Germany, Japan Will Fish Argentine Waters

Foreign interest is growing in the untapped stocks of hake and other fish off the coast of southern Argentina, the NMFS Office of International Fisheries reports. In June 1977, the Argentine Government awarded 1-year contracts to consortia from Japan and the Federal Republic of Germany to catch up to a total of 200,000 metric tons (t) of fish in Argentine waters. Part of the contract involves stock assessment aimed at determining the region's fishery resources.

Substantial fishery resources are reported off Argentina's southern coast, but its domestic fishing industry utilizes these stocks only to a limited extent. Argentina decided to allow foreign fishermen access to its 200-mile Territorial Sea as part of a national effort to increase domestic fish and shellfish consumption and to earn foreign exchange by increasing exports. Both Japan and the FRG are sending fishery research vessels to Argentine waters to assess fishery resources.

EXTENDED JURISDICTION

Argentina declared a 200-mile Territorial Sea in 1967 in response to the Soviet fishing for hake which reached record levels in that year. The Soviet 1967 catch of 680,000 t off Argentina was reduced to negligible amounts in 1968 when the Argentine Navy fired on and seized two Soviet trawlers fishing within 200 miles of the Argentine coast. Brazilian sardine fishermen who had operated off northern Argentina were also forced to withdraw from Argentine-claimed waters.

RESOURCES

Scientific estimates of the fisheries biomass off Argentina prepared by the Subsecretariat of Fisheries of the Ministry of the Economy range up to 10 million t. An annual maximum sustainable yield (MSY) of 2 million t is believed possible. Currently, less than 300,000 t of fish are caught by Argentine fishermen, most of it by the fishermen from the northern port of Mar del Plata. The area below lat. 46° (see map) is still virtually untapped and little is known about the extent of the living resources there. The major species found off Argentina include Patagonian hake, anchovy, pollock, and krill.

Research conducted by the Japanese Fishery Resource Research Center from November 1976 to January 1977 suggests that a groundfish fishery may not be possible south of lat. 46°S, and hake was found to be far less abundant than in the north. The Japanese pointed out that it was still necessary to conduct exploratory fishing during the winter season (July and August) before drawing any final conclusions on the resources of the area.

DOMESTIC FISHING INDUSTRY

Argentina's fishing industry has traditionally been a neglected sector of the economy. The fishing fleet is small and antiquated. Port facilities in the north are inadequate and almost nonexistent in the south. The canning industry is not competitive with foreign canners due to the high price of tin and steel and the poor quality of canning oils available in Argentina.

Domestic consumption of fish is low (2.5 kg per capita in 1970) because beef and mutton are inexpensive. Domestic fish consumption is not expected to increase substantially as long as the Government maintains low meat prices. There is some indication, however, that the new government of General Videla may allow the prices of meat and other food commodities to raise to world market levels. There are extensive freezing facilities for beef in Argentina, but only a few freeze fishery products, especially along the Patagonian coast.

ARGENTINE POLICY

With its large and untapped fishery resources, Argentina is an attractive target for the foreign distant-water fleets which have been forced out of their traditional Northern Hemisphere fishing grounds by the proliferation of 200-mile fishing zones. The Argentine Government now seems to have softened its earlier opposition to foreign fishing and is interested in considering the possibility of joint fishery ventures with foreign companies.

The governments of Presidents Alejandro Lanusse and Juan Peron began to review fisheries development in the early 1970's and attempted to encourage foreign participation. A British trawler fished for 6 months off Argentina in 1972. During the last administration of Juan Peron (1973-74), an effort was made to broaden Argentina's trad-

ing partners and various letters of intent were signed with Socialist Bloc countries, primarily the USSR and Poland, for cooperation in developing fishing port facilities.

FOREIGN INTEREST IN ARGENTINA

Poland was especially interested in establishing a joint fishery venture with Argentina and signed a letter of intent to that effect in May 1974. Poland proposed chartering Polish-flag vessels and motherships and marketing the catch through a Polish trading company. In return, Poland was to construct a new port facility in the southern province of Santa Cruz. The proposal was criticized for infringing on Argentine sovereignty, competing with the domestic fishing fleet, and being economically unsound. No joint venture was established as a result.

Santo Domingo, a Spanish fishing company, signed a merger agreement with the Argentine firm Antartida Pesquera Industrial in early 1977. The new company is to carry out joint fishing off southern Argentina. Cold storage and processing facilities will be built in Ushuaia, 3,100 km south of Buenos Aires. Most of the catch will be exported to Europe. It is expected that up to 40,000 t will be exported to Spain annually.

