, Vol. 54, 1983.

TABLE 39: THE DISTANT-WATER FISHERIES CATCH OF THE SOVIET UNION DURING 1976-1982

Area	1976	1979	1981	in m. tons	
				1982	% of 1982
Atlantic Northwest	852,681	125,193	113,951	109,185	2.7
Atlantic East Central	1,315,430	526,011	780,597	955,801	23.9
Atlantic Southeast	841,250	850,664	904,000	887,840	22.2
Atlantic Southwest	9,710	2,166	17,200	19,040	0.4
Atlantic Antarctic	247,334	342,151	361,478	452,568	11.3
Indian Ocean (Western Part)	21,970	11,844	29,230	25,640	0.6
Indian Ocean Antarctic	17,400	31,151	149,198	144,803	3.6
Pacific Northwest	650,000	650,000	650,000	650,000	16.2
Pacific Northeast	496,704	210,259	2,589	72,000	1.8
Pacific West	78,020	70,775	62,370	67,830	1.6
Pacific Southeast	-	546,567	604,890	608,020	15.2
Other Areas	-	-	-	-	0.5
TOTAL	3,677,818	3,366,781	3,675,503	3,992,727	100

SOURCE: Yearbook of Fisheries Statistics FAO, Rome, 1983.

Among the most important distant-water fishing grounds where the Soviet fleet is present are waters along the West African coasts, the coastal zone of Japan, open ocean grounds close to the Chilean 200 mile economic zone and the waters of Antarctica, in particular the Scotia Sea, Drake Passage, Falkland Plateau, Burdwood Bank and outer limits of the Argentinian 200 mile economic zone.

It can be seen in Table 40 that the dependence of the U.S.S.R. on foreign fishery resources is very high. In 1976, Russians generated over 40% of their landings from overseas fishing grounds. In 1982, the share of long-range catch in the total marine catch of the Soviet Union grew to 42.3%.

According to official FAO data, in African waters (northern and southern regions), the Soviets took, in 1976, approximately 2,150 thousand metric tons of fish and in 1982, about 1,850 thousand metric tons, i.e., 45% and 46% respectively of their total distant-water catch. These numbers reflect the importance of the African fishery resources to the Soviet Union. In this area, the Northwest African coastal waters are the most productive for the U.S.S.R. and other Soviet Bloc countries.

TABLE 40: THE SHARE OF DISTANT-WATER HARVEST IN THE TOTAL SOVIET MARINE CATCH 1976-1982

Year	Distant-Water (DW) Catch	Total Marine Catch	% DW Total
1976	3,677,818	9,360,134	40.6
1979	3,366,781	9,049,666	37.2
1981	3,675,503	8,739,022	42.1
1982	3,992,727	9,428,717	42.3

As Table 41 shows, they are steadily increasing their catches in NW African waters as well as their share in all nation's activities in this area. For example, in 1976, they harvested 1,339 thousand metric tons of fish from the CEEAF area (37% of the overall catch by all nations). In 1979, their landings were only 898 thousand metric tons (33% of the total CEEAF fishery), while in 1982, the catch grew to 1,143 thousand metric tons, i.e., 35% of the CEEAF catch.

TABLE 41: THE CATCH OF THE SOVIET BLOC FLEETS IN THE CEEAF AREA (1976-1982)

Country	1976	1979	1981	in m. tons 1982
U.S.S.R.	1,134,433	769,500	780,579	955,800
East Germany	7,461	8,524	103,904	95,100
Romania	35,804	45,507	85,567	84,400
Cuba	6,400	7,500	8,700	7,100
Bulgaria	25,405	-	8,996	6,600
Poland	129,412	67,703	1,632	-
TOTAL	1,338,915	898,734	989,396	1,143,000
TOTAL CEEAF CATCH:	3,625,632	2,752,457	3,217,688	3,195,851

6.2 The Place of Fisheries in the Soviet Food Production System

The assessment of present and future activities of Soviet Bloc distant-water fishing fleets, in the world ocean in general and in the Northwest African waters in particular, cannot be separated from the complex internal problems existing in the national economies of these states or from external factors which, especially in recent years, are of increasing importance in the development of the marine fisheries of that region.

Agriculture is still unable to supply a sufficient volume of animal protein to the population. Despite achievements in this field, there is a continuing food crisis in the Soviet Bloc and serious food supply problems are forecast in most of these countries both in the near future as well as in the long run.

In the U.S.S.R., the consecutive crop failures of 1973, 1974, 1975, 1979 and 1980 led to the beginning of a troublesome history of Soviet grain imports, at a time and a manner which placed a heavy burden upon the stability of the global food market and upon the world food system.

It should be noted that grain setbacks in the Soviet Union were not unusual. In 1962, the Soviet grain harvest fell 30 million metric tons below trend, and in 1965, 24 million metric tons below expectations. In those earlier years, however, most of the shortfall was absorbed at profound human cost, within the borders of the Soviet Union through reduced feeding of grain to livestock, so the stability of the world market was not endangered. However, the rapid deterioration of food supplies forced Soviet leaders to compensate for setbacks at home with massive grain purchases from the world market, and Russia's grain imports in 1975/76

surged to a record level of 25.1 million metric tons. In 1976, the Russian harvest fell 21 million metric tons below target, and Soviet net imports of grain reached 16.6 million metric tons in 1977.

By 1979, following three very good years of weather throughout most of the world, Soviet grain imports continued to exceed international suppliers' expectations. Despite a record harvest in 1978, (237 million metric tons), Soviet grain imports in 1978/79 remained at the previous year's very high level. Following another bad harvest in 1979, Soviet imports in 1979/80 began their remarkable surge to an unanticipated level of more than 32 million metric tons, mostly feed grain, double the previous year's total and the largest single national grain import requirement in history.

Due to the shortage of feeds and price increases, animal breeding has become less economical and more difficult in the U.S.S.R. Grain shortages have led to a sharp decrease in the number of animals and consequently, a drop in consumption of meat. It was estimated that in 1976 alone, the per capita consumption of meat in the U.S.S.R declined approximately 25
22
percent.

In these circumstances, the Soviet Government is emphasizing the consumption of fish as an important component and substitute for animal meats in the Soviet market. State plans foresee continuing growth of fish supplies and the long-term expansion of the Russian fishery industry. Annual per capita consumption, already high, will grow from 17.6 kgs in 1980 to 19.0 kgs in 1990. Table 42 summarizes the general growth of fish consumption per capita in the Soviet Union.

TABLE 42: ANNUAL PER CAPITA CONSUMPTION OF FISH IN THE SOVIET UNION

<u>Year</u>	<u>Consumption per capita in kgs</u>
1950	7.0
1960	9.9
1965	12.6
1970	15.4
1975	16.8
1980	17.6
1985	18.2
1990	19.0

SOURCE: MacSween, I.M., Markets for Fish and Fishery Products in Eastern Europe, FAO Fisheries Technical Paper No. 241, Rome, 1983.

At present, the Soviet fishing industry supplies about 30 percent of the volume of all protein products and great efforts are being made to increase this percentage. Moreover, the fishing industry contributes to the expansion of exports as well as fishmeal supplies for national agriculture.

Taking into account the protein contents in fish and land animals, and on the basis of Sysoev's methodology ²³ of economic evaluation, we find that the total volume of the 1982 Soviet catch released the national agriculture from the necessity of raising 42 million units of cattle. The actual annual catch of the U.S.S.R. is equivalent to about 30 percent of the total cattle stock of the Soviet/state agriculture.

Soviet writers state that it takes a capital investment of 2,000-2,500 Rubles to produce 100 kilograms of light-weight beef. But for a similar amount of fish, only about 1,500-1,700 Rubles are necessary. ²⁴ Similarly, less manpower is necessary to provide fish protein products than those derived from land animals.

The total demand for fishmeal in the Soviet Union is about 2,500,000 metric tons per year. The current (1982) production of this commodity by the Russian fishery industry is 600,000 metric tons. It is expected that the Soviet fishery sector will be able to supply about 1,2150,000 metric tons in the 1990's.

However, the costs of fish protein production are actually as high as the animal protein delivered by agriculture. For example, the price of 1 kg of fish protein during the period of 1970-75 increased over two times, and in 1976 became equal to the cost of agricultural protein. In 1982, the

cost of animal protein became lower in the Soviet Bloc countries than sea-originated protein. Of course, these comparisons are based on official market prices for fish in the U.S.S.R., which are kept at artificially low levels.

The main reasons for this negative trend are:

- a) increased fuel prices and costs,
- b) growth of shipbuilding costs,
- c) increased distances between exploited fishing grounds and base ports,
- d) increasing share of costly distant-water catches in total fish supplies.

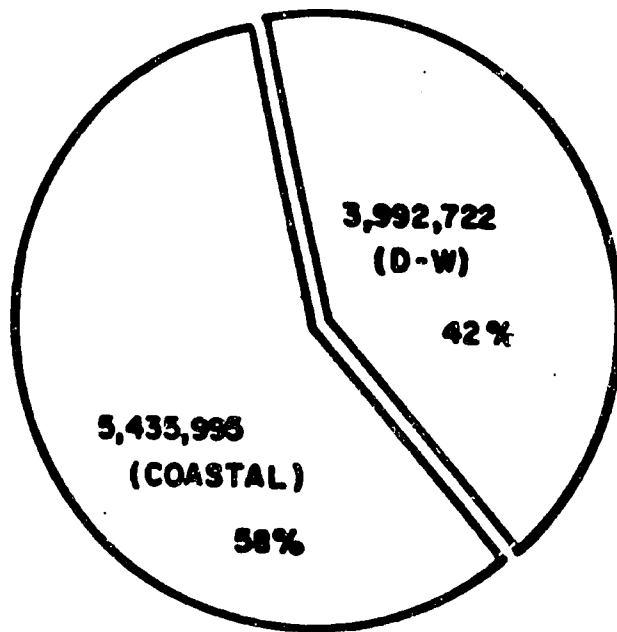
As a result, fish products became more expensive than the price of beef sold in the retail stores. The argument of Soviet planners for developing industrial fisheries based on the premise that they are less expensive than animal protein production by local agriculture, is consequently no longer valid.

6.3 Economic Benefits of the Northwest African Fisheries to Soviet Fishfood and Meal Supplies

6.3.1 Impacts on Consumption of Fish in the Soviet Market

As Table 35 shows, in 1982 the total Soviet harvest of marine organisms was reported to be 9,428,717 metric tons. Russian distant-water catch was 3,992,722 tons, i.e., 42% of the total (Figure 25).

Fig. 25 SOVIET DISTANT - WATER (D-W) AND COASTAL CATCH OF MARINE ORGANISMS IN 1982 (in metric tons)



Russian long-range fishery activity is heavily concentrated in African waters mainly along the northwest and southwest coasts. In 1982, Soviet fleets reportedly took 1,843,641 metric tons of fish and other species in this region. This means that African waters contributed 20% to the total Soviet catch in 1982. At the same time, this region is generating 46% of the Russian distant-water catch. The northwest grounds, where approximately 955,801 metric tons were taken by Soviets in 1982, make up 24% of the total distant-water fishery (Figures 26 and 27).

Fig. 26 RUSSIAN CATCH IN WEST AFRICAN WATERS AS A COMPONENT OF THEIR D-W FISHERY (in metric tons) 1982.

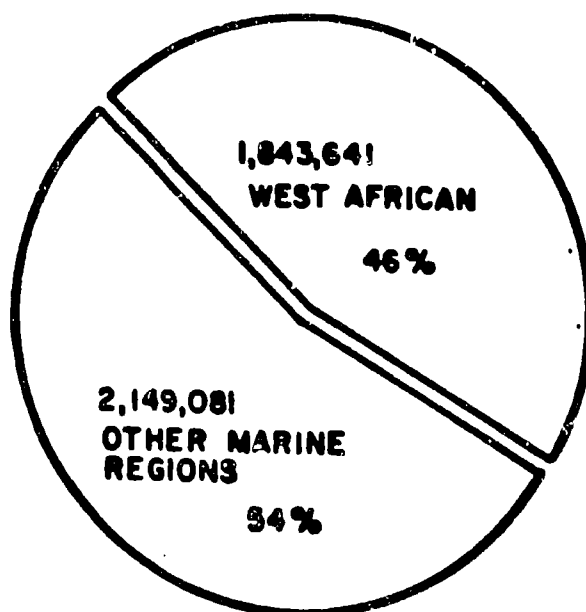
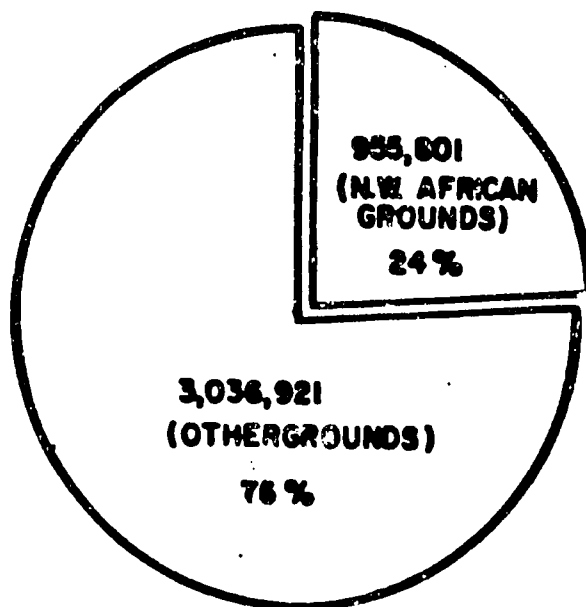


Fig. 27 NORTHWEST AFRICAN CATCH OF THE U.S.S.R. AS A COMPONENT OF ITS TOTAL D-W HARVEST IN 1982.



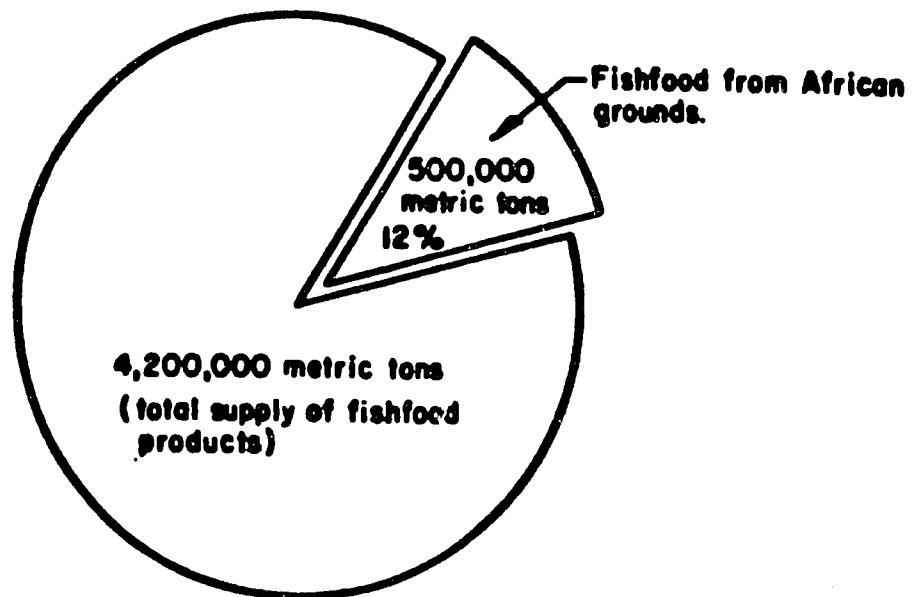
It should be noted that Soviet Northwest African fish catch - according to our estimates - is substantially underreported. Subsequently, the role of this region is much higher than official Soviet's statistics may suggest. There are at least two situations confirming our thesis: in Moroccan waters, abundant in sardine, massive illegal Soviet mothership operations take place,²⁵ with continued underreporting and illegal fishing in the fishery zone of Guinea-Bissau.²⁶ If the Soviet Union is totally denied access to Northwest African fishery resources (currently a very unrealistic assumption), its total catch will be reduced by at least 10%, i.e., about 1 million metric tons.

The composition of these supplies has not been estimated in detail, but it is assumed that Russians recover about 50% of their catch in the form of human grade fish products and the remaining part is reduced to fishmeal and oil. It is therefore accepted in this study that Russians generate about 500,000 metric tons of finished products (fillets, dressed fish, whole fish - all frozen) as well as salted and canned fish. This assumption is based on Soviet recovery ratios reported to the Guinea-Bissau Government in 1983.

According to the FAO (Market for Fish and Fishery Products in Eastern Europe, FAO Fisheries Technical Paper No. 241, Rome, 1983), apparent Soviet consumption of fish products in 1985 (Russian exports and imports of fishery commodities included) will be 4,200,000 metric tons.

If Soviet Northwest African catch levels are maintained, therefore, fisheries in this region will contribute 12% to all Soviet fishfood supplies in their domestic market (Figure 28).

Fig. 28 CONTRIBUTION OF THE NORTHWEST AFRICAN FISHERY TO THE FISHFOOD SUPPLIES IN THE SOVIET MARKET (1982)



Data on exports of Northwest African fish products from the Soviet Union is not presently available, but it is assumed on the basis of the Guinea-Bissau experience that about 20% of the Russian final production is sold to Spain, Portugal, Italy and to some African nations.

Since exports of fish serve to generate hard currency used for imports of other desirable fishfood by the Soviet market, we assume that the Soviet international trade in fishery commodities does not substantially affect the relation between total Soviet fishfood production and consumption.

6.3.2 Northwest African Fishing and Soviet Fishmeal Production

Until 1960, fishmeal production in the Soviet Union was based on raw material composed mainly of fish processing offals and to a small degree on non-edible (trash) fish species, for example, disqualified herring or spats. Fishmeal was produced only in land fishmeal plants.

With expansion of the distant-water fleet activities where factory trawlers and motherships are used, fishmeal production gradually moved to the sea. Also, an increasing volume of fresh food grade fish catch has been reduced to fishmeal onboard these vessels. This trend intensified during the ensuing years, when increased proportions of lower market value species caught (jack mackerel, sardinella, triggerfish and others) by Soviet vessels operating in the Northwest African fishing grounds have been reduced to fishmeal. During 1979-1982, fishmeal production in the Soviet Union increased from 510 to 600 thousand metric tons. In 1982, Russia became the third largest world producer of fishmeal, after Japan and Chile.

It is important to note that during 1968-70, only 30-32% of raw fish material were reduced to fishmeal in the Soviet Union. However, in the ensuing years, the distant-water fleet began to process up to 49% of its total catch into fishmeal. In 1982, of the total marine catch of 9,428,717 metric tons, about 4,620,000 metric tons were reduced into fishmeal.

According to official Russian information provided to FAO, Soviet fishmeal production in 1982 was equal to 600,000 metric tons. When considering reported Soviet catch in Northwest African waters and assumed shares of edible and non-edible fish caught in that area, one can expect that about 500,000 metric tons of fish raw material is reduced to fishmeal. With a reduction ratio of 5:1, the final fishmeal production will be on the order of 100,000 metric tons per year.