The Spaniards will provide the technology, vessels, crews, and will also handle sales. A total of $30 million is being invested in this joint company by the Argentine Development Bank, private Argentine investors, and a group of Belgian financiers. It is not known what species will be caught and processed or if the company has access to data which contradicts preliminary Japanese findings that hake stocks south of lat. 46°S will not support a commercial fishery.

Japan has also placed considerable importance on gaining access to Argentina's fishery resources. The hake and pollock stocks off Argentina offer attractive substitutes for the declining allocations of these species from the United States and USSR 200-mile fishery zones. As a result, the Japanese have sent various missions of government and industry officials to negotiate joint ventures in Argentina.

JAPAN AND THE FRG AUTHORIZED TO FISH

The Argentine Government decreed in January 1977 a 200,000 t quota for foreign fishermen within 200 miles of its coast. Hake was to compose 75 percent of this total. Argentina stands to gain not only increased export revenue and foreign exchange, but also hopes to procure long-term, low-interest loans from the countries allowed to fish in its waters. Argentina requires that 10 percent of the quota be landed and marketed domestically. Argentine fishermen criticized the government for allowing foreign fishing despite the fact that the domestic fleet catches only 15 percent of the potential MSY.

In February 1977, Argentina invited companies from foreign countries to submit bids to fish off Argentina. The government planned to choose two foreign bidders for the 1-year term and split the 200,000 t quota equally. Besides the stipulations outlined in the January decree, the contract recipients would also have to provide research vessels for stock assessment immediately and provide loans for Argentina to build its own research fleet. Argentina does not plan to collect license fees because its emphasis is on fishery development rather than on raising revenue.

Firms and agencies in seven countries submitted bids: Cunard (United Kingdom); Polish Fishing Industry Board (Poland); Compania Argentino-Portuguesa (Portugal); the Government of Bulgaria; Pittsburgh S.A. representing Thyssen Rheinstahl GmbH (FRG); Korea Wonyang Fisheries Co., Ltd. (ROK); and two consortia.

The first consortium was composed of FRG companies (Hanseatische

Norway Investigates Fish Protein Losses

Of the total amount of protein available in Norway in 1974, 600,000 tons were produced domestically, while about 170,000 tons were imported. About 64 percent of the Norwegian-produced protein came from the fishing industry and 26 percent came from agriculture. Imports consisted of 75 percent feed concentrate, 20 percent food grain, and the remainder in imported fish and agricultural products.

Out of the total protein available in Norway, over 270,000 tons, or about a third, was exported and of this over 98 percent was in the form of fish products. Within Norway twice as much protein was used as animal fodder as was used for food for human consumption—or in other words 230,000 tons. Imported and Norwegian-produced feed concentrate supplied 94 percent of all animal fodder, while the rest came from potatoes and fish products.

The protein residue from production processing industries has been calculated to be about 111,000 tons and of this about half is recoverable and is used in the feeding of animals. Out of the 55,000 tons lost in processing, about 80 percent or 42,000 tons was lost in the fish processing industry. As a result of this, the Fisheries Ministry set up a by-product committee to consider the question of the recoverability of residue from the fishing industry and to report the exact protein losses. The figures on general protein quantities and their loss come from a report prepared under the auspices of the Norwegian Council for Scientific and Industrial Research (NTNF).

Hochseefischerie, Hochseefischerei Nordester, Nordsee Deutsche Hochseefischerei, and F.M.S. Scombrus Fischfang) and the second included Japanese companies (Nippon Suisan, Taiyo, Kyokuyo, Hoko Suisan, and Nichiro).

The Argentine Ministry of the Economy announced on 16 June 1977 that both the Japanese and FRG consortia had been awarded 1-year contracts. Their area of operation within the Argentine 200-mile zone is between lat. 40° and 46°S (Zone A on map). During the hake spawning season (1 October to 31 January), the foreign firms will be restricted from fishing in the area bounded by the coast in the west, long. 63°W in the east, lat. 43°30′S in the north and lat. 44°30′S in the south (restricted zone on map).

The Japanese journal *Suisan Tsushin* has reported that the provision to supply a research vessel will be met by sending the RV *Shinkai Maru* during the 1977-78 fishing season. Argentine regulations require that the vessel fly the Argentine flag, and a registry transfer must be approved by the Japanese Government. Another Argentine requirement for Japan to provide long-term, low-interest loans for the construction of an Argentine research vessel will be met by Japanese Government agencies (70 percent) and the Japanese consortium (30 percent). The vessel will cost between an estimated $10.6 and $14.2 million.

The Japanese also will be required to carry out feasibility studies for port construction in southern Argentina. Two trawlers, the *Hinan Maru* owned by Nippon Suisan and another from either Taiyo or Nichiro, will be fishing off Argentina. Press reports indicate that Argentina has agreed to allow Japanese fishermen to immigrate to Argentina.

The FRG will be required to provide essentially the same credit arrangements for the construction of an Argentine research vessel, as well as financing a feasibility study of a new port and a fish processing facility in southern Argentina. It is reported that two of the West German vessels which will participate in the stock assessment are the RV *Walther Herwig* and the RV *Anton Dohrn*.

The two foreign consortia will be allowed to continue fishing in Argentine waters and establish joint-venture companies provided the 1-year trial period is satisfactory to both parties. German press reports indicate the FRG consortium will be allowed to form a joint-venture with 51 percent German ownership. It is not known if the same terms will be extended to the Japanese consortium. If the results of the stock assessment research indicate a large MSY (maximum sustainable yield) and the 1-year experiment is successful, foreign quotas may be increased and other countries besides Japan and West Germany may be allowed to participate in the fishery of that region.

POSSIBLE KOREAN PARTICIPATION

The Argentine agreement with Japan and the FRG will help develop the fisheries between lat. 40° and 46°S, but fishery resources in the region further south will still remain largely unutilized. It appears that the Argentine Government will open this area to foreign participation under conditions similar to the ones imposed on Japan and the FRG.

Press reports from the ROK (Republic of Korea) indicate that Argentina has agreed, in principle, to allow Korean vessels to take 100,000 t annually south of lat. 46°S (Zone B). It is also reported that up to 2,000 Korean fishermen would be allowed to immigrate to Argentina. The discussions between Argentine and Korean fishery officials that led to the reported agreement will be followed by more formal negotiations and research to assess fish stocks off southern Argentina.

According to the NMFS Office of International Fisheries, the Argentine action may influence the way other coastal nations, particularly those in the developing world, will regulate foreign fisheries. The agreements indicate that significant concessions from the foreign companies can be obtained by a coastal nation in return for allowing eager foreign fishermen access to fishery resources there. Many distant water fishing countries have large fishing fleets which are idle because of the closure of their traditional fishing grounds by the extended jurisdictions of coastal countries. The agreements signed with Argentina indicate the price that these distant water fishing countries are willing to pay for access to fishing grounds.

Norway Aids Fishermen With Damaged Gear

The Norwegian Ministry of Fisheries has paid 7.85 million kroner in compensation to fishermen whose equipment was damaged as a result of oil offshore work in the North Sea. There were 1,380 applications for compensation, 995 of which have been approved. The average payout has been 7,890 kroner. Out of the total applications turned down, 140 were refused on the grounds that they had been sent in too late, and these delayed applications represent a total sum of over 1.1 million kroner.

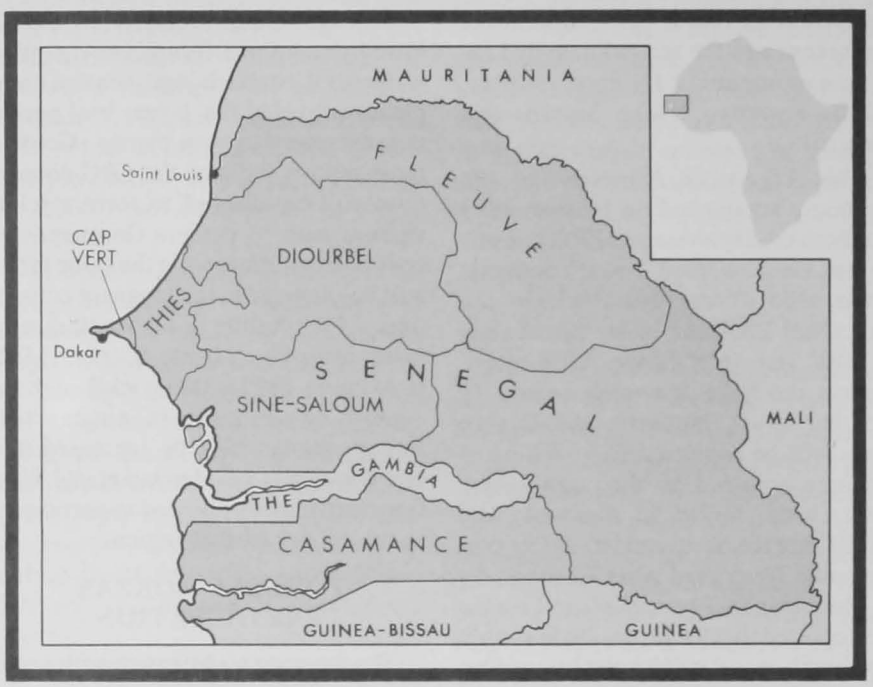
Most of the applications considered were for the period 1975-76; only a few applied to 1974 and a handful to 1973. Some from 1977 have also been processed. Most damage applied to trawlers or to mackerel nets. While scrap on the seabed was the main cause for damage to trawlers, supply ships were the main source of damage to mackerel nets. A total of 12 million kroner had been allocated for such compensation: 8 million until the end of 1976 and 4 million for 1977 by late summer.