However, taking into account the underestimation of Soviet catch in this region and illegal fishing of less valuable fishmeal species, such as triggerfish, jack mackerel or sardinella, we assume that at least another 100,000 metric tons of fishmeal is generated by Soviet Northwest African fishing. Figure 29 depicts fishmeal production based on reported catch and on our estimates considering underreporting and illegal fishing operations.

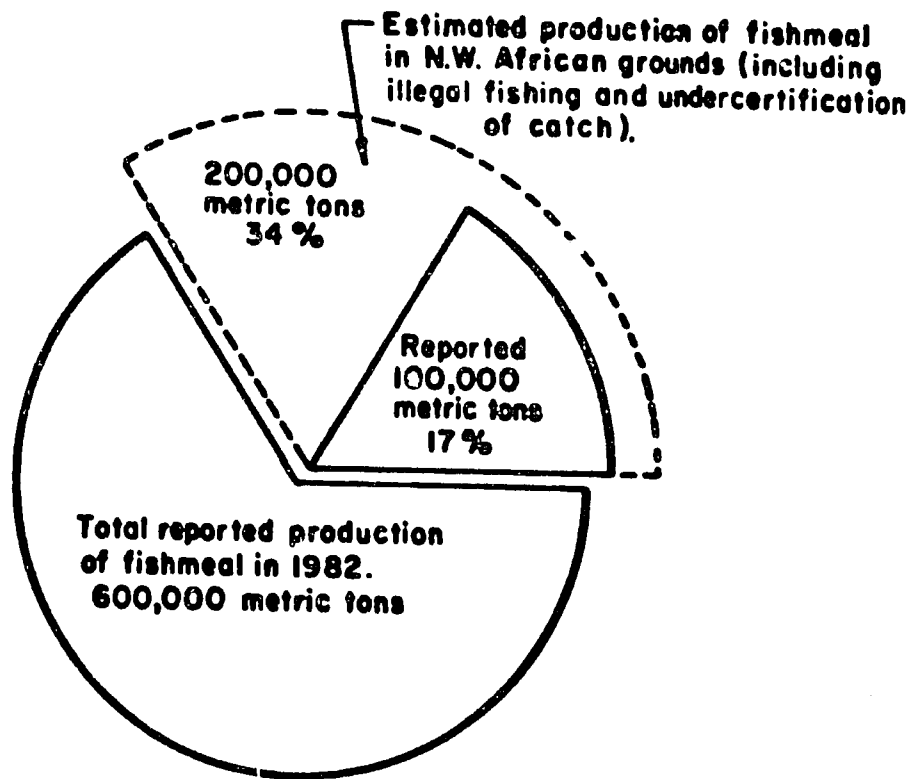


Fig. 29 FISHMEAL PRODUCTION IN THE U.S.S.R. AND NORTHWEST AFRICAN SHARE IN 1982.

The Northwest African fishing grounds contribute 17-34% of the fishmeal utilized by Soviet agriculture. It can therefore be concluded that West African living marine resources are contributing substantially to fishfood and meal supplies in the Soviet Union. Curtailment of these fisheries would seriously affect the food security of the U.S.S.R. and force it to increase imports of grain, fishmeal and fishfood commodities.

If their fishing activities were curtailed in the area, the Russians would try to move their fleets from Northwest Africa to other, already exploited regions (Namibia, Southwest Atlantic, Southeast Pacific) but one must expect that also they will intensify an open ocean fishing (beyond 200 mile zone) along Northwest African coasts as well as increase fishery activities in ex-Spanish Sahara waters. Efforts would also be made to increase the number of vessels in joint ventures with Mauritania, Spain (Canary Islands), Guinea-Bissau and Sierra Leone.

In relocating their fleet, the Soviets would face many difficulties, particularly for the Mayakovskij, Luchegorsk and Kronshtadt type large factory trawlers, which are employed successfully in the traditional Northwest African grounds. Alternative fishing grounds in other parts of the world are accessible only for more modern, potent and reliable super factory ships such as Super Atlantik, Sprut, or Gorizont class trawlers, but these ships are already fully utilized.

There would also be problems in employment of mothership fleets composed of smaller catchers supported entirely by floating fishmeal or canning ships if Northwest African grounds are restricted for Soviet fishing. These and other impacts should be assessed carefully in a more detailed study, on Russian ocean going fleet capabilities and alternative employment opportunities for various types of ships.

6.4 Footnotes

21. Kaczynski, V., Distant-water of the East European Countries: Their Present Economic Status and Future Activities in the Northeast Pacific, *Ocean Development and International Law Journal*, Vol. 6, 1979.
22. Schroeder G.E., Severin B.S., Soviet Consumption and Income Policies in Perspective in: *The Soviet Economy in a New Perspective*", Washington D.C., 1976.
23. Sysoev, N.F., *Economics of the Soviet Fisheries Industry*, Moscow, 1970.
24. Mikhailov, S.V., *Okeanologia*, (*Oceanology Journal*), 1962, pp. 385-387.
25. Personal communication of Mr. Rohammad Rami, graduate student from Morocco in the College of Fisheries, University of Washington, August, 1983.
26. Personal communication of Mr. Paul Turpin, Director of the Office for International Cooperation, Fishery Secretariat Guinea-Bissau, November, 1984.

7.0 POLITICAL AND RELATED BENEFITS OF FISHERY AGREEMENTS AND FLEET OPERATIONS IN NORTHWEST AFRICA; FOCUS ON THE SOVIET UNION

A cursory review of Soviet fishing activities in the NW African region, shows several broad areas of "non-economic" benefits which accrue to the Soviet Union. These areas include physical access, intercultural familiarity and the development of economic ties and dependency relationships.

7.1 Physical Access

Probably the most significant non-economic asset which comes to the Soviet Union as a result of its foreign fishing activities is that of physical access and presence. All of the stipulated forms of access permit exploration and exploitation of coastal marine living resources, platforms for instrumentation and increased capabilities for surveillance of military and economic activities in the region. In a geographic context, it may be no coincidence that attempts at fishery cooperation have been concentrated in countries strategically near to important international shipping lanes and choke-point straits.

7.2 Research Vessel Access

Although the various agreements usually specify that scientists from the developing country shall be on board, presumably to exercise limited control over activities, it would be naive not to recognize that the Soviets would use the opportunity and instrumentation to gain as much hydrographic and geophysical data as possible. In addition to such information with military significance, the Soviets gain invaluable information on the living and non-living resource base of the area.

7.3 Increased Efficiency of Soviet Long-Range Fleet Operations

Through the use of joint ventures to establish land support bases in strategic locations, such as Singapore and the Canary Islands, the Soviets

reduce the chronically inefficient operational costs of their fishing fleets.

The Soviets for many years used motherships to service their fishing and whaling vessels on the high seas. However, the whole fleet still had to make the long voyage from fishing grounds to a Soviet home port. The gaining of fully integrated land support bases means a savings in both fishing, fuel and other expenses.

7.4 Resource Access

For the Soviet fishing fleet, access to foreign stocks connotes not only the availability of fish but the employment of personnel and vessels, whether directly in catching or indirectly in processing the harvest. With its sizable investment in fishing and support tonnage (Kaczynski, 1982) and the numbers employed in all aspects of its fishing industry, the Soviets can ill afford to have any of their fleet idled by unavailability of fishing grounds. Joint fishing ventures with foreign countries, particularly developing countries, has insured this access.

An interesting example of the leverage created by joint ventures is apparent in the Sovhispan (Soviet-Spanish) operation. When Equatorial Guinea expelled the Soviet fishing fleet from its waters in 1980, Spain applied for and received permission to harvest part of the catch previously assigned to the USSR. It is clear, however, that Soviet officials anticipate returning to these waters through the cosmetic value of the joint operation with Spain, confident that this will mitigate the political antagonism.

7.5 Airspace and Airport Access

In addition to providing logistic support to the fishing fleet for parts, equipment, and crews, such access familiarizes Soviet pilots

with airfield and navigation features which could later be of great military significance. The air link between the developing nation and the U.S.S.R. also opens an avenue of communication for supplies and individuals.

7.6 Local Representation

In agreements that allow placement of a permanent Fishery Ministry representative in the developing country, the Soviets have gained a formal and legitimate presence in any country with which it has a fishing agreement. Such agency offers a potential for serving Soviet interests far beyond fishery coordination itself.

7.7 Intercultural Familiarity

All agreements specify some degree of training and personnel exchanges. An entire fishery infrastructure tied psychologically to the U.S.S.R. may be built through comprehensive programs of training in the U.S.S.R. schools established in the developing country, familiarity with Soviet equipment, supervisory councils meeting alternatively with respective countries, etc. A policy of this type serves to dissolve barriers of misunderstanding and prejudice. Lines of communication and individual contacts are established which would be vital for influencing future events in the developing country (i.e., continued access, the construction of permanent bases, etc.).

7.8 Economic Ties

Although the umbrella agreements lack details, they clearly contemplate Soviet investment in the Northwest African countries. Whether significant economic assistance and capital investment would actually materialize is, of course, totally another story. Economic ties can be strengthened, possibly to the point of dependence, when linked to loan

repayment, (as it happens in Guinea-Bissau) capital availability, and Soviet equipment/technology installed in physical plants. Additionally, once a body of individuals in a developing country becomes financially dependent on activities and services provided from outside, a strong special interest lobby is in place -- in this case, to influence internal policy in the Soviet interest. An example was provided in the U.S. When Soviet access to the U.S. Fishery Conservation Zone was denied in response to the Soviet intervention in Afghanistan, American fishermen economically dependent on Soviet cooperation in joint ventures formed a lobby to advocate that operations based on the direct allocation of fish for the U.S.S.R. be allowed to continue in spite of the political objections.

7.9 Political Benefits

The strategic importance of Soviet joint fishery ventures in the Third World, especially Africa, refers to the role of the fishing fleet in forwarding political aims or in complementing Soviet military goals. The use of the Soviet fishing fleet to help local Communist parties consolidate power through economic development has been proven with regard to Angola, Chile, Mozambique, and South Yemen.

The Soviets' use of their fishing fleet for strategic purposes has been cited in many Western sources and steadfastly denied by the U.S.S.R. Sergei Gorshkov, Admiral of the Fleet of the Soviet Union, has stated that the Soviet fishing fleet is indeed an important component of his country's sea power. He takes issue, however, with the Western view that "sea power" is, in effect, "Military power that is brought to bear at sea". He contends that from the Soviet viewpoint, the essence of sea power is "how far it is possible to make the most effective use of the world ocean... in the interests of the state as a whole". Included in this perspective is

the potential for research into and the exploitation of the ocean's resources.

A detailed description of the interaction between Soviet fishing and oceanographic vessels and military craft and the gathering of intelligence is found in an article by Alphonso Max written for Este y Oeste, "Soviet Interest in the South Atlantic," (Max 1968, pp. 17-21). Max describes activities of Soviet vessels off the southeast coast of South America during the 1960's as a mixture of some fishing and considerable intelligence gathering. Soviet whaling ships, submarines, and fishing vessels appeared to be acting in concert in mapping the Straits of Magellan and the coast of Tierra del Fuego: a significant sea route in case of war or the closure of the Panama Canal.

Additional evidence of the integration of Soviet maritime operations is the fact that all officers in the fishing fleet carry reserve rank in the Soviet navy. Also, the research facilities, equipment, and assignments of the fishing and oceanographic research fleets are supervised by the Soviet Military Industrial Commission.

A consideration of the physical location of some of the Soviet joint fishing ventures further helps to explain the existence of these operations. Las Palmas and Santa Cruz have historically been important bunkering ports for world shipping because of the proximity of the Canary Islands to the Great Circle routes of ocean trade. This location produces a convenient post for observing vital maritime traffic such as Middle East crude shipments along the Cape route to western Europe and affords a base for disrupting that trade should political needs so require. The same observations apply to Singapore and its strategic location at the narrow entrance to the Strait of Malacca -- a crucial route between the Indian

Ocean and the western Pacific, specifically for crude oil shipments from the Middle East to Japan.

It could be said that the presence of the Soviet fishing fleet in the Canaries and Singapore is clearly attributable to the geographical locations of these ports. It is inconceivable that the Soviets would fail to take advantage of their presence in these ports to acquire intelligence on ship movements and other activities important to the allies of the United States.

8.0 LICENSE FISHING, FEE STRUCTURES, AND THE CASE OF THE SOVIET UNION

This section explores the licensing and fee systems of Senegal, Mauritania and Guinea-Bissau and analyzes the impact of these systems and unreported catch on the collection of licenses, fees and income to the coastal countries. Gambia and Guinea Conakry are not considered due to lack of data and information.

8.1 Senegal

Senegal had two primary fishing agreements as of 1983, one with Spain and one with the European Economic Community. Total tonnage permitted in Senegalese waters under the EEC agreement was 3,000 GRT for tuna boats and 2,150 GRT for trawlers obliged to land their entire catch in Senegal and 2,300 GRT for tuna boats and 5,000 GRT for trawlers not obliged to land their entire catch in Senegal. A supplementary 9,000 GRT for a four month period between April and October was permitted. The EEC agreement was to run from 16 November 1981 to 15 November 1983. The EEC was to contribute CFA 100 M toward CRODT and compensation of CFA 2,500 M in addition to the costs of licenses and fees. The agreement also makes provision for Senegalese onboard observers.

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The fee structure for EEC vessels was negotiated as follows:

- (i) Trawlers landing their entire catch:
 - CFA F 8 500 per GRT for shrimp boats
 - CFA F 7 500 per GRT for fish boats
- (ii) Trawlers not landing their entire catch and fishing through the year:
 - CFA F 17 000 per GRT for shrimp boats
 - CFA F 15 000 per GRT for fish boats

- (iii) Freezer trawlers not landing their entire catch and fishing for a four-month period between 1 April and 30 September:
CFA F 10 500 per GRT
- (iv) Tuna boats landing their entire catch:
CFA F 2 per kilo of tuna caught
- (v) Tuna boats not landing their entire catch:
CFA F 6 per kilo of tuna caught

The negotiated agreement with Spain runs from 6 March 1982 to 5 March 1984 and includes agreement on license fees, two trawling surveys for research purposes and the establishment of a mixed commission to oversee the agreement.

The vessels authorized to fish in Senegalese waters include 15 shrimp trawlers with a maximum tonnage of 3,400 GRT with the possibility of an additional 24 shrimpers with a maximum tonnage of 6,200 GRT, 20 fresh fish trawlers to 6,400 GRT, ten long-liners to a maximum of 1,130 GRT and 46 tuna boats up to a level of 45,900 GRT. License fees are based on a tonnage rate of CFA 21,250 per GRT for freezer trawlers and CFA 9,357 per GRT for fresh fish vessels. Tuna vessels, on the other hand, will pay CFA 6,000 per MT of tuna fished. The agreement also covered crew make-up, loading, obligations, trawler mesh-size and made provision for on-board observers. Unfortunately, without knowing whether foreign boats unloaded fish caught in Senegalese waters, any estimate of fees is very general.

The first annual Spanish payment was tentatively expected to yield, by CEECAF calculations:

Shrimp Freezer Trawlers	15 @ 6,201,923 =	93,028,845
Other Freezer Trawlers	24 @ 7,752,404 =	186,037,696
Fresh Fish Trawlers	20	= 315,000,000
Contribution Toward Training Vessel		= 150,000,000
		<hr/>
	CFA	895,548,079
	\$	3,000,000

Adequate data on licenses and fees actually collected is not available at this time and as such, further analysis of Senegalese fee system is not possible. In addition, data on the type of EEC vessels actually fishing in Senegalese waters is not available.

The Senegalese license and fee system limits the number and types of boats fishing in Senegalese waters. It also provides a good monetary incentive to foreign fishing boats to fish in Senegalese waters. However, except for tuna, there is no limit on total catch taken by these vessels. This could present some difficulty in limiting overall catch and thereby protecting the stock.

8.2 Mauritania

We know very little about the structure of joint ventures between foreign countries and Mauritania in terms of fees and licenses paid by vessels working for the joint venture. However, on the basis of CEECAF project information, some data is available on the Mausov Joint Venture between the Soviet Union and Mauritania. This joint venture calls for Sovrybflot (a Soviet Company) to provide vessels to Mausov and manage and operate those vessels. All pelagic fish, in turn, is sold to Sovrybflot by

8.3 Guinea-Bissau

Our best information on licenses and fees, and the need for serious policy rethinking, comes from the work of Kaczynski, Management of the Fishery Resources in Guinea-Bissau: Present Problems and Potential for the Near Future, September 10, 1984, as a World Bank consultant to the government of Guinea-Bissau. Here he has focused on fishery cooperation between the Soviet Union and Guinea-Bissau to show how an agreement can be set up in such a way as to surely limit the income to the host country, in this case, Guinea-Bissau. What follows is an overview of the Soviet fisheries policy in Africa and its economic implications.

The Soviet method for setting up fishing agreements follows a similar pattern to much of the Soviet Union's foreign aid programs. They strive for an umbrella agreement which is very positive for the developing country and then "negotiate" separate agreements or protocols which contain the meat of the relationship between the Soviets and the host country. The umbrella agreement with Guinea-Bissau regarding fisheries activities in Bissau waters, for example, comes across as being very generous, humanitarian, and helpful to Bissau. It is this agreement which is "known" by the world - not the overall relationship which is based primarily on separately negotiated agreements and protocols.

These agreements are very important to the Soviet Union and make up an important part of what one might call Soviet Marine/Foreign policy. These arrangements are designed not only to provide access to national fishing grounds for Soviet distant water fleets, but also serve to insert the Soviets into the national economy of the host country. For instance, most of these agreements enable Aeroflot to use the local airport; they allow the Soviets to set up a "fisheries mission" in country to represent Soviet

interests; they allow for Soviet access to deep water ports around the world; and they establish joint ventures with national companies which allow the Soviets a source of hard currency from export and from costs charged to the joint venture (more detail on this later) and it allows the Soviets to conduct scientific research in key parts of the oceans.

In general, the outcome of the Soviet relationship, regarding fisheries, with Bissau has been positive only for the Soviets. They have not paid anywhere near what the fish catch is worth and they have seriously abused the resource in Guinea-Bissau waters. In general, the license fee which they are supposed to pay is based on the value of the processed fish sold by the Soviet fleet at international market prices. There are three critical problems with this - first, the host country has no way of knowing what species of fish are caught or how much is caught; second, the host country has no idea as to how much and what is processed and sold and has no way of checking on the price that the processed fish is sold at; and third, the Soviets have a joint venture with Spain and a good deal of fish is transshipped and sold by this company at Las Palmas among other places, and there is no way for the host country to know what the actual revenues from these dealings are.

The Soviets also negotiated the agreement in such a way to allow vessel substitution -- meaning that the Soviets can mix and match whatever ships they want in Guinea-Bissau waters. Because the fee is based only on value of fish products sold, there is no restriction on Soviet effort, the composition of Soviet catch or on where the Soviets fish. The documents which are generally used by CEECAF and FAO contain agreements which do not tell the full story about the Soviet catch and relationship to the various fishing countries.