The Lobster Fishery of Senegal

Senegalese fishermen caught 262 metric tons (t) of spiny lobster in 1976, a decrease of 46 percent over the record 1975 catch of 483 t. A total of 74 t were exported in 1975, most of which was shipped live to France.

SPECIES AND GROUNDS

The spiny lobster caught by Senegalese fishermen include pink lobster, *Palinurus mauritanicus*, and green lobster, *Panulirus regius*. Lobster is found in various locations along the coast of Senegal and was particularly abundant in 1975 off the coast of the Sine-Saloum region between Dakar and The Gambia (see map). In 1974, the best catches were made off Dakar in the region of Cap Vert, and near Saint Louis in the Fleuve Region of northern Senegal.



METHODS

Artisanal fishermen using dugout canoes, or pirogues[1], landed over 87 percent of the 1975 lobster catch of 483 t. The remaining 62 t (13 percent of the catch) was landed as the incidental catch of the commercial trawlers which fish primarily for sole, shrimp, capitaine, and dentex, and by a few specialized lobster vessels.

CATCH

Senegal's lobster catches increased fourfold from the 1965 and 1966 catches of 90 t, to the 1975 catch of nearly 500 t. This increase is primarily due to the enlargement of the fleet and to an intensive program begun in the early 1970's to finance the purchase of outboard motors by the canoe fishermen.

An agreement concluded with Canada in 1972 provided for the purchase of 3,500 outboard motors as well as for the construction of storage, distribution, and maintenance facilities for the motors. As a result, the fishermen were able to significantly increase their catches in 1974 and 1975 (Fig. 1). The 1976 lobster catch, however, decreased by nearly 50 percent (Table 1), according to Senegalese statistics. This decline was partly attributed to high winds, especially in the Cap Vert region, and to mechanical problems with the last shipment of outboard motors.

Catches in each region vary considerably from year to year, and available regional catch data do not show a pattern of continually higher catches in any particular region. In 1974 the largest catches were made in the Fleuve region bordering Mauritania in the north, although in 1975 the best catches were in the Sine-Saloum region. The largest

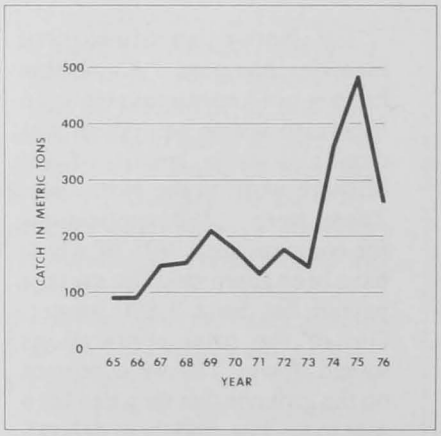


Figure 1.—Senegal's annual lobster catch, 1965-75, in metric tons. Source: Fishery Committee for the Eastern Central Atlantic, "Statistical Bulletin No. 1, Nominal Catches 1964-74."

Table 1.—Senegal's artisanal and commercial lobster landings by region, 1974-75, in metric tons.

Fishery and region	Year 1976	1975	1974
Artisanal			
Fleuve	38	36	123
Diourbel[1]	—	—	—
Thies	135	88	48
Cap Vert	28	6	110
Sine-Saloum	NA	276	NA
Casamance	13	15	17
Total	214	421	298
Commercial[2]	48	62	60
Grand Total	262	483	358

Table 2.—Senegal's incidental lobster trawl catches, by month, 1975-76, in metric tons, and vessels employed.