The fee system works as follows: The Soviets report everything to Guinea-Bissau - the catch, what's done with the catch and how much it is to be sold for. Interestingly, the price lists of finished products are established a priori, i.e., before marketing of these commodities in international (or Soviet) markets. The fee, which is then agreed upon, is retained by the Soviet/Spanish joint venture (Sovhispan) which then built the Bolola storage plant in Bissau. This plant is used by Soviet-Guinean joint venture, thus the infrastructure development in Bissau supports the Soviet/Guinea-Bissau joint venture needs including storage of the Soviet joint venture landings for the local market.

In addition, it is estimated, on the basis of the size and number of Soviet ships fishing in the area and the amount of fish catch that they should be able to take, that somewhere on the order of \$37 million in license fees have not been paid over the last 5 years. Finally, the Soviets have convinced the Bissau government that the best way to speed up the repayment of its debt to the USSR is to allow the Soviets to put more joint venture ships into Guinea-Bissau waters in order to generate more income to the joint venture, Estrela do Mar. However, the Soviets always charge the joint venture more than its income, thereby making the debt (currently equal to US \$3,600,000) a "chronic problem".

Guinea-Bissau, however, is looking to change the fishery agreement with the Soviet Union. They requested that the Soviets should pay \$200-\$300 per GRT for each vessel. The Soviets refused this type of license fee suggesting instead that 27 ships now be allowed to fish in Guinea-Bissau waters through the joint venture and pay no license fee at all. Since Guinea-Bissau refused, the Soviets continued fishing illegally in Guinea-Bissau waters during 1984.

Negotiations between Guinea-Bissau and the Soviets were scheduled in December, 1984. Guinea proposes two types of fees - first, a permit fee which will be based on a cost of \$.50/GRT per vessel. This will ensure that the type and size of fishing vessel is registered. Second, there will be a fee on the catch level of and species allocated. This latter fee - a poundage fee - will also be based on the price and value of the fish catch. This will require that the host country be informed about the composition and level of catch. Also, there will be the need to have the international price for a particular species harvested in order to estimate their value on the international market.

The most difficult task is to determine the magnitude and composition of the fish catch. This can be done only by sending some observers on-board Soviet (and other foreign) vessels. Some form of surveillance and enforcement capability, is therefore imperative. Additionally, some way of cooperation with foreign fishing vessels should also be considered. A first step, however, is to estimate the level of sustainable yield potential and then limit effort (types of vessels, gear and number of fishing days) based on an estimate of how long it should take for a particular mix of boats to catch that potential. One way to start, then, is to set quotas of fish catch; to limit effort in order to not overstep those quotas; and to limit the fishing season and number of days which foreign vessels are allowed to fish.

In order to ensure compliance, the fee, based on species and catch volume must be paid in advance. That way, it is in the interest of the foreign vessel captain to keep accurate records in order to get his fee back should catch be lower than paid for. In addition to this, before quota is allocated, the Soviets will be asked to provide detailed

information on the types of ships, gear, harvesting potential, fishing season, etc. for each vessel proposed to fish in Bissau waters. The Soviets will find it difficult to live with this situation, however, and we expect that they will use their political pressure based on their role as an arms supplier to Guinea-Bissau in order to force this country to accept their terms, i.e., keeping the status quo. Portuguese Africa (Cape Verde, Sao Tome and Principe, Angola, Mozambique and Guinea-Bissau) are keys to their strategy for gaining a foothold in Africa. In Guinea-Bissau, this fishing agreement is a key part of their relationship.

8.3.1 Economic Implications of the License Agreement

In order to substantiate the finding made by Kaczynski, we have summarized his own economic analysis of the Soviet license fishing. Its implications are clear - the Soviets are grossly underpaying the country in comparison to what they are actually catching in Guinea-Bissau's waters.

The value of license fees paid by the Soviet Union to Guinea-Bissau are based on Soviet data entirely - reported catch, reported sales of processed fish and on prices for fresh and processed fish prepared by the Russians. The Soviets argued for, and got, the right to calculate license fees on the basis of processed fish value when in fact, license fees based on the value of fresh fish would have been much more advantageous to Guinea-Bissau. Table 43, taken from Kaczynski, summarized Soviet production and license fee calculations during the period 1978 - 1983. Due to a lack of data on total catch harvested, estimates of the true value of fresh fish caught by the Soviets is made only for 1982 and 1983. Tables 44 and 45 show that even Soviets themselves consider the value of fresh fish taken by Soviet ships as much higher than that of processed fish. Table 46 summarizes the loss to Guinea-Bissau based on a fee system set up on the

basis of processed rather than fresh fish. Kaczynski estimates that during the period 1978 - 1983, this resulted in a net loss to Guinea-Bissau of nearly \$7 million.

This figure also does not take into account the gross underreporting of fish catch by the Soviet Union. If that catch is underestimated by 1/3, then the Soviets underpaid (using fees based on processed fish catch) on the order of \$24 million from 1978 - 1983. If a fee system based on fresh fish were in effect, then for 1982 alone, the Soviets would have paid over \$11 million instead of the \$2.7 million actually paid.

TABLE 43: YEARLY PRODUCTION VALUES AND CORRESPONDING LICENSE FEES OF THE SOVIET FLEET OPERATING IN THE GUINEA-BISSAU EEZ DURING 1978 - 1983 (IN US \$)

<u>Year</u>	<u>Total Value of Processed Products</u>	<u>Average Price Per M. Ton</u>	<u>Yearly License Fee Based on 15% of the Final Product Value</u>
1978	10,610,666	208.5	1,591,500
1979	15,084,666	250.2	2,262,700
1980	16,636,000	249.0	2,345,400
1981	18,268,000	231.5	2,740,200
1982	17,968,000	216.0	2,695,200
1983	6,946,666	224.0	1,042,000
Total Value of License Fees (15%) Paid During 1978-83:			12,687,100

SOURCE: State Secretariat for Fisheries, 1984, and author's estimates.

TABLE 44: ESTIMATED VALUE OF FRESH FISH HARVESTED BY THE SOVIET FLEET DURING 1982

Species	Catch Volume M. Tons	Price per M. Ton \$ USA	Total Value \$ USA
Triggerfish (Balistes sp.)	74,643	160	11,942,880
Horse Mackerel (Decapterus sp.)	6,630	330	2,187,900
Horse Mackerel (Decapterus sp.) Purse-seining	20,190	330	6,662,700
Sardinella (Sardinella aurita)	3,453	300	1,035,900
Other edible fish	7,084	135	956,340
Fish meal grade fish	20,000	130	2,600,000
TOTAL:	132,000		25,385,720

SOURCE: State Secretariat for Fisheries, 1984.

TABLE 45: ESTIMATED VALUE OF FRESH FISH HARVESTED BY THE SOVIET FLEET DURING 1983

Main Species	Catch Volume M. Tons	Price per M. Ton \$ USA	Total Value \$ USA
Triggerfish (Balistes sp.)	42,241	135	5,702,535
Catfish (Arius sp.)	1,867	220	410,740
Croaker (Pseudotolithus senegalensis)	1,777	480	852,960
Threadfish (Galeoides decadactylus)	1,014	340	344,260
Cutlassfish (Trichiurus lepturus)	1,192	265	315,880
Other	22,210	150	3,331,500
TOTAL:	70,301		10,957,875

SOURCE: According to data delivered by the Soviet Fisheries Representative to the State Secretariat for Fisheries, 1984.

TABLE 46: EVALUATION OF ECONOMIC LOSSES BY RGB AS A RESULT OF LICENSE FEE COMPUTATION ON THE BASIS OF PROCESSED FISH PRODUCTION VALUE

Year	Value of Processed Fish	Value of Fresh Fish	License Fee Value - 15% (in US\$)		
			Processed Fish	Fresh Fish	Loss for RGB
1982	17,968,000	25,385,720	2,695,200	3,807,858	1,112,658
1983	6,946,666	10,957,875	1,042,000	1,653,681	601,681

These are conservative estimates, since lowest prices of fish were assumed when calculating all values. No verification of price of harvested species and their names as prepared by the Soviet fleet operators had been carried out on a regular basis. ²⁸ However, even a cursory comparison of Soviet price lists for 1982 and 1983 show large price differences with the world market trends at the same period.

It is clear, on the basis of work done in Mauritania and Guinea-Bissau, that a close monitoring of catch levels and changing of license and fee systems would potentially yield substantially more revenues to the coastal nations. Such a monitoring program must be undertaken in conjunction with a surveillance and enforcement program. None of these will be effective, however, without appropriate decisions and the political will to carry them out.

8.4 Footnotes

27. Everett et.al., op. cit., 1982.
28. In some cases, to mislead local and country authorities, Soviets produced their price lists with Russian names of species or products, such as, for example, Khek (hake), Solnochnik, Preservy (marinated products), etc.

9.0 MONITORING, CONTROL AND SURVEILLANCE

9.1 Definitions of Terms and Recognition of Problems

Management of any resource requires: (1) information regarding the nature, location and extent of the resource and its current level of exploitation; (2) a plan (usually a body of law) describing how the resource may be exploited; and (3) a means of ensuring compliance with the law. Management of marine fisheries resources is particularly difficult in that they are often widely distributed (which complicates the data collection task), are fugitive and often migratory (they must be pursued), are difficult to see (they are usually subsurface and often at substantial depths), and come in a wide variety of species and types (all of which may require different and specialized management treatment). The economic value of these resources is so great, however, as to make the investment in management effort more than worthwhile. This is particularly true in the case of the Northwest African coastal nations, who have relatively few other natural resources.

In April, 1981, a special meeting was held at FAO Headquarters in Rome to review and discuss monitoring, control and surveillance issues and systems for fishery management. This meeting was organized as part of FAO's Extended Economic Zone program of assistance to developing countries and was attended by representatives of both the developed and developing nations. ²⁹ One result of this meeting was general agreement regarding terms and definitions, as:

Monitoring - the continuing requirement for the measurement of fishing effort, characteristics, and resource yields (catches)

Control - the regulatory conditions (legal framework) under which the exploitation of the resource may be conducted (i.e., management schemes)

Surveillance - the degree and types of observations required to maintain compliance with the regulations.

These definitions have been generally accepted and, in part as a result of FAO's continuing programs, the terms are coming into general use in the developing countries.

Following the Rome meeting, a meeting was held in Freetown, Sierra Leone, 30 June to 3 July, 1981, specifically to review the "MCS" problem in the West African region. The meeting was attended by some 30 participants representing the countries of the Gambia, Ghana, Guinea (Conakry), Liberia, Morocco, Nigeria, Senegal and Sierra Leone, with observers and participants from the United Kingdom, the United States, FAO/Rome, and the CEECAF Project office in Dakar. The underlying problem was summed up in the opening statement of the Honorable K. C. Gbamanja, Minister of Natural Resources, Sierra Leone:

"With the extension of the territorial waters by states, areas of the sea which formerly were part of the high seas have now come under national jurisdiction and have brought in their wake, problems concerned with the management of the resources in the extended zone. We in the developing countries, lack the capabilities for effectively managing the resources in our waters."³⁰

9.2 Costs and Benefits

The meeting in Rome particularly recommended that coastal states conduct "an assessment - however broad - of the costs of exercising control in relation to the benefits to be gained," and noted that "surveillance equipment should not be finally determined until the degree and type of violation has been identified." This view was repeated at the subsequent meeting in Sierra Leone.

A benefit-cost study of monitoring, control and surveillance for the five-country region of Mauritania/Senegal/Gambia/Guinea-Bissau/Guinea was

beyond the scope of the present analysis and survey project. Some general observations can be made, however, and broad conclusions drawn.

As reported and reviewed in Section 4 of this report, the value of the annual reported catch in the CECAF region is approximately \$1.4 billion. Illegal fishing and intentional underreporting of the catch would appear to involve at least an additional \$400-\$600 million, for a total catch value of \$1.8 to \$2.0 billion each year. At present, monitoring-control-surveillance in the region ranges from ineffective to nonexistent. A system of qualified onboard observers supplemented by frequent boarding and inspection at sea, an adequate port inspection and measurement capability, and an aerial surveillance and monitoring program would substantially reduce the incidence of both illegal fishing and intentional underreporting.

The amount of such reduction is impossible to predict accurately, but it might be reasonably expected that illegal activity would decrease by 70% or more. In this event, quite aside from the \$280-420 million per year value of the resource effectively "gained", the coastal states would realize a direct benefit in terms of fees paid on the previously unreported catch. If these fees are on the order of 8% of catch value, this amount could be some \$30 million per year. ³¹ The added costs to the states in its region might be on the order of \$1 million to \$3 million or more per country, for a total of \$5 to \$15 million per year. The benefit-cost ratio in this event would be from 6:1 to 2:1 and the effort involved is clearly worthwhile.

The numbers employed here are exceptionally rough estimates, based on incomplete, unreliable and inaccurately reported catch data, and as such, must surely be significantly in error. The general relationship, however,

would appear to be valid. Increased investment in monitoring, control and surveillance of marine fisheries in Northwestern African waters can be justified on the basis of immediate economic return. A more important and equally valid justification can be made from the point of protection and long-term management of the resource to avoid its depletion or total destruction.

9.3 Monitoring

Monitoring activity is directed primarily at collection of basic data regarding the nature of and pressures on the resource, which in turn will permit improved management for the benefit of all involved. Specific information required includes total catch by species, amount, location and type of fishing effort, and size composition of the catch. This information is basic to assessment of the fish stocks and its collection is more scientific than regulatory in nature. While some of this information, such as number and type of fishing vessels, concentration of effort, and so on, can be collected from aircraft or spacecraft, the majority can only be obtained on-board the fishing vessel itself. Existing logbooks and fishing records in the Northwest African region are both inaccurate and misleading. A trained and qualified onboard observer corps would seem to represent the most practical solution to this data collection problem.

9.4 Control

Every country in the region has existing national fisheries legislation of some sort. Much of this is overly complex and difficult to enforce. In other cases, key requirements seem to have been overlooked. It is unreasonable to expect that these laws will be completely rewritten. On the other hand, some simple additions to the law to require, for example, uniform and clearly visible identification marking of fishing

vessels, or to require vessels to report entering or leaving the EEZ, would greatly simplify the existing control problem in these waters.

Some previous reports addressing management and control of EEZ fisheries in West Africa have suggested that a regional approach is required, due both to the migratory nature of the stocks themselves and to the fact that distant-water fleets tend to follow the stocks from country to country. There is substantial merit to the argument from a scientific point of view. From a practical standpoint, however, it is unlikely that any of these coastal states will relinquish control to a regional authority at any time in the near future. Monitoring (stock assessment) activities and pooling of statistical data is clearly possible, practical and acceptable on a regional basis. Surveillance activities from aircraft or spacecraft may be acceptable on a regional basis, but this subject must be approached carefully. Direct law enforcement activities involving naval patrols and boarding/inspection at sea are likely to remain within the province of local government control. As a consequence, each state will require a minimum surface vessel patrol capability.

These vessels need not be high speed patrol craft. The average fishing vessel will have a cruising speed of 12 to 16 knots (a few are indeed capable of much higher speeds) and will fish at perhaps 4 to 6 knots. This is well within the capability of the average patrol boat. A more important requirement is that the patrol boat be able to keep the seaworthiness equal to this of the average fishing vessel under typically encountered weather conditions. The patrol boat must be sufficiently large that it can operate at sea for several days and offer reasonable comfort to its crew during this period of time. A vessel length overall on the order of 150 feet or more might be appropriate.

A primary use of these boats will be to support boarding and inspection of fishing vessels at sea on the fishing grounds. The boarding party should include a qualified inspector who is not only familiar with fisheries legislation and types of gear but who can also identify catch species and make rough estimates of catch amounts, thus providing an independent check on data provided by the onboard observer corps and by the vessel itself.

There is a definite relationship between the probability of detection and the level of compliance with any law or regulation. It is not necessary that every vessel fishing in the EEZ be boarded and inspected, only that the capability to do so clearly exists and is seen to exist. Given a reasonable probability of detection and the certainty of a meaningful penalty, the level of compliance will be high and consistent with the value attached to the right to fish in these waters.

9.5 Surveillance

As noted in the 1981 meeting in Rome, fisheries surveillance has three principal objectives:

- (1) to quantify and verify the number and type of fishing vessels and pattern of fishing effort;
- (2) to ensure an acceptable level of adherence to control and monitoring measures, and
- (3) to gather information as a data base for related analyses.

The principal methods of surveillance will involve spacecraft, aircraft and/or surface vessels. As a general rule, spacecraft will provide broad regional coverage of a scope and scale impossible or impractical to obtain by any other means. Disadvantages include relatively low resolution in commercially available data, and substantial delays (on

the order of weeks or months) between the time data is first acquired and its delivery to a "user agency" in a developing country. The fisheries management task requires more immediate information, and thus is more closely related to the tactical reconnaissance problem than to strategic reconnaissance. As a result, while satellite data may and should be used for regional analysis, it is usually of limited value for direct fisheries surveillance. A significant exception involves satellite systems such as the TIROS-N/ARGOS. This is discussed and reviewed in a separate section of this report.

For regional fisheries surveillance purposes, the 1981 Rome meeting concluded that "the use of aircraft is considered essential and (within cost considerations) any type of aircraft is preferable to none." This viewpoint was repeated at the subsequent meeting in Freetown and is generally accepted in West Africa. The Freetown meeting implied, however, that small single-engine aircraft were "a good way to size up the situation in most EEZ's".³² This suggestion is not only incorrect, but is also basically unsafe. Airborne fisheries surveillance requires operations at relatively low altitudes up to 200 miles off the coast. Few pilots will accept the risks associated with operating a single-engine aircraft under such conditions.

As a general rule, the principal requirements for aircraft selected for non-military maritime surveillance activities are (in order of importance): multi-engine, range or endurance on station, payload, speed and altitude capability. Ease of maintenance, repair, commonality of equipment and availability of support services are other factors that together with systems' cost will define the specific aircraft or combinations of aircraft that offer the most cost-effective solution to any nation's maritime surveillance problem.

A variety of aircraft including high-performance jet aircraft, long-range patrol planes and low altitude STOL aircraft have been proposed by various manufacturers and suppliers for the fisheries and maritime surveillance role. Each manufacturer has naturally sought to present his product in its best light. As a consequence, comparisons of alternative aircraft or systems contained in such presentations are usually less than complete and may, in fact, be based on unrealistic (and often unstated) assumptions regarding altitude, airspeed, payload or flight endurance requirements.

A complete comparative analysis of the costs and effectiveness of alternative aircraft systems is beyond the scope of this report. Some simple observations may be made, however. The optimum flying height for major radar and electronic intelligence (ELINT) sea surveillance aircraft is in the range of 2,000 to 25,000 feet altitude. Operating between these altitudes, moderately sized targets may be detected at ranges up to approximately 70 nm by radar and 260 nm with ELINT. Below 2,000 feet, detection range is severely limited by the line-of-sight horizon, while above 10,000 feet radar detection range for moderate size targets may actually decrease as a function of increasing "sea return" and changing target angle.

The principal advantages of pure jet aircraft are their high speed, which decreases the time required to fly from point to point, and their ability to operate at high altitude above the weather. They are most fuel-efficient at altitudes above 30,000 feet. In contrast, turboprop (or jet prop) aircraft are most fuel-efficient at altitudes between 10,000 and 25,000 feet. Although they operate at slower speeds, they also consume less fuel per hour and thus have similar range capability.

In the typical maritime surveillance role, an aircraft might be required to conduct a wide-area search at, say, 10,000 feet altitude. When an "unidentified" vessel is detected by radar or other means, the aircraft may be required to descend below 3,000 feet to determine vessel type and below 1,000 feet for positive identification. Such identification is best achieved from an aircraft that is capable of flying safely at speeds approaching 100 knots at altitudes below 1,000 feet.

In general, turboprop aircraft with their combination of operating efficiency and low speed/low altitude capability would appear to be more suited to the maritime surveillance role than pure jet or reciprocating engine aircraft, particularly where aircraft operations are confined to a single EEZ area for a typical West African nation. If a regional program is attempted, then a higher performance multiengine jet aircraft may be feasible, particularly where smaller aircraft are available to assist in low altitude identification. At least one developing nation with an unusually large EEZ (Indonesia) operates a Boeing 737 for maritime surveillance purposes.

9.6 Satellite Systems and Cooperative Targets

The previous section on surveillance operations has been concerned with the typical case of noncooperative targets, or vessels which may operate illegally in a zone. An alternative approach to fisheries surveillance presumes "cooperative" targets. In this case, as a condition of license to fish in the area, the vessel carries on-board a small transmitter which periodically transmits a "string" of digital data at a precise frequency. These data contain information regarding vessel identification and any of a variety of peripheral data set by an on-board observer or crew member, which could include water temperature, catch on

board, or similar information. If a surveillance aircraft is within line-of-sight range, these signals can be detected and the vessel's location determined through a series of direction-finding "cuts". Alternatively, the signals may be received by a satellite which in turn can determine the position of the vessel through a series of doppler frequency shift measurements.

This is the principle behind the position-locating capabilities of the Nimbus-7 and TIROS-N satellite series. Nimbus is a prototype NASA experimental satellite. TIROS-N is an operational outgrowth of the NIMBUS experiment. TIROS-N, which is primarily an imaging weather satellite, is operated by the U.S. National Oceanic and Atmospheric Administration (NOAA). One of the instrument systems onboard is the ARGOS Data Collection System. The ARGOS system has two primary functions. It locates, by means of doppler frequency shift, the position of certain types of radio transmitters and then acts as a data relay to retransmit digital data provided by the transmitter system. The ground receiving station receives the data from the satellite. The data consists of transmitter ID, several doppler shift measurements, and the peripheral data. A microcomputer at the receiving station then calculates the latitude, longitude, and elevation of each transmitter.

The biggest difficulty with the existing satellite system is obtaining permission to use it. The system was conceived, apparently for political purposes, as a cooperative multi-nation effort. Access is controlled by the "ARGOS Committee", composed of representative from NASA, NOAA and the French governmental agency for space, CNES. For all practical purposes, CNES permission must be obtained before any user agency can utilize the position-locating system. This permission has not been easily obtained,

even by agencies of the U.S. Government. As one example, the U.S. Coast Guard tried unsuccessfully for more than two years to obtain permission to use this system to monitor the location of vessels fishing in the United States Atlantic EEZ. The Coast Guard is presently using the system, but it is unclear whether or not official permission was ever received from CNES.

9.7 Footnotes

29. Report on an Expert Consultation on Monitoring, Control and Surveillance Systems for Fisheries Management, Rome, Italy, 27-30 April, 1981, FAO/GCP/INT/344/NOR.
30. Statement by the Honorable K. C. Gbamanja, Minister of Natural Resources, Sierra Leone, at the opening of the Consultation on Monitoring, Control and Surveillance, Freetown, 30 June - 3 July, 1981, as reported in CECAF/TECH/81/35, Dakar, October, 1981.
31. See, for example, Fishery Monitoring, Control and Surveillance: When is it Worthwhile, J. A. Gulland, FAO, in FAO/GCP/INT/344/NOR, 1981, Annex 2, page 31.
32. Report of the Consultation on Monitoring, Control and Surveillance, CECAF/TECH/81/35, October, 1981, page 24.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The fishery resources of West Africa are extremely rich. At the very least, their yearly value is equal to about \$1.4 billion (as of 1983). The value of the resource taken illegally and not reported in the region examined by this study is estimated at \$400-\$600 million per year. The Coastal States do not have the capability to adequately monitor or control fishing operations in this area. As a direct consequence, illegal fishing and underreporting of catch is widespread. The effect is to substantially reduce the revenues otherwise accruing to these nations. Current estimates, available data on catch per unit effort, and data on the quality of the fish caught in Northwest African waters indicate that the stock is being depleted and that the pressure on fish resources is increasing.

License and fee systems are not adequate to maximize the economic benefit which should accrue to the coastal nations from their fishery resources. Based on the license fishing arrangements involving Soviet activities in Mauritanian and Guinea-Bissau's waters, we have estimated that at least \$50 - \$150 million in fish is being taken illegally from these areas and that a substantial portion of this could be recovered in fees and other benefits if different license systems and international fishery agreements were set up. Because the resources are depleted and scarcer, quota systems may be necessary to assure the recovery of the decimated stocks. If one were to include the other foreign fishing fleets

and develop a system of licenses and fees which worked to the advantage of the coastal nations, these numbers would represent a lower end estimate of what could be recovered. In addition, with proper controls on fishing activities, illegal fishing and smuggling could be halted or limited in this region.

The Soviet Union and Eastern Bloc nations operate the largest fleets in this area, and report taking one-third of the entire catch in the area (950,000 metric tons in 1983). This figure is commonly believed to be less than half the catch actually taken. Available data indicates the actual Soviet catch may be as much as three times that reported.

The United States has the technology to monitor fishing activity throughout the West African fishing zone. This technology can be transferred to the West African coastal states. The West African nations will require assistance in training and institution building (i.e., training of on-board observers, inspectors, and fisheries management personnel), and physical equipment (i.e., surface patrol vessels, aircraft, surveillance and communications equipment). The nations have requested such assistance.

Some additions to regional fishing laws and regulations are highly desired. These include requirements for highly visible and uniform marking on fishing vessels, radio reporting when entering and leaving an EEZ, and periodic activity reporting while in the zone. The nations have indicated their interest and in some cases have requested assistance to draft appropriate legislation.

Regional management projects involving more than one country are unlikely to succeed at this time as the nations are reluctant to delegate direct control authority to any regional organization. Each nation would

prefer its own program. Cooperation between programs (sharing of information, possible sharing of some equipment) is possible and expected to occur.

Country-level programs in either or both Guinea-Bissau and Guinea (Conakry) are recommended. Both countries have serious problems of a similar nature, and both countries have requested assistance from the United States. Training for on-board observers (to obtain basic data regarding the status of the stocks) and for fisheries management personnel could be provided through USAID. Equipment and technical assistance for surface patrol and aerial monitoring could be provided through the U.S. Department of Defense. Pilot level programs established in either or both of these countries can serve as demonstration role models for other countries in the area. A project should be considered for Mauritania in the near future.

Country programs should have a substantial technical assistance and training component. The Canadian program in Senegal is considered a failure by the Canadians themselves, as having been delivered to the Senegalese without adequate continuing technical support.

Available unclassified satellite technology could be employed to monitor the location and activity of major fishing vessels in the West African zone. This would include all distant-water vessels operating in this area. The technology has been operationally demonstrated in U.S. waters.

The CEECAF Project, headquartered in Dakar, Senegal, is the only reliable source of fisheries statistical data in the entire Northwest African region. This project is scheduled to effectively terminate operations in the very near future as a result of funding cutbacks within

FAO. The continued existence of this project is considered essential to a regional understanding of marine fisheries resources in this area.

If the coastal states acquire the capability to adequately enforce their existing laws and effectively manage their marine fisheries resources, this will have a major economic impact on nations presently fishing illegally in this area. A study should be undertaken to examine the spread of this impact, alternatives available and likely courses of action by affected nations, and the resulting political and economic consequences.

10.2 Recommendations

There are a number of activities which could be pursued in West African fisheries in order to improve the current situation in terms of the health of the stock and potential benefits to the coastal nations. It is important, however, to note that the following areas of activity should ideally be undertaken as part of a coherent and coordinated project. The main recommendations emerging from this analysis include (1) the development of an effective information system, (2) policy analysis, advice, and implementation and (3) a surveillance, monitoring and control system.

10.2.1 Fisheries Information System

For any policy analysis and implementation effort to be successful, one must have the appropriate data and information on which to base decisions. It is clear from this study that CECAF has begun to house a substantial regional data base which would serve as an effective starting point for a regional fisheries data and information service. However, at present, CECAF is alarmingly underfunded and understaffed and as such is unable to provide all the data and information, let alone analytical

assistance, required by the coastal nations. In addition, CEECAF is largely an apolitical organization and as such should refrain from becoming involved in the overtly political decisions regarding fisheries agreements between foreign fleet operators and the coastal countries. This is a difficult problem to solve because the data and information which is used to make political decisions is, of itself, political. Finally, CEECAF is a regional organization, and an effective monitoring, surveillance and control program will likely have to be national in character. As such, while a regional approach to fisheries management is desirable, national programs are required at present due to the difficulty in securing regional cooperation and to the wide variety of existing conflicts and different national goals among the coastal nations.

Whether or not the fisheries information system is set up along regional or national lines, the following types of data must be collected on a continuing basis in order for proper economic and decision analysis to be undertaken:

1. Catch data by country, species and national fishing grounds.
2. Effort data by country, boat type and national fishing grounds.
3. Catch per unit effort for all fishing boats in NW African waters.
4. Local and international prices for fresh and processed fish.
5. License and fee structures for the various countries and information on the various bi-lateral fishing agreements which are signed and implemented.
6. Costs of operating various types of fishing vessels including distant-water fleets and local artisanal fishing boats.
7. Joint venture activities, including effort, catch, fresh and processed production, local and export markets, etc.

These sets of data would enable an effective analysis of fisheries in the area and accurate determination of the state of the stocks. Only on the basis of this information can effective policy analysis be undertaken and subsequent changes in policy made. It is critical to emphasize that while the resource itself demands regional management, the realities of national politics require that data and information be collected first on a national basis and that decisions be made and implemented at the national level. To the extent that regional cooperation can be developed, it will greatly aid national programs. However, as a practical matter, priority should be given to developing national approaches.

Funding and support to CECAF to continue development of a regional information base could logically be provided through USAID and this support is strongly recommended. Fisheries information systems should also be developed at the national level. This could include onboard observer programs as well as training and education for fisheries management personnel. Such training programs could be provided through existing USAID channels.

10.2.2 Policy Analysis, Advice, and Implementation

The development of a surveillance, monitoring and control/enforcement system can be a fairly expensive exercise. Given the estimated magnitude of the illegal fish catch and its value in conjunction with the magnitude of income which could be obtained by optimizing foreign license fishing policies, such a program is fully justifiable economically.

A surveillance and enforcement system is not the first step toward a rational and efficient fisheries management policy. Prior to, or at least in conjunction with, initiation of such a program, an analysis of policy options available to the coastal nations should be made.

The first step should include a careful evaluation, of current fishing agreements and license and fee mechanisms. It should include an evaluation of current catch and effort data and an analysis of these data and the effects of alternative license and fee schemes. The analysis undertaken and presented in this report can only be considered preliminary as much of the required data and information was simply not available to the study team.

Further economic/market analysis should be undertaken along the following lines:

- 1) Cost-benefit or cost-effectiveness studies of monitoring, control and surveillance programs for local governments;
- 2) In-depth economic assessments of fishery resources, sectors and development advice for local governments;
- 3) Market analysis, both domestic and for export;
- 4) Impact on foreign fleets of various types of new laws and surveillance monitoring and control activities. The response of foreign fleets, both political and economic, should also be examined.

These and similar studies are critical to the overall development plans of coastal countries and the specific design of a fisheries monitoring and control system.

Only after policy options and effects have been defined and the host country has shown the "political will" to undertake the steps necessary to ensure that the new policy is carried out should a relatively expensive surveillance and enforcement system be fully implemented. This policy and

political good will could be built with technical assistance from USAID and other U.S. agencies. As with all development programs, the collection of reliable resource information and the making of policy may be impossible without improved means of surveillance and monitoring and the information such activities would provide.

10.2.3 Surveillance, Monitoring and Control

Any data and information collection program must include means by which the data and information collected can be verified. In the area of fisheries information, there is a tendency for fishermen to underreport the level of their catch. In the Northwest African fisheries area, the catch of foreign fishing fleets is underreported by a factor of two to three or more, and the coastal nations have no means of verifying the figures. For instance, in Guinea-Bissau the license fishing protocols and joint venture arrangement with the Soviet Union allows the Soviets to arbitrarily report catch size and composition, amount of fish processed and sold and the price obtained for that fish. At no point in the cycle does Guinea-Bissau have the ability to check the reporting methods or accuracy of data on the Soviet fleet activities. We believe that this is true of other foreign fleets and other coastal nations in West Africa. Obviously some effort must be made to rectify this type of situation.

We believe that the following steps should be taken:

1. All license and joint venture agreements should include allowance for on-board observers whose purpose is to collect scientific data regarding the extent, distribution and composition of the marine fisheries resource. These data will form the base for subsequent development of fisheries management policy and regulations. The observers themselves, however, must be clearly seen as scientific staff and not directly related to or involved in immediate enforcement action.
2. License and joint venture agreements should be set up to control the number and types of vessels fishing in national waters. Senegal's agreements with the EEC and Spain do this by limiting

the total GRT which is allowed in Senegalese waters. On the other hand, to the best of our information, both Mauritania and Guinea-Bissau have signed agreements which do not limit the number of ships in their waters. For the health of the stock and for ease of enforcing fishing regulations, this should be modified.

3. Fees should be paid prior to the fishing season and based on catch allocation. The fee estimates should be based on the volume of resources and species allocated. The number and the type of ship, number of fishing days, and expected catch per unit effort should also be estimated prior to the fishing season.
4. On-board observers should be kept on board foreign vessels at all times and should be well trained and paid enough to provide some disincentive to being "bought off" by crews of foreign fishing vessels. In Guinea-Bissau, local observers sent on-board Soviet vessels to watch Soviet ship activities were reportedly bribed by the Russians with gifts and vodka. Observer programs will have to be established in local fishery offices.
5. Periodic spot checks by means of random boardings by fisheries and naval officials should be made in order to enforce regulations and to deter bribery and illegal fishing.
6. A system should be set up by which the coastal nations have a method of tracking ships through their waters using a combination of onboard observers, direct radio reporting and airplane or satellite reconnaissance.

7. Any surveillance, monitoring and control system, however, will not be maximally effective without some enforcement capability. In other words, any system to control fishing excesses and violations of fishing agreements must have some "teeth" in it. A system must exist for boarding ships, detecting violations, apprehending vessels if need be and enforcing actions against those vessels with fines or other penalties, or compliance with fishing regulations will not happen.

A further step in the planning of any fisheries management program should be an analysis of the consequences of the program for both the coastal nations and the distant-water fishing fleets. For instance, if the coastal nations implement a strict management scheme, will this force Soviet Bloc or other distant-water fleets to move to other fishing grounds; and if so, where? At the same time, how far can the coastal nations go before those fleets leave, and is that in the best interests of the coastal nations? Clearly any program planning will have to provide answers to these types of questions.

In sum, then, these three areas -- data and information collection, policy analysis advice and implementation and surveillance monitoring and control/enforcement should be undertaken simultaneously in order to give any fisheries management project its best chance for success.

APPENDIX A

International Articles, West African Fisheries

"Fishing News International"

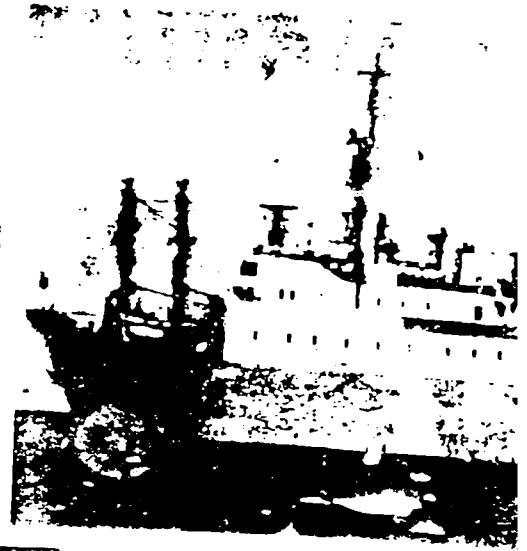
December, 1983

July, 1984

October, 1984



RUSSIA TOP OF LEAGUE...



Left: Soviet fishing vessels working in West African waters come in all shapes and sizes. This picture shows a small stern trawler.

Right: A Tropik class freezer stern trawler out side Dakar.

Below: The Russian vessels are attracted to Senegal by Dakar's excellent repair and maintenance facilities. This picture shows a Soviet fishing vessel undergoing routine maintenance in one of the port's dry docks.

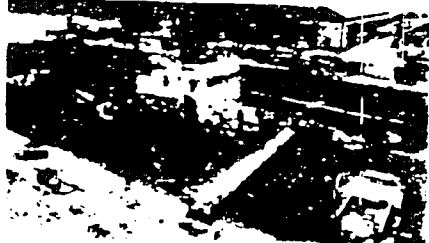
THE CATCH LEAGUE...

WITH HER fish catches in the North-west Africa region totalling around one million tons a year, the Soviet Union is by far the biggest foreign fleet operator in the region.

According to catch statistics submitted to CEEF by the USSR, Soviet vessels in the region have taken 1,000,000 tons worth of fish in 1983, a 22 per cent increase on the 820,000 tons taken in the previous year. The USSR normally supplies 70 per cent of the West African region worth US\$200 million. Major importers were Senegal (\$52 million), the Ivory Coast (\$10 million), Togo (\$6 million) and Cameroon (\$4 million). While some of the supplies came from Soviet operations in Latin America, the greater part of them were from catches within the CEEF region, or in ICSEAF waters to the south.

Just over half the Soviet catch (552,000 tons) in the CEEF region in 1982 was caught in the so-called Sahara sub-division between 19 deg. and 26 deg. N, while 196,000 tons was reportedly

Fleet takes one million tons a year from North west Africa region



taken in the Northern Oceanic division offshore of Morocco.

Another major fishing area for the Russian fleet was in the Cape Verde coastal division (131,000 tons), while 64,000 tons was caught in the Sherbro division off the coast of Sierra Leone.

Soviet fishing vessels operating in the CEEAF

region range from 164 gross ton RS class purse seiners to the giant 5000 ton Aerodrom factory trawlers.

One of the workhorses of the Soviet fleet is the Mayakovski class, several hundred of which were built between 1958 and 1962. These 84.7m long factory stern trawlers are commonly seen in the CEEAF area, particularly outside Dakar.