Month	Catch[1] 1976	1975	Vessels 1976	1975
January	4.54	6.39	60	71
February	5.13	7.70	67	82
March	5.87	8.71	66	74
April	9.95	6.51	65	74
May	6.34	8.11	66	70
June	5.30	6.91	67	69
July	1.74	3.75	65	78
August	1.30	1.72	66	67
September	0.78	1.74	67	61
October	0.31	0.71	63	56
November	0.22	7.89	67	58
December	6.95	2.07	68	61
Total[2]	48.43	62.21		

[1]Assumed to be whole weight landings.
[2]Totals may not agree due to rounding.
Source: Direction de l'Océanographie et des Pêches Maritimes, Ministère du Développement Rural et de l'Hydraulique, Senegal.

[1]Over 67 percent of the pirogues are now equipped with 10-25 horsepower outboard motors.

amounts of lobster caught in 1976 were taken in the Thies region, due to the large number of fishermen there and the consequent intense fishing effort (Table 1). No catches of any type of fish or crustaceans were reported for the Diourbel region.

Data for the commercial fishery show that catches are highest during the dry season from November to June (Table 2), but monthly catch data for the artisanal fishery are not available. Catches decline during the rainy season which lasts from July through October.

PROCESSING

Live Lobster

Senegal is the only West African country which currently exports a large amount of live lobster, according to a report prepared for the International Civil Aviation Organization (ICAO)[2]. The report notes that this is due to a general lack of experience and organization needed to take advantage of the resources that exist in West African waters. In addition, lobster which is caught by trawl is often bruised or damaged, making it unsuitable for live export. Senegal has several specialized lobster vessels capable of delivering undamaged lobsters for live export.

Lobsters to be shipped live are offloaded and held in tanks for at least 24 hours to permit cleansing and to allow the lobsters to recover from the shock of being caught and handled. This also permits the exporter to accumulate enough lobster for a full shipment. The tanks do not have provision for water circulation, and no control is exercised over temperature, oxygen content, or water quality in general. When the exporter has enough lobster, they are packed in corrugated cardboard cartons with wet seaweed or wood shavings. The cartons are loaded full and the packer compresses the lobsters slightly when securing the lid. This restricts movement and minimizes damage to the lobsters during transit.

Research has shown that the storage life of live lobsters depends on the temperature at which they are kept. Lobster to be shipped live should be held for at least 24 hours and the water temperature gradually reduced to about 6°C to slow the lobsters' metabolism and activity, which reduces mortality in transit[3]. The ICAO study (Footnote 2) recommends that shipping containers be insulated to prevent sudden temperature changes. The study concludes that:

"Although the existing quality of crawfish (lobster) as delivered to the European import markets is acceptable, improvements can and should be made since the present practices and standards of hygiene are generally poor in comparison to those employed by companies in major crawfish exporting countries . . . handling, processing, and distribution procedures must be upgraded if the West African trade is to compete in world markets."

Table 3.—Senegal's lobster production for export, by company and commodity, 1974-76, in metric tons.

Country	Year		
	1976	1975	1974
G.V.D.	44.7	53.2	46.6
Sosechal	22.0	16.8	18.6
Sopesea	1.0	1.9	0.4
SPAC	—	0.7	20.5
Other[1]	11.3	1.7	2.8
Total	78.0	74.3	88.9

[1]Includes Surgel, Senepesca, Adripeche, Safcop, Sopao, Issa Konte, Procos, and Afrique-Langouste.
Source: Senegal. Direction de l'Océanographie et des Pêches Maritimes. Ministère du Développement Rural et de l'Hydraulique.

Frozen Tails

Lobsters to be used for the production of frozen tails are usually de-tailed on board and the tails are packed on ice. When they reach the shore-based processing plant, the tails are washed and cleaned by hand. After freezing, the tails are individually packed in plastic bags and placed in cartons (usually 10 kg) for quick freezing and shipment.

COMPANIES

Nine Senegalese companies, most of which process several other species, processed lobster in 1975 for export. By far the largest of the companies is Les Grandes Viviers de Dakar (G.V.D.), a company which specializes in exporting live lobster. Its 1976 production was 44 t or 57 percent of the total Senegalese lobster exports (Table 3). The second largest amount of lobster was produced by Sosechal, which has plants in Dakar and at Ziguinchor in the Casamance region. Primarily a shrimp exporting company, Sosechal produced 22 t of lobster in 1976 (28 percent of the total). SPAC (Société Sénégalaise de Produits Alimentaires Congelés) of Dakar, a company which also processes perch, shrimp, and sole, produced 20 t of cooked lobster in 1974. Its 1975 lobster production fell to less than 1 t, and in 1976 SPAC stopped producing lobster. Small quantities of live and cooked lobster and frozen tails are produced by several other companies (Table 3).

EXPORTS

Senegal, unlike many developing countries, consumes most of its lobster catch domestically. Exports accounted for only 15 percent of the 483 t caught in 1975. Most Senegalese are Moslem and therefore do not eat shellfish for religious reasons. However, the 500,000 foreigners who live in Senegal and the relatively large tourist industry may account for the large domestic lobster consumption.

Senegal exported 74.3 t of spiny lobster in 1975, an 18 percent decline from the 90.5 t marketed abroad in 1974. Live lobster made up over 67 percent of all export shipments in 1974.

Most of Senegal's lobster is marketed in France. Export statistics by commodity are not yet available for 1975 and 1976, but French import statistics indicate that France imported 62 t of live lobster from Senegal in 1975. In 1975, about 70 t of lobster—94 percent of all spiny lobster exports—were shipped to France, mostly by air freight. In 1974, 54.8 t of lobster were shipped to France.

Spain imported 2.9 t of lobster from Senegal in 1975 and 12.4 t in 1974 while Italy imported 22.3 t from Senegal in 1974. Other nations imported 0.9 t of lobster from Senegal in 1974 and 1.4 t in 1975. The United States does not import any lobster from Senegal.

[2]"A Review of the Trade in Fish Transported by Air from Selected African Countries," International Civil Aviation Organization, October 1976 (UNDP/ICAO Project RAF/74/021).

[3]Lobsters will live for 10 days at 0°C but only for 3½ days at 10°C. A storage temperature of 5°C has proven most desirable.

Mauritius-USSR Fishing Pact Not Renewed

The Mauritian Government has decided not to renew the fishing agreement with the Soviet Union which was signed in 1970 and expired in 1976. This agreement, renewed twice in the past, provided the Soviets with certain port facilities in return for Soviet assistance to the Mauritian fishing industry.

The decision of the Mauritian Government, made in May 1977, was motivated partly by the lack of reciprocity on the part of the Soviets, and also by certain Soviet activities that the Government considered to be prejudicial to Mauritian interests.

THE SOVIET AGREEMENT

In the 1970 agreement, the Soviets promised to deliver fish, organize fishing cooperatives, donate fishing equipment such as outboard motors and nets, assist in vessel construction and technological development, etc. The Mauritian Government believes that this agreement was not respected and it is said that, apart from some gifts of fish and a few nets and some other minor donations, the Soviets showed little interest in carrying out the terms of the agreement. As for the Soviet mission sent to study the Mauritian fishing industry and the opportunities for fisheries cooperation, it was said in official Mauritian circles that the Soviet aid proposals were unacceptable because of the "strings" attached to them, which would have been in conflict with national interests.

The Prime Minister, Seewoosagur Ramgoolan, decided against the renewal of the agreement for which the USSR had been exerting a great deal of pressure. Officials close to the Prime Minister said that he was "very disappointed" in the activities of certain Soviet nationals in Mauritius, the use and channeling of money obtained by the Soviet Embassy for its cultural funds, and the release of Mauritian money to Soviet vessels which anchored in Port Louis. It was alleged that on several occasions in 1976 the Soviets spent as much as Rs. 80,000[1] per vessel for provisions as opposed to Rs. 20,000-30,000 in previous months. Since it was impossible to keep track of the use of Mauritian currency, the Finance Minister decided to restrict the sums released for Soviet crews.

JAPAN MAY SIGN

According to *L'Express*, it is possible that the Mauritian Government will sign a fishing agreement with Japan similar to the one it had with the Soviet Union. This agreement would permit the Japanese-owned KGKK[2] company to proceed with an expansion of its current activities and would permit the use of port facilities and the regulated exploitation of fishery resources in the new Mauritian 200-mile zone. The KGKK forms part of the Mitsubishi group and has been using a fishing base at Trou Fanfaron for 15 years. After the contract between the company and the Government expired in 1976, the Prime Minister opposed the renewal of the contract. At that time, various problems had arisen and a strong Mauritian conglomerate was exerting pressure not to renew the contract with the Japanese and to sign a similar contract with the Soviets instead. The Japanese, who at the same time were having difficulties with the Malagasy Government, decided to throw all their weight in the balance. Following the arrival in Mauritius of a high official of the Mitsubishi group, the affair was resolved with a "working arrangement." (Source: IFR-77/133.)