Gross tonnage of the Mayakovskis ranges between 2500 and

Other vessels from the USSR fishing the CEEAF region include 591-ton TST class tuna seiners and 2638-ton SST super tuna seiners which fished off Sierra Leone in 1983, and 649-ton SRTM stern trawlers, which are often seen in the waters of Conakry, Senegal and Sierra Leone.



have caught about 150,000 tons, of which 135,000 tons was exported.

The Soviet Union-Guinea-Bissau agreement allows Russian vessels to pursue a fish between 1900 to 1910 hours a year. Some 15 per cent of the value of the catch is paid over to the local Russian government, and the total of a maximum of US\$2 million in 1983 and 1982. Part of previous payments of this fund is a large gold store (the US\$6 million) was built at Bissau.

However, the local Soviet-Guinea-Bissau joint venture Estrela do Mar charters about six to eight Soviet vessels for its operation and some of the Russian fishing payments have contributed to charter fees.

The Soviet fleet ceased operations in Guinea-Bissau waters in December last year, after catching only 70,000 tons in the year and paying US\$1 million in fees. Under a bilateral co-operation

complex IMAPEC, this establishment was in 1980 forced to cease operation. But it was taken over by the Mauntania Libsa joint venture Solimaurem in late 1981, and has been completely refurbished ready for re-opening this year.

In March 1980, Mauntania signed an agreement with the

Left: Soviet fishing vessels working in West African waters come in all shapes and sizes. This picture shows a small side trawler.

Right: A Tropic class freezer stern trawler outside Dakar.

Below: The Russian vessels are attracted to Senegal by Dakar's excellent repair and maintenance facilities. This picture shows a Soviet fishing vessel undergoing routine maintenance in one of the port's dry docks.



taken in the Northern Oceanic division offshore of Morocco.

Another major fishing area for the Russian fleet was in the Cape Verde coastal division (131,000 tons), while 64,000 tons was caught in the Sberbro division off the coast of Sierra Leone.

Soviet fishing vessels operating in the CECAF

region range from 164 gross ton RS class purse seiners to the giant 6000 ton Aerodrom factory trawlers.

One of the workhorses of the Soviet fleet is the Mayakovski class, several hundred of which were built between 1968 and 1969. These 647m long factory stern trawlers are commonly seen in the CECAF area, particularly outside Dakar.

Gross tonnage of the Mayakovski's ranges between 2500 and 8000 and they have a fish hold capacity of 600-650 tons. Crew members number from 86 to 100.

Another commonly seen Soviet vessel class in the region is the 2320-ton East German built Atlantik, probably the most popular and successful freezer stern trawler of its type from an Eastern European yard.

Slightly smaller than the Mayakovskis, it has a length overall of 82.2m and a fish hold capacity of 450,500 tons.

Another Soviet fishing vessel class which has become common in the CECAF area over the last five years is the Super-Atlantik. These 3923-ton trawlers have an overall length of 102 metres and a breadth of 15.26 m.

Other vessels from the USSR fishing the CECAF region include 591-ton TST class tuna seiners and 2635-ton SST super tuna seiners which fished off Sierra Leone in 1982, and 649-ton SRTM stern trawlers, which are often seen in the waters of Conakry, Senegal and Sierra Leone.

Principal species caught by the Soviet fleet in the region are horse mackerels, sardines, sardipella, anchovies, hairtails, tuna, mackerel, saupfish and triggerfish.

For a number of years a fleet of Soviet fresh fish trawlers landed cephalopods at Nouadhibou in Mauritania for sorting, freezing and eventual export. In addition, a number of Soviet freezer vessels were authorized to fish in waters off Mauritania.

On the change of government in 1978, the Mauritanian authorities decided to phase out the issue of fishing licences and encourage establishment of joint ventures in their place.

Since they were mainly supplying the Nouadhibou processing

complex IMAPEC, this establishment was in 1980 forced to cease operation. But it was taken over by the Mauritania-Libya joint venture Salmaurem in late 1981, and has been completely refurbished ready for re-opening this year.

In March 1980, Mauritania signed an agreement with the Soviet Union, to establish a joint venture called MAUSOV, and Soviet vessels restarted fishing for MAUSOV for three months in mid-1981. Operation began again in October 1982 and continued to December last year, when they were suspended for a while.

The company had chartered about 24 vessels of Soviet origin. Ten were Super-Atlantiks, six were BRMTs and four were Atlantiks, for small pelagic trawling. Four SRTMs were used for cephalopod trawling.

All pelagic fish is reportedly sold to Sovrybflot and some is then sold to Fransov. The demersal fish and cephalopods are sold to the Japanese trading company Taiyo. In 1983 the company vessels were believed to

have caught about 150,000 tons of which 132,000 tons was exported.

The Soviet Union-Guinea-Bissau agreement allows Russian vessels to normally fish between 70,000 to 130,000 tons a year. Some 15 per cent of the value of the produce is paid over to the Guinea-Bissau government, and this reached a maximum of US\$ 1 million in 1981 and 1982. Part of previous payments of this fund a large cold store (for US\$ 1 million) was built at Bissau.

However, the local Soviet-Guinea-Bissau joint venture Estrela do Mar chartered about six to eight Soviet vessels for its operation and some of the Russian fishing payments have contributed to charter fees.

The Soviet fleet ceased operations in Guinea-Bissau waters in December last year, after catching only 70,000 tons in the year and paying US\$ 1 million in fees.

Under a bilateral co-operation agreement signed in 1967 the Soviet Union has fished Guinea waters and landed at least 10,000 tons of frozen fish at Conakry.

The Sierra Fishing Company of Sierra Leone is linked to the Soviet fleet through a long-term agreement between the two governments and the extended three year accord terminated in May 1984, but was expected to be renewed. Twelve per cent of the value of the Soviet catch is available to the company for purchase of chosen species for landing and, in addition, the Soviet vessels pay licence fees.

The Russians mainly use trawlers for catching about 70,000-90,000 tons of fish each year, and are not authorised to have a shrimp directed operation. In 1983 the value of 55,000 tons of fish frozen was estimated at US\$ 11 million.

In October 1982 the Sierra Fishing Company (Sierra Leone) made an arrangement with the Moroccans to establish a joint venture to fish in Moroccan waters.

Dakar, Casablanca, Las Palmas and Santa Cruz de Tenerife all benefit from the Soviet presence in the CECAF region through maintaining and repairing vessels and providing onshore facilities.



The little and large of West African fishing. A Senegalese handline canoe (circled) fishes in the middle of a fleet of 20 Soviet trawlers anchored outside Dakar.

We all gain

OUR fishing industry accounts for nearly a quarter of the products of protein origin consumed in the Soviet Union. Yearly per capita fish consumption is now 19 kg and this will rise in the future.

Efforts to improve fish and other seafood consumption are being greatly assisted by cooperation between the Soviet Union and other countries, mainly on the basis of full equality and mutual benefit.

The Soviet Union is now a signatory to 64 inter-governmental and 13 inter-departmental agreements on fishing with 44 countries. It is also represented in 16 multilateral conventions and agreements on the problems of fishing and the seas of ocean resources. In more than 20 countries broad ties are maintained in this field; in 13 countries mixed societies and companies are established.

Soviet experts give technical assistance in constructing fishing projects, carry out design and surveying-work under contract in waterways, and aboard the ships of some countries.

Each year, many foreign citizens undergo training in the Soviet Union, mastering advanced fishing methods. About 1800 students from more than 60 countries are trained in Soviet higher and secondary schools of the fishing industry. These students come mainly from Africa, Asia and Latin America developing countries.

All-round ties with other socialist countries are especially effective.

More than 20 years ago, the governments of the German Democratic Republic, Poland and the USSR signed an agreement on co-operation in fishing. Bulgaria, Romania and Cuba joined later.

Working within the agreement, a mixed commission plans scientific and technical contacts and mutual assistance in developing marine fishing. It helps to exchange experience in the use of vessels, in catching, storing, processing and transporting



A Soviet trawler working in New Zealand waters under charter to a local company transfers her processed catch to a carrier vessel.

**Writes Nikolai Kodryatsev,
First Deputy Minister
of Fisheries of the USSR**

fish, and also informs the participating countries of results of the search for and studies of ocean resources.

One example of this is the years of fruitful co-operation between Cuba and the Soviet Union. We granted a credit to Cuba and assisted in constructing the modern fishing port in Havana, which has become one of the largest and best in Latin America. Cuba has repaid the credit by repairing and loading Soviet fishing ships at the new port.

'We provide third world countries with technical assistance'

Another sphere in mutually beneficial relations is co-operation in the construction and repair of fish catchers, factory ships and trans ports. For example, in the yards of the GDR and Poland various modern ships are built for the USSR and

other countries, and this no doubt promotes the development of their shipbuilding industries.

Co-operation between the Soviet Union and developing countries figures prominently in the external links of our fishing industry. These countries are striving to strengthen their political and economic independence under difficult conditions. We support the principle of the sovereignty of each of them, and the right to dispose of their natural resources. These countries get the opportunity to extract the greatest benefit from their fish stocks by inviting in Soviet fishing vessels when this meets their national interests.

Soviet experts have worked out ten-year plans for the establishment of national fishing economies in a number of developing countries including Mauritania, Angola, Mozambique, Guinea Bissau, Sierra Leone and the Democratic Republic of Yemen.

We also provide third world countries with technical assistance in developing their industries. Examples of this include the establishment of a fishing port in

from cooperation



Built in East Germany, the Super Atlantic class 107 metre long trawler is one of the most successful fishing ships in the Soviet fleet.

Aden and a cannery in Mskaka, and the delivery and repair of fishing ships in Yemen. We have set up a research centre for fisheries in Mauritania, a fishing complex in Paris in Peru, and are establishing the coastal fleet and processing plants in Angola.

In their turn, Soviet fishing vessels call at the ports of developing countries for maintenance, food, fuel and water, and to rest and change crews.

'The resources of the seas are used through joint efforts'

Business relations to fishing have also been maintained for many years between the USSR and developed capitalist countries.

The broadest contacts are with neighbours Finland, Sweden, Norway and Japan. The resources of the seas are used through joint efforts, problems of their preservation for future generations are solved, joint research is conducted and catch quotas are fixed. Such measures make it possible to fish with-

out endangering the resources.

Over the past five years Soviet and American scientists have taken part in about 40 research voyages in the Pacific and Atlantic Oceans.

Also, the mixed Soviet (Soviet-American) company has been operating for several years. Its interest is in fish stocks in some areas of the Pacific and to exploit them at least USSR ships for processing.

We also maintain business contacts in fishing with other capitalist countries in whose waters our vessels have traditionally worked. These include Canada, France, Iceland, Denmark and New Zealand.



A British catcher transfers mackerel to a Russian factory ship.



Soviet fishing ships are regular users of repair and maintenance facilities in developing country ports. This trawler is in the drydock at Dakar.

'Fishing News International' - October 1988

USSR plans fleet for the future

THE Soviet Union has designed a new Antarktida class large-tonnage trawler which is expected to form the basis for the long-term development of the Eastern European fishing fleets.

The ship, which is to operate in the ice-bound conditions of the southern Polar ocean, is mainly designed for catching and processing Antarctic krill but can catch various types of fish at the same time.

Interchangeable equipment on the production lines of the processing plant

allows a quick switch from one product to another. The new trawler will be co-produced by shipyards in the USSR, East Germany and Poland.

Programme

Yuri Rizanov, chief engineer of the Leningrad Fishing Fleet Design Institute, has said that the designs have been drawn up in accordance with the long-term programme for the development of the Comecon member-countries' fishing fleet.

The programme covers the

period up to the year 2000 and provides for the construction of 28 types of fishing vessel for various purposes, produced on a co-production basis.

Mr. Rizanov has said that the need for the Comecon fleet to be re-equipped arises from the opening up of deepwater areas of the open ocean, following the introduction of 200-mile economic zones by maritime states, fishing for new types of fish and marine organisms and the development of mariculture and coastal fishing in territorial waters.

New autonomous super-trawlers with unlimited sailing ranges will be built in East German yards under the programme for member-countries. These

ships will be designed to trawl at high speed for such fish as tuna, bonito and squid.

Series

Soviet shipbuilders have undertaken the construction of a series of vessels for catching sprats, Baltic herring and Far East Pacific saury. The future fleet will include a series of floating canneries, shrimp trawlers, research and fish-finding vessels.

The fleets, which will be built in the Soviet Union, the GDR, Poland, Romania and Yugoslavia, will have interchangeable engines, navigation and fish-finding apparatus, and spare parts.

SPACE WATCH ON FISH POACHERS

FISHING boats poaching in protected waters may one day be spotted by radar in satellites 700km above them.

This possibility was suggested last month by Sir Peter Anson, head of the Marconi Space & Defence Systems's Space Division, when he spoke at a maritime law enforcement seminar in London.

He said that new developments in satellite-borne imaging radar could well offer the means of policing any future international maritime legal agreement.

A series of remote sensing

...it's now a real possibility

satellites could be placed in fixed orbits 700km above the Earth. These would employ Synthetic Aperture Radar (SAR) to provide day/night, all-weather surveillance over fishing grounds, shipping lanes and other sea areas.

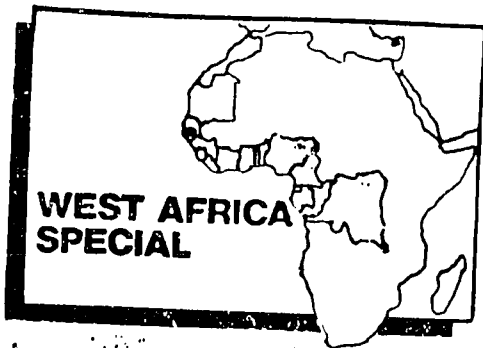
Recent technological advances in SAR now meant that a single spacecraft equipped with such a sensor

could scan over 100,000 sq. km of ocean in less than three minutes. Such satellites would also be able to provide navigational information. And, when coupled to optical sensors, they would be able to monitor fishery resources and pollution.

The problem of processing the huge mass of radar imagery so obtained was also being overcome, said Sir Peter Anson. Rapid advances in the areas of data reduction, data processing and pattern recognition would accomplish in minutes what had taken days.

He also anticipated further improvements in the resolving power of SAR sensors which, even today, can readily detect ships and, from their wakes, determine speed and course to within accuracies of five per cent and ten degrees.

When allied to the speed and increasing availability of communications via satellite, these advances in detection might pose fresh legal problems which, said Sir Peter, could mean the setting up of a new international maritime policing organisation.



The CECAF Project:

funding cut threatens valuable service



A four man outboard powered handline canoe powers on to the beach at Kayar

THE Food and Agriculture Organisation of the United Nations (FAO) established the Fisheries Committee for the Eastern Central Atlantic in 1967. Support for the work of this Committee has been provided by the Regular Programme of the FAO and substantially by the UN Development Programme (UNDP), since 1975, through the inter-regionally funded CECAF Project.

Membership of CECAF includes African nations along the coast and a number of non-African states fishing in the area. Present members are Benin, Cameroon, Cape Verde, Congo, Cuba, France, Gabon, The Gambia, Ghana, Greece, Guinea, Guinea Bissau, Italy, Ivory Coast, Japan, Korea, Liberia, Mauritania, Morocco, Nigeria, Norway, Poland, Romania, Sao

Tome and Principe, Senegal, Sierra Leone, Spain, Togo, USA and Zaire. Equatorial Guinea is shortly expected to become a member of CECAF and a country participating in the Project.

The underlying objective for the Project is to assist the Committee until it can provide its member states with all or most of the services provided for in regional bodies of developed countries.

Within the context of the present food security situation in Africa, a collapse in the abundance of fish stocks for the CECAF region, as experienced by such countries as Peru and Namibia, would necessitate drastic management action and remove a large source of protein supply and foreign earnings.

Without collaboration and national commitment by member countries, the risk of undermining the development opportunities through a collapse in the levels of fish stocks is said to be dangerously high.

Viewed against the situation when it was established, the Committee has made considerable progress towards providing its member countries — and especially the developing coastal states — with the same sort of services and support in managing shared stocks or shared fisheries, or in tackling common problems, as is provided by the much longer established bodies, plus additional services not provided by developed countries' commissions.

For example, regional compilations of catch and other statistics are now available and there has been a noticeable improvement in most national statistics.

Knowledge of the fishery resources, their distribution and migration and their state of exploitation has also been substantially increased.

Another important achievement is that the competence of local scientists has been greatly increased and several coastal states can now take their full share in the scientific work of the Committee. However, the Project acknowledges that training takes a long time and more assistance will be needed.

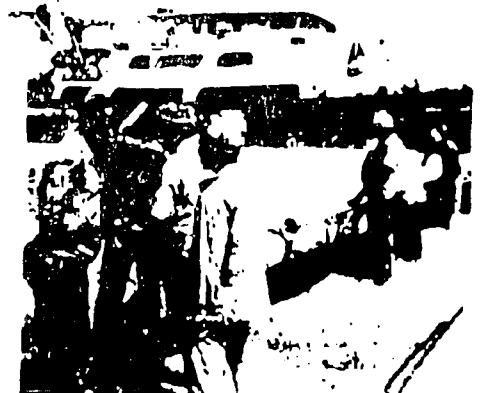
Progress towards the implementation of management measures has depended on previous progress in statistics and stock assessment, as well as on the level of awareness for the need for management measures. Although it has been slow, it has not, however, been insignificant.

The Committee has recommended the use of a larger mesh size in the demersal trawl fisheries. It has also raised the awareness of countries of the problems of and benefits from implementation of practical management schemes such as the regulation of fishing effort and control and surveillance.

Perhaps the most significant measure of the success of the Committee is the extent to which the output from its work is being used by member countries in determining their national policies. Several coastal countries, for example, are using information produced by the CECAF stock assessment groups in determining the amount of catch that they will allow to be taken by foreign fleets, or through expansion of the national fleet.

But this progress and the prospects of the continued orderly growth of CECAF towards a regional body capable of fulfilling all its potential responsibilities, is threatened by the cessation of funding for the CECAF Project.

In the long-term, similar funding — directly by the member states — may be possible, but for the present — bearing in mind the scarce financial situation of many developing countries — continuing support is urgently needed.



Fishermen mounting nets at Dakar. In the background the big Georgetown, Guyana, tuna seiner Iberic discharges her catch for processing at one of the port's three canneries

APPENDIX B

Interview with USSR Fishing Trawler

Captain Vladil Lyssenko

"Calypso Log", December, 1982

VLADIL LYSSSENKO

Translated for *Calypso Log*
by Elizabeth M. Tobin

Recently Captain Vladil Lyssenko defected from the Soviet Union to the West, claiming that his act was rooted not in political protest but in ecological protest. Capt. Lyssenko has spent most of his life as a sailor and fisherman in the Soviet Union. He currently makes his home in Sweden. During a recent visit to France, Captain Lyssenko agreed to meet with Yves Paccalet, editor of the French edition of Calypso Log, in our Paris office. He was accompanied by Leonide Pliouchitch, a mathematician and a Soviet dissident. (Editor's note: Calypso Log is presenting this interview because we believe the ecological issues raised are of enormous importance. However, we must emphasize that the information offered by Captain Lyssenko in this conversation has not been independently verified.)