According to the NMFS Office of International Fisheries, reports indicate that the Government of Guinea-Bissau is also dissatisfied with its fisheries agreement with the Soviet Union. In May 1975, Guinea-Bissau and the USSR established a joint venture company, Estrela do Mar, to develop Guinea-Bissau's offshore fisheries. Under the terms of this agreement, the USSR was to supply fuel for five fishing vessels it donated to Guinea-Bissau in exchange for fishing rights in Guinea-Bissau-claimed waters.

Although the USSR did provide a few vessels as stipulated in the agreement, they turned out to be the wrong class for use in coastal fisheries and, in addition, the Soviets insisted on providing the crews themselves. The promised training program and processing facilities have not yet materialized. There have been articles in the government-controlled press claiming that the dozen or so Soviet trawlers that operate out of Guinea-Bissau are literally scraping the bottom of the sea clean.

[1]The exchange rate is approximately 6.6 Mauritian rupees = US$1.00.

[2]This company is believed to be the Kaigai Gyogyo Kabushiki Kaisha.

FRESHWATER SHRIMP FARMING ATTEMPTED

The northern Japanese city of Sapporo in Hokkaido started experimental culture of Indonesian freshwater shrimp in July 1977, according to a *Minato Shimbun* report. Because the tropical shrimp "onitenagaebi" requires an optimum temperature of 30°C and will not survive at temperatures below 15°C, the municipal authorities will use hot spring waters in the vicinity of Jozankei. The aquaculture project will be located at Lake Jozankei near the city and will be assisted by the prefectural hatcheries. The males of this species grow to 40 cm and weigh 500-600 g 12 months after hatching.

Sixteen Polish Trawlers Slated for Soviet Union

Sudoimport, Russia's vessel importation association, and the Polish foreign trade association "Centromor" have signed a large contract in Moscow, according to a report in the *Ekonomicheskaia gazeta*.

From 1978 to 1980, 16 fish-processing trawlers, 1,800 dwt each, are expected to be delivered to the Soviet Union. The vessels will be constructed at the V.I. Lenin wharf in Gdansk. In conjunction with the previously signed contract, 10 supertrawlers for harvesting tuna on the open seas will also be delivered to the Soviet Union from Poland during this same period.

Guinea-Bissau's State Secretary of Fisheries was in Moscow in July to renegotiate the agreement. Reportedly, two main Guinea-Bissau demands were to be the complete reorganization of Estrela do Mar and a reduction in the rents paid to the Soviet Union for the use of the fishing vessels.

Krill Harvest, Fleet Plans Told by Japan

During the 1976-77 Antarctic summer season, the five-vessel Japanese krill harvesting effort yielded a total of 12,000 t of krill, some 2,000 t more than had been anticipated, according to Japanese news reports. All aspects of experimental krill harvesting have now been completed, leaving processing and marketing research for the future.

The semi-governmental Japan Marine Resource Research Center and Taiyo jointly experimented in shelling the tiny crustaceans on factory vessels. The shelling was done on both boiled and raw krill, and a "spectacular expansion" of krill utilization and marketing possibilities were reported.

The Fisheries Agency of Japan also was organizing a fishing fleet led by a factory ship to harvest Antarctic krill during fall 1977. The fleet was to consist of one refrigerated transport owned by various independent companies.

The trawlers, which used to operate as independent vessels catching Alaska pollock in what has become the Soviet 200-mile fishery zone, will function as krill "catcher boats." The semi-governmental Japan Marine Fisheries Resource Research Center planned to charter all the vessels and administer the fleet operation, thus acting as an arm of the Government to subsidize the operation.

Last summer, Taito Seiko Company, a leading Japanese manufacturer of fishing nets and ropes, began manufacturing krill nets for use on the 349 GT trawlers. The nets were designed to work efficiently with smaller thrusts. Conventional Japanese krill nets are suitable for use on 3,000 GT trawlers having enormous thrusts. The new nets were to be available for the pending Antarctic summer season at a cost approximately 50 percent above that for a conventional krill net.

Monbetsu Fisheries Cooperative Association of Hokkaido has been successfully utilizing mixed feed containing dried Antarctic krill to culture king salmon. The experimental culture of king salmon is conducted in Lake Saroma near Monbetsu city. Krill is used to intensify the pink color of the salmon flesh for higher prices at the markets. The salmon is expected to sell for 1,500 yen/kg (US $2.77/lb). (Source: Report 77-5, NMFS Language Services Branch.)