CALYPSO LOG Captain Lyssenko, you claim that you left your country because the Soviet Union is systematically destroying the biological riches of the sea?

LYSSSENKO I came to the West to make it known. I am here to denounce a criminal and absurd system. I am not an intellectual; my disagreements with the Russian authorities do not stem from moral, political, or philosophical ideas, as is the case with Pliouchitch, Solzenitsyn, or Shakarow. In exercising my profession, it became obvious that this kind of socialism destroys nature, but political dissent came at a later time for me. I have a passion for the sea. I cannot bear to see it harmed. Yet, this is what I contributed to for a number of years, first as a sailor and then as the commander of a vessel of the fleet of Murmansk.

C.L. Tell us about your early career.

LYSSSENKO I will only speak of what I know best, the fleet of Murmansk. But, of course, the Soviet Union has numerous other fishing ports, where many other vessels are operating: Archangel, Leningrad, Odessa, Vladivostok. In 1953-1954, we were fishing only in the Barents Sea. We were catching cod. We had about 175 boats that were active in that area. I was young, and I was not well aware of the problems; I hardly

questioned anything when I listened to old fishermen who were protesting. We were taking fish out of the water that measured 40 centimeters (16 inches) long and were barely three years old. The old men used to say, "Why catch them so young?" Nobody listened to them. Sometime later a law authorized us to catch cod measuring 35 centimeters (14 inches) long. Only then did I feel shocked. Fish of that size did not have enough time to reproduce. We were depleting the stock of the species.

C.L. International regulations were in the conceptual stage at that time, but there were several agreements between governments that set forth regulations—some that applied to mesh sizes, for instance.

LYSSSENKO I must tell you something. Soviet authorities do not care about international regulations. Our representatives sign whatever is wanted, and they make a number of solemn promises. Then they return from conferences and laugh at the naiveté of the West. In areas where controls were frequent, we resorted to the double-net method: We fished with small-meshed trawls but we also carried other nets that met webbing regulation standards. We used to produce them whenever necessary. In areas where controls were not likely, it was worse. Every Soviet vessel is assigned a minimum catch



quota that is set by the general plan (Gosplan), which is devised by Moscow bureaucrats. The means utilized to meet the quota do not matter. We used fine nets and we also managed to use special frames that pulled the fish toward our nets.... More often than not, we would line the bottom of our trawls with canvas or animal skins. The West makes me laugh when they speak of moderation agreements and controls....

C.L. At that rate, the Soviet coastal waters must have thinned out quite rapidly.

LYSSSENKO In 1955, it became impossible to meet the plan's quota in the traditional banks of the Barents Sea. We went fishing in the area of Novaya Zemlya, which is full of fish. The only problem was that the fish there is radioactive, because of atomic fallout from experiments the USSR conducted on these islands. We used to work with a Geiger counter in hand. When it acted up too much, we would dump the contents of our nets back into the sea. When it was behaving mildly, we would keep our catch. Party "scientists" would come and explain to us

that it was not as dangerous as one would think and that, no matter what, "radioactivity is mainly concentrated in the liver of the fish, which is thrown away."

C.L. We should feel sorry for the children of those days who were duly fed cod liver oil from Novaya Zemlya by their mothers.... But go on with your story.

LYSSENKO Once the Barents Sea was exploited, we went to Spitsbergen, where sea perch became our specialty. We did such a good job that three years later, there were none to be found. We went down toward Iceland, Newfoundland, and the North American continent. This took place throughout 1959, 1960, and 1961. The first time I hauled my net off the Georges Bank, I was amazed: I had never seen such an abundance of fish, let alone such a variety. We destroyed herrings there. At that time, I counted that the Soviets had over 1,000 vessels working in the North Atlantic. Ninety percent of the trawlers off the Georges Bank spoke Russian. There were so many of us that ocean liners used to alter their routes.

By 1964, the Georges Bank was depleted of most of its resources in fish. Yet, we were still catching a sort of small and inedible hake that the Soviet authorities imposed upon the population under the name "hake-ling." We caught hundreds of tons of them. They barely weighed 150 grams (5 ounces) each. The flesh was watery and disgusting. Then, one day, we lowered our nets to 400 meters (1,300 feet), as opposed to the usual 80 to 100 meters (260 to 330 feet), and we caught some beautiful hakes. Our biologists realized that those were the adult population of the inedible "hake-ling's": We had exterminated the young population of the species before even knowing who were the spawners.

C.L. Such anecdotes do not speak highly of professionalism among Soviet biologists.

LYSSENKO Soviet biologists are just like any other citizens in the country: They abide by the rules or they are in trouble.... In the USSR you must be cautious of the way you speak out.... I communicated with the Party and suggested that it might be

preferable to eat large fish, rather than small ones. I had allies who held important positions in the hierarchy of power. In the name of fisheries, I even received the Lenin Order, which was personally given to me by Nikita Krushchev (it was in gold and platinum—the highest reward). On that day, I had a meeting with him at the Kremlin. I argued the case of the fisheries. I thought I had won a battle. But I did not: The logic involved in the Soviet economic system is such that it dictates waste.

C.L. Could you expand on this last point, which seems important.

LYSSENKO After cleaning out the North American banks, we went down the Atlantic, sometimes along the coast of Brazil and Argentina, sometimes along the coast of West Africa and South Africa. We went as far as South Georgia—nearly to Antarctica. And it was the same story everywhere we went. As I said, each Soviet fishing boat must meet the quota. To do so, you catch anything and use every possible means. The only thing that matters is tonnage. In Spitsbergen, I remember that it used to take 15 minutes to catch 10 to 15 sea perches. Since we were ill-equipped, we would throw them into our holds without salting them. Half of them rotted. But that's not all.

Once we got to Murmansk, we could not unload our catch; cold-storage units were too small and there was no one to package the fish. It wound up decaying in our holds. One year, I had access to a classified document addressed to the Minister of the Fisheries, whose name was Ichkov. The report said that 30,000 tons of fish were burned in Murmansk and, likewise, 70,000 tons in Vladivostok. The same report estimated that less than 30 percent of the fish caught by Murmansk trawlers made it whole to the cold-storage units of the port. I should also add that in the Soviet Union there are not enough trucks to transport fish throughout the country, so another portion of the fish catch decays in storage. We arrive at the following paradox: In a country that plunders the oceans of the globe, hardly anyone eats fish, except in large cities such as Leningrad and Moscow!

C.L. Captain Lyssenko, you left the fisheries in 1969 and you went into

freight operations. A few years later, you emigrated to the West. How did this come about?

LYSSENKO As I told you, I have always had a passion for the sea. Yet I received the Lenin Order medal because I was destroying it. It soon became unbearable for me. You know, toward the end of my career as a commander, we were using bottom trawl nets. Once we had located fish banks we would scrape the bottom once, then we would come back, and this way we would even catch the eggs! The places we went through are devastated and sterilized for a long time. Certain countries located in the area where we proceeded with such destructive methods were rather unfriendly toward us. In 1969, the Argentinians fired at us after they claimed their 200-mile territorial zone.

As far as I am concerned, my joining the merchant marine did not improve my feelings about the Soviet system. I was the commander of a tanker that used to go to Cuba loaded with oil products and return with molasses. There are no cleaning facilities in Havana; we would therefore rinse out our tanks at sea. I was no longer destroying the sea, I was polluting it. I came to the West six years ago.

C.L. There is a question I am very eager to ask you. It is said that every Russian trawler carries spies on board...

LYSSENKO There are two categories of Soviet trawlers: the ones that are involved with fishing and spying activities, and the ones that are conducting nothing but spying activities. Aboard the first category of trawlers, the KGB men are nonetheless in full control; every sailor must obey their orders, including the captain.... I will tell you a story about these "trawlers" that carry no fishermen. In the beginning, when we used to approach American shores, the KGB men would disguise themselves as fishermen and would pretend to be fishing. Of course, the U.S. Coast Guard was not fooled for long. Today, the Soviet secret service specialists are still cruising the oceans in make-believe fishing boats, but when they meet Western coast guards, they do not bother to change their military uniforms anymore.

APPENDIX C

Fishing Vessel Types and Identification

(expanded from R. J. Allain, "Study of Aerial Fisheries Surveillance in Certain Coastal States," GCP/INT/370/NOR, FAO, Dakar, April, 1982.)

BMRT type - "PUSHKIN"

The "Pushkin" was the first of the Russian stern trawlers, and is an exact copy of the British "Fairtry". The first factory stern trawler in the world, the "Fairtry" was built in 1953 by J. Lewis and Son, a small shipyard in Aberdeen, and launched in March, 1954. In 1953, a Soviet trade delegation obtained preliminary information regarding the "Fairtry". Later that year, the Lewis company received a tender from the Soviet government for the construction of twenty-four factory trawlers on this design, with the stipulation that a copy of the "Fairtry's" plans be sent to the USSR in advance for preliminary study on an aid in negotiations.

"Thus occurred what was probably one of the most important and certainly the fastest transfer of technology in the history of commercial fishing. With virtually no prior tradition of high-seas fishing, the Soviet distant water fleet was off and steaming".* Negotiations with the British were terminated shortly after receipt of the plans, and the Soviet Union proceeded to build 42 vessels on this design.

* William W. Warner, Distant Water: The Fate of the North Atlantic Fisherman, Little, Brown and Company, 1983.

Length over all:	277' 84.5 m.	Speed:	12.5-13.3 knots
Beam:	44' 13.4 m.	No. in crew:	90-125
Draft:	17' 5.2 m.	Where built:	West Germany (GFR)
Disp. tonnage (loaded-light):	3,538-2,235 tons	When built:	1954-1956
Deadweight (metric tons):	1,230-1,242 tons	No. built:	42
Gross tonnage:	2,472-2,555 tons	Endurance:	60-80 days
Propulsion type:	Diesel motor	Hold capacity:	57,063' 1,616 m.
Horsepower:	1,900	Fuel capacity:	Unknown
No. Screws:	1	Fresh water capacity:	Unknown

Type of Fishing Gear:

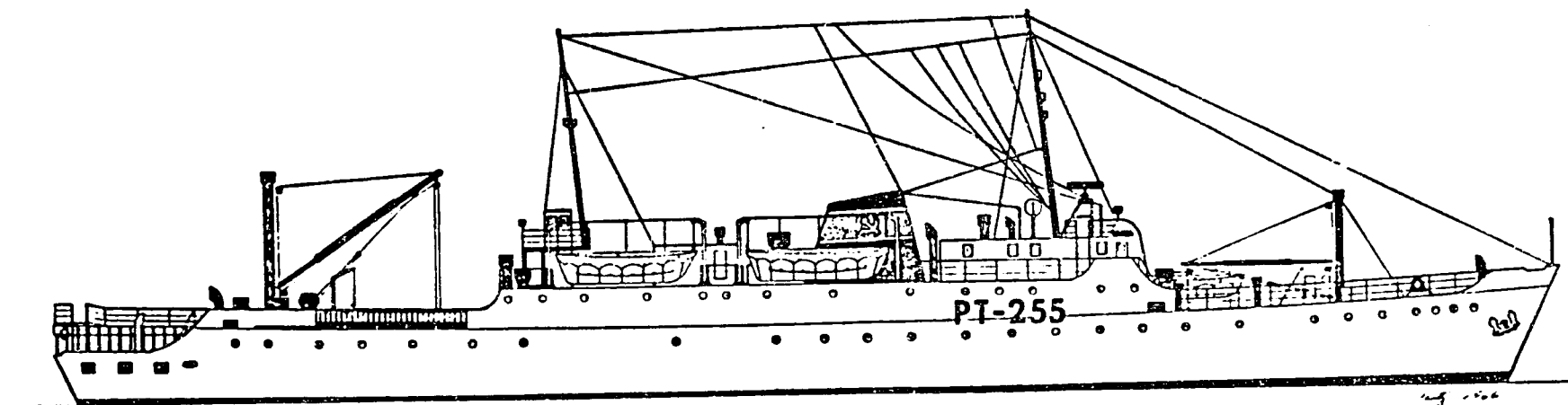
This vessel generally trawls with a 37.7 m. (124') trawl and 970 kg. (2,138 lb.) oval trawl board. The winch is electric and it has 2 drums, a pulling force of 9000 kg. (19,841 lb.), a hauling speed of 60 m. (197') per minute, and a drum capacity of 1,500 m. (4,921') of 26 mm. (1.02") diameter cable.

Production Capacity:

The annual production in 1956 was 9,000 tons for the vessel, Pushkin, and 8,600 tons for a sister ship, Stalingrad, in 1955. This class can freeze 30 to 40 tons of fish fillets or dressed fish per day. They are stored in -19°C (-0.4°F) refrigerated holds. This class has the capacity to process 500 tons of fish and livers per hour as well as converting 23 tons of fish wastes to fish meal per day. They can also extract pure liver oil from fresh livers.

Remarks:

This class was the first of the Russian stern trawlers. The design was based on the British Fairtry.



VESSEL TYPE: Stern Trawler (SMRT)
VESSEL CLASS: Pushkin

BMRT type - "MAYAKOVSKIY"

The "Mayakovskiy" class developed into what was undoubtedly the workhorse of the Soviet fleet and it will be a common sight on fishing grounds around the world for years to come. Although the first vessels of this class have probably now gone to the scrap-yards, there may still be more than two hundred of these ships fishing for the Baltic and Far Eastern fleets. These vessels were built between 1958 and 1969 in Klaipeda on the Baltic and Nikolaev on the Black Sea, and are seen in the CECAF area, particularly outside Dakar port.

A "Mayakovskiy" BMRT is characterized by a long flat bullet-like silhouette, with a low extended superstructure and twin masts in place of a stern gantry. They may be identified if their side number falls within the following range: LB-0225 to EB-0536. The first letter is the index for the vessel's home port and can be either L for Klaipeda, K for Kaliningrad, N for Leningrad, R for Riga and Liepaya, or E for Tallinn. The second letter will always be B for "BMRT", large trawler. There are a few exceptions to the rule. Those vessels with side numbers ranging from KB-0265 to KB-0278 from both Leningrad and Kaliningrad are of the Polish built "Kosmos" class. There are also specially adopted "Mayakovskiy's" used as research vessels that have side numbers outside the given range. Their white paint scheme and deck equipment will make them readily identifiable as such.

The key factor influencing fishing operations of this type of vessel is the use of a stern bridge or wheelhouse. Located above the trawl deck, this small wheelhouse affords a view of the trawl deck and stern of the vessel. It is equipped with repeaters of the helm, telegraph and variable pitch control, so that the vessel can be steered from this position. When

shooting or hauling the trawl, the officer on watch must transfer the helm from the forward main wheelhouse to the stern as there is absolutely no view of the trawl deck from the main bridge. This usually implies that a lookout must be left on the forward bridge if the vessel is working in a dense traffic zone. In more contemporary vessel design, this inconvenience has been eliminated through the use of a higher single bridge amidships, allowing the officer and helmsman on watch a view both fore and aft.

Length over all: 273' 81.7 m.	Speed: 13.7 knots
Beam: 46' 14 m.	No. in crew: 102-114
Draft: 18' 5.5 m.	Where built: USSR
Disp. tonnage (loaded-light): 3,712-3,658 tons	When built: 1958 - still building
Deadweight (metric tons): 1,301 tons	No. built: 100 (at end of 1966)
Gross tonnage: 3,170 tons	Endurance: 80 days
Propulsion type: Diesel motor	Hold capacity: 58,638' 1,661 m.
Horsepower: 2,000	Fuel capacity: Unknown
No. Screws: 1 (C/P)	Fresh water capacity: Unknown

Type of Fishing Gear:

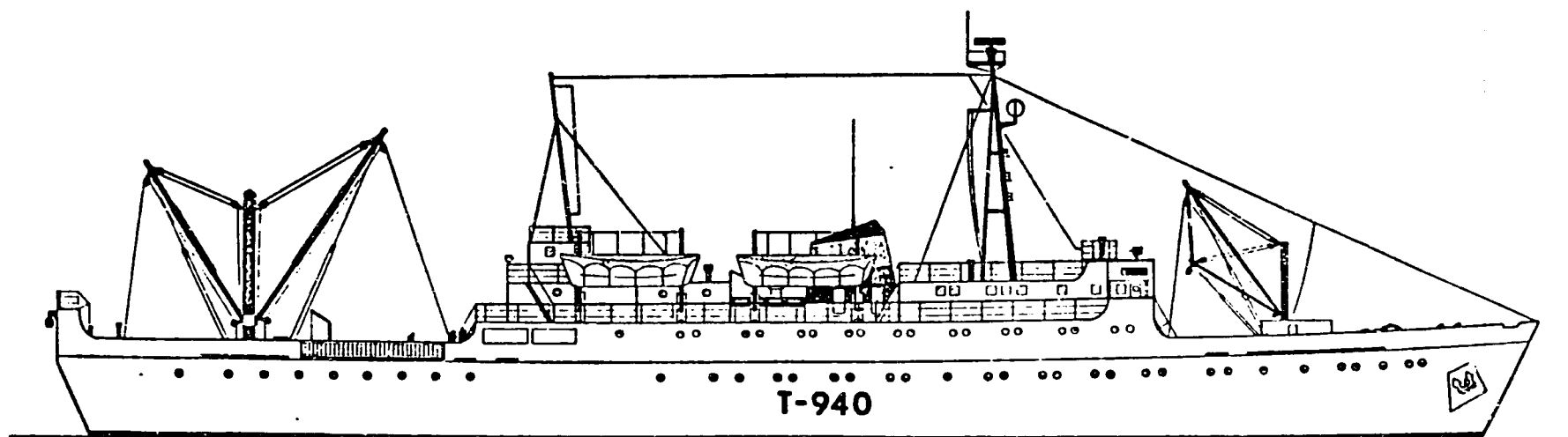
The vessel trawls with a 37.7 m. (124') trawl and 970 kg. (2,138 lb.) oval trawl boards. The trawl winch is electric and has 2 drums, a pulling force of 12,000 kg. (26,000 lb.), a hauling speed of 60 m. (197') per minute and a drum capacity of 2,500 m. (8,202') of 26 mm. (1.02") diameter cable.

Production Capacity:

The annual production of a top vessel in 1964 was 15,000 tons. The hold capacity of fish products is about 900 tons and the frozen products are stored at -18°C (-0.4°F). The maximum daily capacity of frozen products is 20 tons of fillets and 10 tons of dressed fish which are frozen at -40°C (-40°F). The meal plant can handle 20 tons of waste per day, the oil plant can use 1.6 tons of livers per day, and the canning plant has the capacity to process 3,500 tins of liver a day. Approximately 14 tons of distilled water can be produced per day.

Remarks:

These vessels are often used in exploratory fishing operations.



VESSEL TYPE: Stern Trawler (BMRT)
VESSEL CLASS: Mayakovskiy

BMRT type - "LESKOR"

The "Leskor" class was built from 1959-1962. Similar in appearance to the "Mayakovskiy", the "Leskor" has a slightly larger hold capacity, a larger fish meal plant, and a larger frozen products capability with ten percent less gross tonnage.

Length over all: 279' 85.2 m.	Speed: 12.5 knots
Beam: 45' 13.8 m.	No. in crew: 75-110
Draft: 18' 5.4 m.	Where built: Poland
Disp. tonnage (loaded-light): 3,477-2,298 tons	When built: 1959-1962
Deadweight (metric tons): 1,240 tons	No. built: 70
Gross tonnage: 2,893-2,670 tons	Endurance: 70 days
Propulsion type: Diesel motor (8-cylinder)	Hold capacity: 62,754' 1,777 m.
Horsepower: 2,000 normal 2400 maximum	Fuel capacity: 29,311' 830 m.
No. Screws: 1	Fresh water capacity: 8,652' 245 m.

Type of Fishing Gear:

This vessel generally trawls with a 37.7 m. (124') trawl, and the 970 kg. (2,138 lb.) oval trawl board. The trawl winch is electric, has 2 drums, a pulling force of 12,000 kg. (26,000 lb.), a hauling speed of 72 m. (236') per minute, and a drum capacity of 2,000 m. (6,562') of 26 mm. (1.02") diameter cable.

Production Capacity:

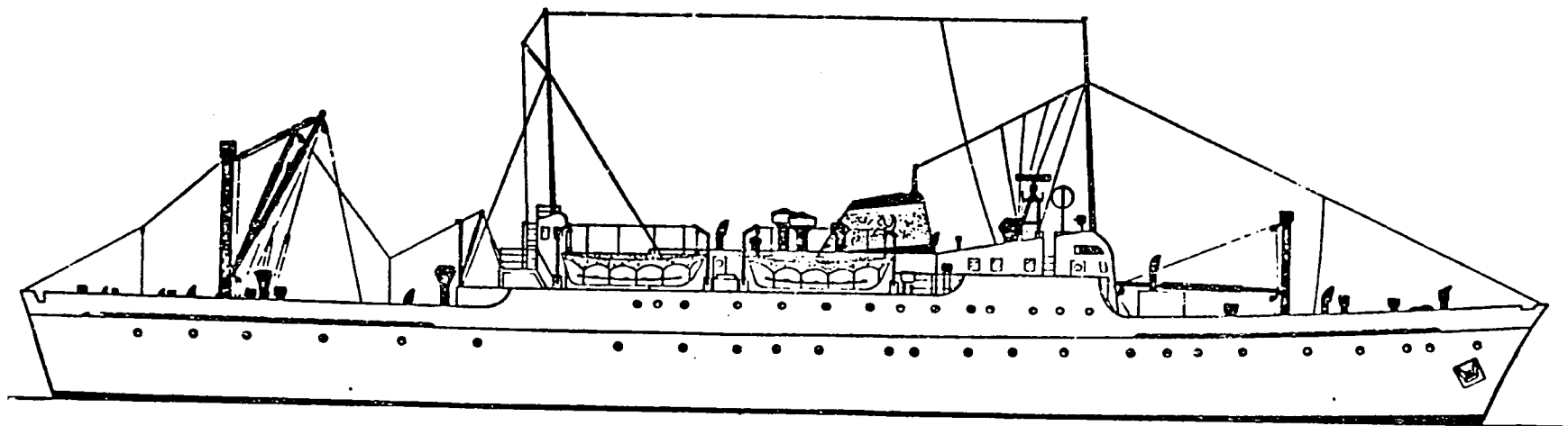
This vessel can carry about 650 tons of frozen products in -18°C (-0.4°F) refrigerated holds. The maximum daily capacity of raw fish is 50 tons. She can freeze 30 tons of fish fillets per day or 27 tons of dressed fish (headed and gutted) per day. She can use 25-30 tons per day of fish wastes or scrap fish for fish meal, can process 3000 tins of liver per day, and has the facilities for rendering oil from livers and distilling water.

Remarks:

In Poland this vessel is classified as the B-15 series of trawlers and as the Dalmor class.

Pertinent References:

Piltz (1960), Kamenskii and Muragin (1961).



VESSEL TYPE: Stern Trawler (BMRT)

VESSEL CLASS:

Leskor (Polish B-15 Trawler, Dalmor class)

RTM type - "TROIPIK"

The abbreviation RTM stands for Refrigerator-Freezer Trawler in Russian and is used as a designation for two classes of East German trawlers, the "Tropik" as described here, and the newer "Atlantik", dealt within the next section.

The "Tropik" was the first vessel type delivered to the USSR intended for work in tropical waters. Unlike the "Mayakovskiy" and "Kosmos" classes, the "Tropiks" are not ice reinforced. They do have superior air conditioning systems for the comfort of the crews, however. Beginning in 1962, approximately forty-five such vessels were delivered to the Black Sea fleet based at Batumi, Kerch and Sevastopol. This fleet carries out the majority of its work in tropical waters. The remaining vessels were delivered to the "Kaliningrad", and Bulgarian fleets. The first vessel of the class, the "Tropik" now fishes for Ghana.

"Tropiks" may be easily distinguished from "Mayakovskiy" and "Kosmos" class trawlers. The "Tropik" has a very low trawl deck that appears "hollowed out" from a distance. The gunwhales rise to the main deck aft of the twin king posts or trawl gantry masts. The cargo gilson supports on the bow are more slender than those of the "Mayakovskiy" and "Kosmos" classes and are "goal-post" shaped. The upper and bridge decks are enclosed as on the "Atlantik" class while the life boat stations are on the upper deck parallel to the stern wheelhouse. There are usually additional life boats on the bow.

"Tropik" side numbers all fall within the range FV-7003 to GV-7086. All Baltic registered vessels of this class are based in Kaliningrad; vessels having a side number beginning with the letter F are from the Crimean ports of Sevastopol or Kerch and those that begin with G are from the port of Batumi in Soviet Georgia. At least one vessel, the "Raduga", is a research vessel in the Pacific.

Length over all: 262' 79.8 m.	Speed: 12.5 knots
Beam: 43' 13.2 m.	No. in crew: 76
Draft: 18' 5.7 m.	Where built: East Germany (GDR)
Disp. tonnage (loaded-light): 3,262-2,400 tons	When built: 1962-1966
Deadweight (metric tons): 793 tons	No. built: 52
Gross tonnage: 2,435 tons	Endurance: 60 days
Propulsion type: Diesel	Hold capacity: 37,080' 1,050 m.
Horsepower: 2(670) = 1,650	Fuel capacity: Unknown
No. Screws: 1 (C) and AR	Fresh water capacity: Unknown

Type of Fishing Gear:

This vessel is designed to fish a variety of gear. She can trawl, seine with the use of the dories stored on the fore deck, gill net, long line, troll with the dories, pole and line with live bait, and night light with electrical pumps. The 37.7 m. (124') trawl with the 970 kg. (2,138 lb.) oval trawl boards are most likely used when trawling. She has a three-drum electric-powered combination seine and trawl winch. The trawl drums have a pull of 12,000 kb. (26,435 lb.), a hauling speed of 60 m. (197') per minute, and a 2,000 m. (6,562') capacity of 26 mm. (1.02") diameter cable. The seine drum has about the same pull but a hauling speed of 10 m. (32.8') per minute, and a capacity of 2,000 m. (6,562') of 22 mm. (.866") diameter cable.

Production Capacity:

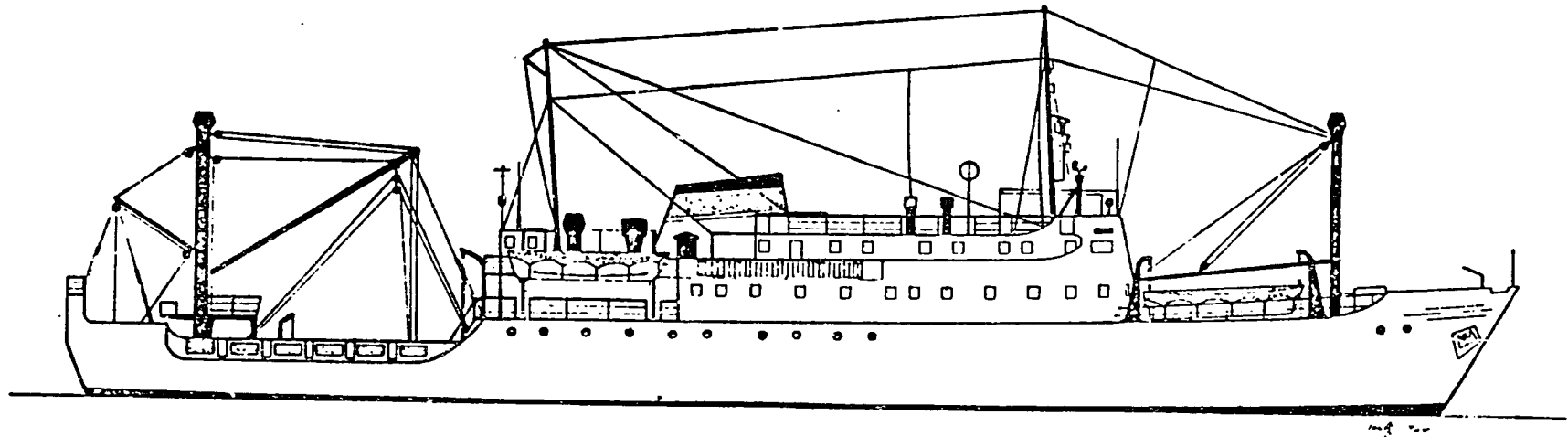
The annual production has been as high as 7,050 tons. The daily capacity is about 50 tons of fish. She can freeze 30 tons of fish, use 20 tons of wastes for meal, and 882 pounds of liver for oil per day. She can distill 15 tons of fresh water and make about 6 tons of flake ice in a day. The fish hold is held at a temperature of -25°C (-13°F).

Remarks:

Two of these ships were given to Ghana. They are designed for work in the tropics.

Pertinent References:

Borisov (1962), Sudostroic (1963).



VESSEL TYPE: Stern Trawler
VESSEL CLASS: Tropik

RTM type - "KOSMOS"

The "Kosmos" class, built in Poland from 1963, is essentially an upgraded and improved "Leskov" stern trawler. Like the "Leskov" and earlier "Mayakovskiy", the "Kosmos" was primarily designed for fishing in northern waters and has a reinforced hull.

Length over all: 272' 83.0 m.	Speed: Unknown
Beam: Unknown	No. in crew: Unknown
Draft: Unknown	Where built: Poland
Disp. tonnage (loaded-light): Unknown	When built: 1963 - still building
Deadweight (metric tons): Unknown	No. built: 10 as of 1964
Gross tonnage: 2,900 tons	Endurance: Unknown
Propulsion type: Diesel motor	Hold capacity: 65,332' 1,250 m.
Horsepower: 2,400	Fuel capacity: Unknown
No. Screws: 1	Fresh water capacity: Unknown

Type of Fishing Gear:

The fishing gear is probably very similar to the gear used on the Leskov class of stern trawler.

Production Capacity:

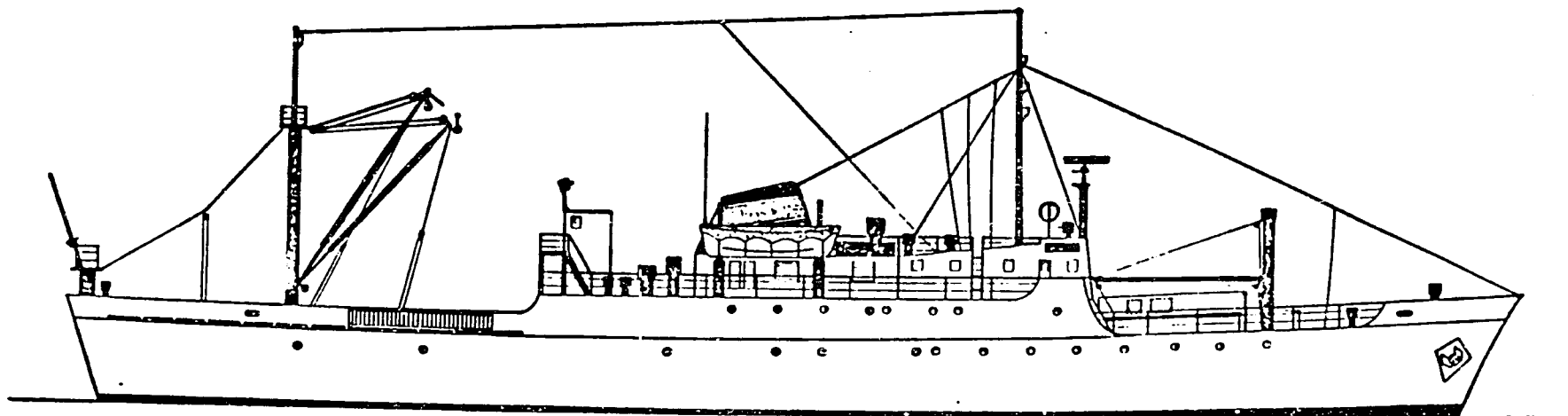
The production capacity is probably similar to that of the Leskov class of stern trawler.

Remarks:

The Kosmos class stern trawler replaced the Leskov class, and has a number of improvements. It is classified as the B-26 trawler series in Poland.

Pertinent References:

Brady (1963), World Fishing (March 1966).



VESSEL TYPE: Stern Trawler
VESSEL CLASS:
 Kosmos (Polish B-26 Trawler)

RIM type - "ATLANTIK"

The "Atlantik" class stern trawler from the Volkswerft yard in Stralsind in East Germany is probably the most popular and successful vessel class ever built in an Eastern European yard. In addition to the approximately one hundred and fifty such vessels delivered to the USSR, twelve vessels were delivered to Bulgaria, eight to Romania and five ships were transferred from the USSR to the Cuban fleet. Although the USSR's "Atlantik's" are seldom seen in northerly waters, vessels from the other nations are frequent visitors to Eastern Atlantic waters.

The "Atlantik" type vessels delivered to the USSR have been more or less evenly distributed between the Baltic, Black Sea and Far Eastern fleets. As is the case with their predecessor, the "Tropik", the "Atlantik" class vessels of the Baltic ports and Black Sea bases fish mostly in tropical waters.

The "Atlantik" class vessel, built from 1966 to 1976 is a significant improvement over the "Tropik" class. The incorporation of a combined bridge and winch control house amidships, and a very long trawl deck permit much faster shooting and hauling times. The deck is also split so that a second trawl may be shackled directly to the ground warps and shot away while the first trawl is being dumped, much as on the more recent "Aerodrom" class.

The "Atlantik" class may be distinguished from the "Tropik" and other vessel classes by its totally enclosed superstructure and twin funnels directly behind the bridge. The bridge itself is raised onto a separate deck much as is the case with the "Altai" and "Aerodrom" classes. Overall, the "Atlantik" gives the external appearance of having a high superstructure on what seems a very short keel lending to a somewhat "top-

heavy" look. This is not the case. The deceptively short hull is, in reality, only three meters shorter than that of the "Mayakovskiy". Despite the "bulky" appearance, Soviet and Bulgarian masters praise the vessel's excellent sea keeping characteristics.

Side numbers range from KV-7101 "Atlantik" to KV-7249 "Tesev".

"Atlantiks" are registered in all of the Baltic ports mentioned previously. Like the "Tropik's", they are also based in Kerch, Sevastopol and Batumi, the component ports of the Black Sea fleet. There is some duplication of names. For example, there are two "Atlantiks" named "Kondor", one based in Riga, the other in Burgas, Bulgaria.

Length over all: 270' 82.2 m.	Speed: 13 knots
Beam: 45' 13.7 m.	No in crew: 80
Draft: Unknown	Where built: East Germany (GDR)
Disp. tonnage (loaded-light): 3,200 tons	When built: 1966 - still building
Deadweight (metric tons): Unknown	No. built: 100 planned by 1970
Gross tonnage: 2,760 tons	Endurance: 60 days
Propulsion type: Diesel	Hold capacity: 45,140' 1,278 m.
Horsepower: 2(1315) = 2630	Fuel capacity: Unknown
No. Screws: 1 (CP and AR)	Fresh water capacity: Unknown

Type of Fishing Gear:

This vessel appears to be designed for trawling only. The trawl size is unknown, but it is probably the 37.7 m. (124') trawl that they use.

Production Capacity:

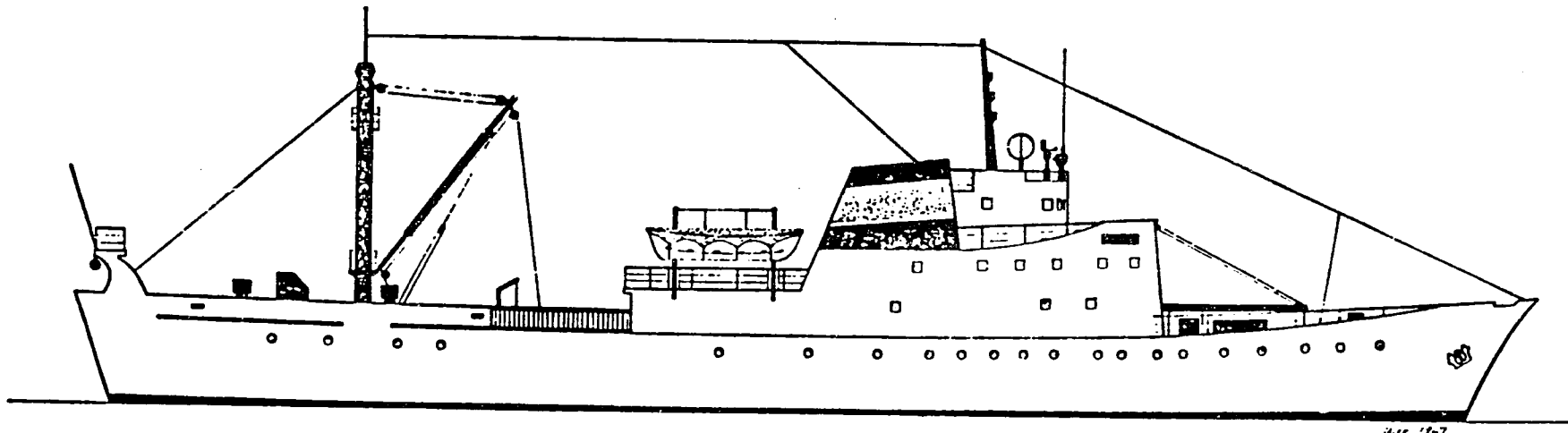
The vessel can handle about 80 tons of fish a day. Since the vessel will work in the tropics, the catch is immediately chilled in special containers to 2°C (35.6°F). A total of 45 tons of fish can be frozen per day and 35 tons of undersirable fish converted to fish meal.

Remarks:

This vessel is designed for the tropics and it replaces the Treplk class of stern trawler.

Pertinent References:

World Fishing 1965 (July), CFR 28(2) p. 59.

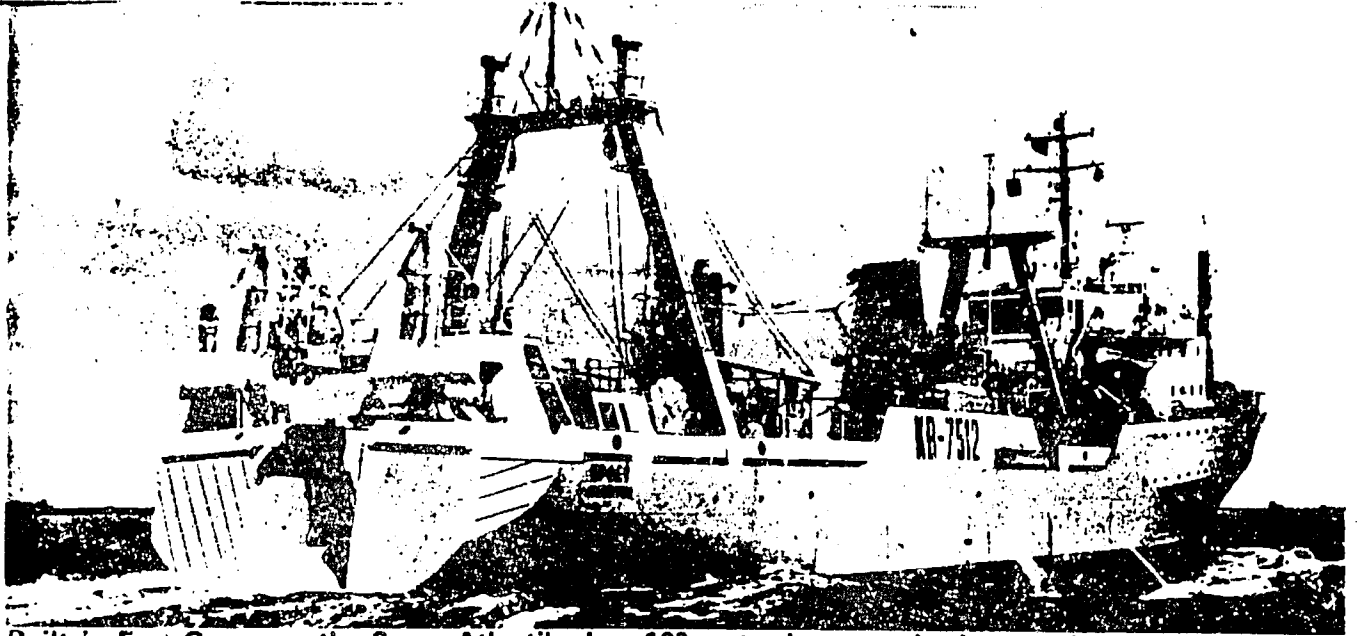


VESSEL TYPE: Stern Trawler
VESSEL CLASS: Atlantik

RTMS type - "SUPER ATLANTIK"

In 1971, together with twelve "Atlantik" class vessels, the Volkswerft yard in Stralsund, GDR, delivered the first "Super Trawler", KV-7501 "Prometey", to the Soviet Union. Of a size approximating that of the Soviet built "Altai" class, the new "Super Atlantik" quickly surpassed the cumbersome "Altai" in popularity and by the end of 1977, seventy two such vessels had been delivered to the USSR. Romania has already received at least six such vessels while East Germany's own fleet took delivery of its first vessel in 1976. The first newer improved "Super Atlantiks" of type 464 emerged in 1977 with the delivery of "Kapitan Purgin". This class of vessel is still being built at the time of writing.

Superstructure and funnel arrangement are totally different from the Soviet "Altai" class. On the "Super Atlantik", the main superstructure is located well forward while the tall twin smokestacks are placed much further aft, almost on the stern. "Super Atlantiks" are given side numbers in the 7500 and 0400 ranges. Because the class is not yet complete, no end range has been determined. The "Super Atlantiks" are based in the Baltic and Black Sea ports mentioned previously as well as those of the Soviet Far East.



Built in East Germany, the Super Atlantik class 102-metre long trawler is one of the most successful fishing ships in the Soviet fleet.

RMS type - "NATALIYA KOVSHOVA"

Built in France for the Soviet Union in 1965-1966, the three ships in this class are the largest stern trawlers ever built. Total overall length is 423 feet, or 50% larger than the typical stern trawler. She carries a crew of 232, which is three to four times greater than those of other trawlers. She is equipped with an on-board canning factory which can produce 200,000 cans per day of sardines, herring, or mackerel.

Length over all: 423' 129 m.
 Beam: 62' 19 m.
 Draft: 23' 7 m.
 Net tonnage: Unknown
 Deadweight (metric tons): 4,500 tons
 Gross tonnage: 8,425-8,500 tons
 Propulsion type: Diesel-electric
 Horsepower: 2 (2,000) = 4,000
 Screws: 1 (CP; AR 400 hp.; BT 400 hp.)

Speed: 14 knots
 No. in crew: 232 (166 for factory)
 Where built: France
 When built: 1965-1968
 No. built: 3
 Endurance: 90-120 days
 Hold capacity: 109,478' 3,100 m.
 Fuel capacity: 88,287' 2,500 m.
 Fresh water capacity: 21,189' 600 m.

Type of Fishing Gear:

This vessel is designed to trawl. The size and types of nets are unknown, except that they are bottom or midwater trawls. The trawl winch has five drums, a pulling force of 15,000 kg. (33,069 lb.), and a hauling speed of 120 m. (394') per minute.

Production Capacity:

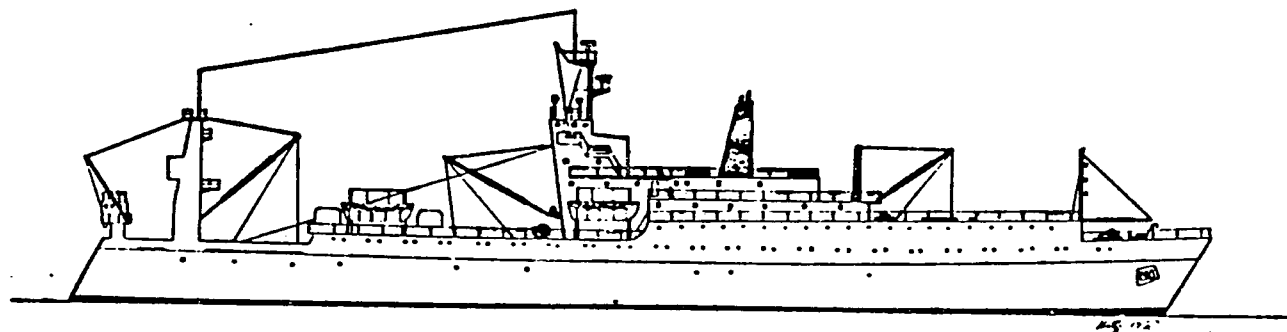
The factory is set up for canning herring, mackerel, and sardines, while other species are frozen. The cannery consists of two lines. Output per day of the factory is 200,000 large cans (250 cc - 15.2 in) of natural herring or mackerel on one line only, or 100,000 smaller cans of sardines, herring, or mackerel in oil on one line and 100,000 larger 250 cc (15.2 in.) cans of herring or mackerel (oil or natural) on the other. In a day a total of 20 tons of fish can be frozen for future canning. A total of 1,000 lb. of frozen fish can be thawed per hour for canning. The fish meal plant can handle 20 tons of wastes per day. A total of 550 pounds of flake ice can be made per hour.

Remarks:

This is the largest stern trawler ever built. The names of the three vessels are: Natalia Kovshova, Maria Polivanova, and Anatolii Khaline.

Pertinent References:

Shipbuilding and Shipping Record (1968), World Fishing (1966), Brady (1966).



VESSEL TYPE: Stern Trawler

VESSEL CLASS: Nataliyya Kovshova

BASE ("MOTHER SHIP") type - "PIONIERSK"

This class is designed to act as a base or mother ship for typically up to 40 stern trawlers, which may transfer their catch directly from trawl net to the base ship for processing and freezing.

Length over all:	543' 165.4 m.	Speed:	15.5 knots
Beam:	70' 21.3 m.	No. in crew:	248-261
Draft:	27' 8.1 m.	Where built:	Poland
Disp. tonnage (loaded-light):	Unknown	When built:	1963 - still building
Deadweight (metric tons):	10,000 tons	No. built:	9 at end of 1966 (11 planned)
Gross tonnage:	13,639 tons	Endurance:	75 days
Propulsion type:	Diesel	Hold capacity:	387,049' 10,960 m.
Horsepower:	6,250-6,550	Fuel capacity:	1,900 tons 164,566' 4,660 m.
No. Screws:	1	Fresh water capacity:	300 tons 67,098' 1,900 m.

Type of Fishing Gear:

None: but there is a stern chute and winch for hauling codends aboard.

Production Capacity:

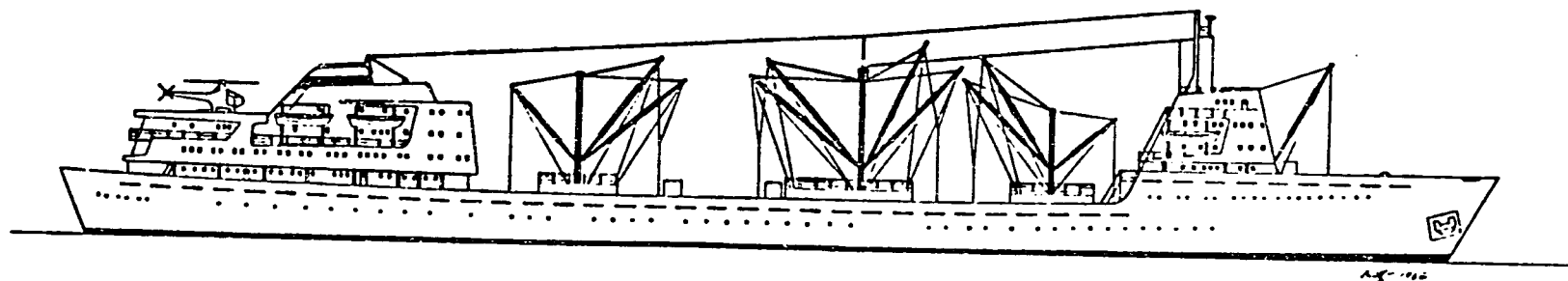
The ship acts as a base ship for 20 to 40 SRT's during the herring season and a freezer ship for the trawl fisheries during the rest of the year. She can process (lightly salted) and store 200 tons of herring per day in -5°C (23°F) holds. She can produce 100-150 tons of fish meal per day and when working with the trawlers she can fillet and freeze 100 tons of fish per day. She can also produce 100 tons of distilled water, 20 tons of ice and 5 tons of fish oil a day.

Remarks:

This ship is known in Poland as the B-64 series and a later modified model as the B-67 series. The names of some of these ships are Pioniersk, Professor Baranow, Gryf Pomorski.

Pertinent References:

Brady (1966), Fishing News International (1964) and (1967), CFR 26(3) 1964 p. 71.



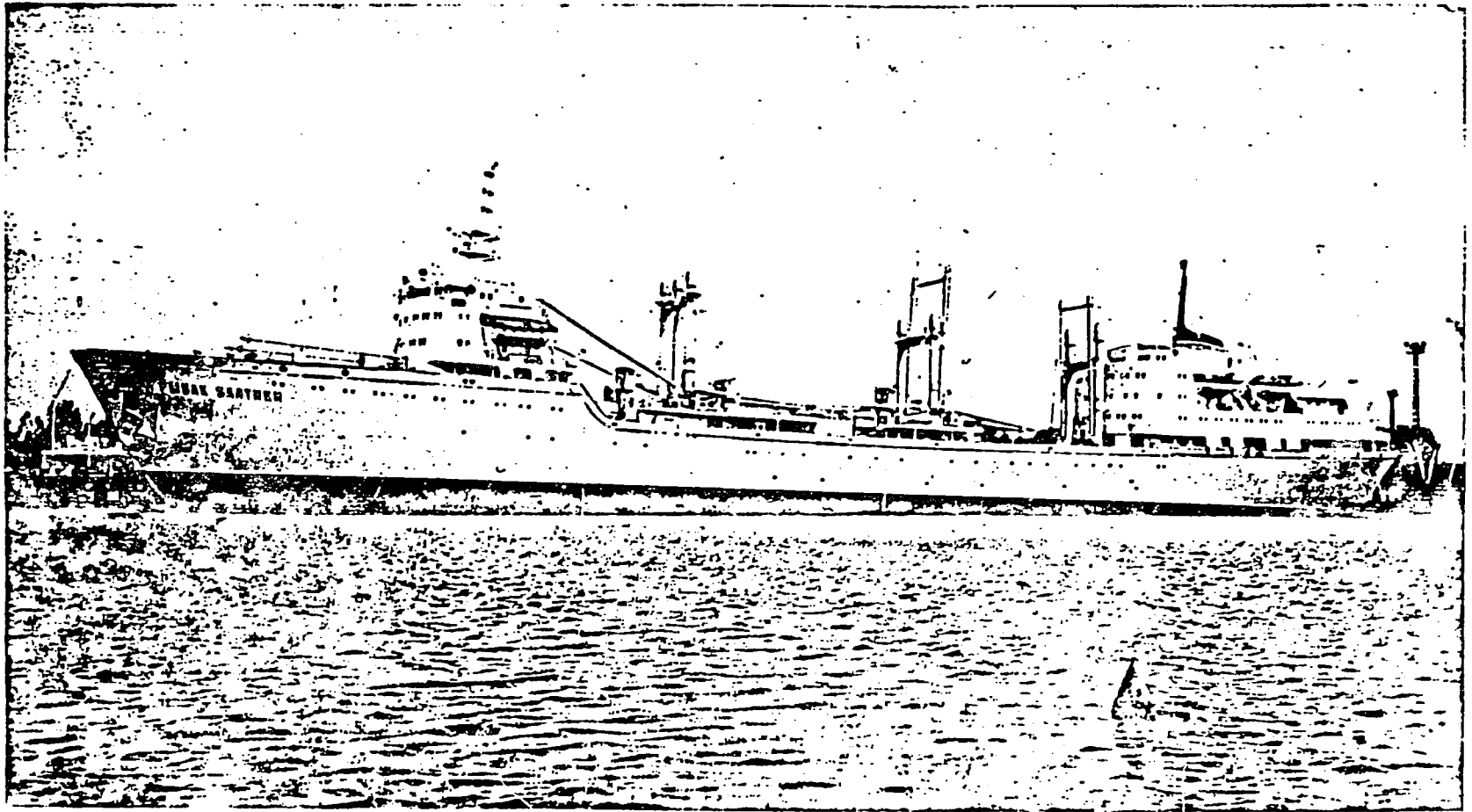
VESSEL TYPE: Base Ship

VESSEL CLASS: Pioniersk (Polish B-64 series)

fish factory mother ship
10000 DWT

ANNEX No.1

Profesor Baranow
class.



USSR VESSEL IDENTIFICATION

Normally all Russian trawlers can be classed by their number.

Stern trawlers: BMRT (large factory stern trawler) :0225-0660
(with the exception of the 2600's)
RRT (refrigerated fish trawler) :0236-0457

Note: BMRT and RRT have duplicate numbers in some 34 cases involving 0200's and 0400's. However, 2 letter prefix will be different.

RMT (freezer fishing trawler) :7003-7200
PRT (production refrigeration trawler) :0111-0125
0801-0825

SRTK (medium freezer stern trawler) :8046-8151
(several in 1200-1300's)

Soviet hull is grey/white

Side trawlers: SRTM (medium refrigerator fishing trawler):8000-8044
(exception add 0815 and 0839)

SRTR (medium refrigerator fishing trawler):0021-0042
0203-0205
0703-0726
1100-1176
3166-3204
9001-9169

Pendant numbers: Soviet fishing vessels:

First letter (home port designator):

A - Arkhangelsk
B - Belomorsk
F - Sevastopol
G - Batumi
K - Kaliningrad
L - Klaipeda
M - Murmansk
N - Leningrad
P - Vladivostok
R - Riga
S - Yuzhno-Sakhalinsk
T - Petripavlovsk
Z - Tallin

Second Letter (type of vessel):

A - PRT
B - BMRT, RRT, PRT
E - SRTS
G - RT
I - SRT, SRTK, SRTM, SRTR
K - CGO
M - MRTR
N - TKR
P - FAC
R - PR, PTR
T - TR, PTR
V - RTM

Examples: MI-0012 : GORNOSTAY, LENTRA CL.SRT - MURMANSK
AB-0012 : Khibiny, Altay CL.PRT - AKRHANGEKSK
LB-0225 : RAPOLAS CHERNAS, MAYAKOVKIY C.BMRT - KLAIPEDA
FA-0338 : GEROI ELTIGENA, REMBRANDT C.PRT - SAVASTOPCL
KV-7028 : VEGA, TROPIK C.RTM - KALININGRAD

Auxiliary vessels:

Refrigerated transports . : 0000's
Factory base ships : 0100's
Refrigerated transports : 0200's
 0300's
 0400's (some 0400's are tankers)
Fuel and water carriers (tankers) : 0500's
Sea-going tugboats : 0600's

Japanese

Distinctive looking stern trawlers with "H" frames fore and aft.

Vessel name is displayed above wheelhouse. Two combinations exist with respect to side numbers:

1. Number is composed of three letters followed by up to three numbers:

FOI - 209

SOI - 565

YGI - 099

2. Side number is made up of four letters which also double as the vessel's call sign:

JAQW

JIDN

JRTU

any trawlers have identical names and the word "MARU" is found on all Japanese trawlers.

Bulgarian

Operate a dozen trawlers of the Soviet "Atlantik" class.

Vessel name is written in Russian letters on the ship's bow but in English above the wheelhouse.

Side number is comprised of numbers only, i.e.:

1019 : SLANTCHEV BRIAG

10395 : AURELIA

1045 : KITEN

10426 : ROTALIA

East German

Side number is comprised of the standard prefix "ROS" plus a three digit number.

The prefix used designates the home port of Rostok.

The three digits which follow this prefix fall in the 300's, 400's and 500's for stern trawlers and in the 200's for side trawlers.

Furthermore, stern trawlers are named after individuals and side trawlers after places, i.e.:

ROS 109 : MANSFIELD

Romanian

Operate stern trawlers similar to those of the Soviet fleet.

Vessel name is written in English letters on the ship's bow which distinguishes it from Bulgarian trawlers.

Side number is comprised of one to four digits only, i.e.:

1	:	OZANA
861	:	DORNA
1062	:	JIJIA

Those vessels whose name contains the word "POLAR" are classed as refrigerated transports.

Polish

Side number is comprised of three letter prefix followed by a two or three digit number, all of which are lower than 400, i.e.:

SWI	Home Port	Swinoujsoie
SZN	Home Port	Szozecin
GDY	Home Port	Gydnia

Spanish

Distinguishing feature is the length of the vessel's side number: two letters - single number - four numbers, such as : SS-2-1809.

When prefix is:

BB
C, CA
FE
FI
HU
LC
SE
SS
ST
VI

Home port is:

Bilbao
Cadiz
El Ferrol
Gijon
Huelva
La Coruna
Seville
San Sebastian
Santander
Vigo

Side number is often located on the ship's bow and it is necessary to copy the entire number as there is some duplication in the last four digits.

Vessel's name can be found on the wheelhouse.