Japan Upgrades Fishery Agency, Appoints New Research Center Chief

Japan's Agriculture and Forestry Minister, in a mid-summer press conference in Tokyo, disclosed that the status of the Fisheries Agency of Japan would soon be elevated to that of a ministry. Although the Agency would not become an independent ministry, its current parent organization will change its name to the "Ministry of Agriculture, Forestry and Fishery."

The Agency will receive in FY78 increases in funding despite the current administration-wide budget freeze. One of the programs to receive an increased funding is ocean ranching. The Agency is currently preparing a submission requesting the establishment of a new division called the Coastal Fisheries Development Division, which will administer all phases of ocean ranching.

Hirotake Fujimura has been appointed Director of the Board of the quasi-governmental Japan Marine Fisheries Resource Research Center. The new director intends to emphasize not only the development of new fishing grounds, but also research in marketing novel Anatarctic fish species.

With regard to the Center's new project, surveying fisheries in the vicinity of the Kerguelen Islands, Fujimura denied the rumor that it was a made-up project for vessels retired from the northern seas fisheries. He also emphasized the importance of the Center's involvement in future surveys of the world's potential fisheries. He maintains that individual fishing companies are no longer capable of conducting comprehensive survey activities, such as the recent private surveys carried out off the Argentine and Chilean coasts. (Sources: Japanese news articles and Report 77-5, NMFS Language Services Branch.)

Japan's Salmon Fishermen Oppose Vessel Retirement

Japan's major salmon fishing companies expressed their strong opposition earlier this year to the Fisheries Agency's proposal to retire four salmon mothership fleets, according to a report in the *Minato Shimbun*.

The Fisheries Agency's proposals were prompted by the Japanese Government's willingness to accept the Soviet quota for a Japanese salmon fishery of 62,000 t for 1977. The government was ready to accept that quota because the Soviets indicated that Minister Ishkov himself increased the figure to 62,000 t by allowing 5,000 t more than the initial figure. The difficulties the Japanese salmon fishery faces are compounded by complicated Japanese domestic conflicts among the three segments of the industry, namely the large companies operating mothership fleets (332 vessels), medium-sized companies operating salmon driftnet vessels (368 vessels), and the coastal fishermen strongly dependent on the salmon fishery for their livelihood (1,120 vessels).

The Fisheries Agency's plan to reduce the number of independent salmon fishing vessels by 20-30 percent was viewed by powerful fleet owners as being too protective of the small companies. In 1976, a lean-year total of 80,000 t of salmon was harvested; fishermen were hoping to harvest at least 87,000 t this year, which is a bounty year.

Growth Predicted for Moroccan Fisheries[1]

Morocco's fishing industry will grow rapidly during the next few years, and sardines and trumpet fish will play major roles in this expansion, the NMFS Office of International Fisheries reports. Considerable improvements in the fishing fleet, establishment of a refrigeration network, and modernization of plant facilities will be required, however, if Morocco is to reap the benefits of its fisheries resources. The expansion of the nation's fishing industry is creating significant trade opportunities for U.S. companies.

CATCH

Morocco's 21,000 fishermen landed nearly 236,000 metric tons (t) of fishery products in 1975, according to the Office National des Pêches (ONP) of Morocco[2]. This included 206,000 t of "industrial" fish used for canning or reduction into fish meal, 29,400 t of fresh fish for domestic consumption, 481 t of crustaceans, and 52 t of mollusks. Fishermen at the Atlantic Ocean ports of Agadir, Essaouira, and Safi (Fig. 1) landed 79 percent of the total catch, followed by fishermen in Casablanca (16 percent), and the Mediterranean port of Al Hoceima (5 percent). The rest of the catch (less than 1 percent) was landed in 13 smaller fishing ports.

Sardines played a leading role in Morocco's fisheries in 1975, as they have for years, and accounted for 79.5 percent of all landings. The 1975 sardine catch of 167,400 t, however, was 52 percent below the 1973 catch of 349,300 t (Table 1). This decrease was anticipated because Morocco's sardine fisheries are influenced by upwelling which changes in a cycle. The upwelling off Morocco peaked in 1973, producing abundant plankton, an essential food for sardines and their larvae. Moroccan marine scientists expect sardine catches to continue decreasing through 1977 and then to begin increasing, as meteorological and oceanographic forces begin to gather strength, until 1980 or 1981 when another record upwelling and sardine harvest is predicted.

Catch variations have also been caused by a southward migration of sardines from the traditional grounds off Safi, Essaouira, and Agadir to the waters off the Western Sahara. This migration has particularly affected the northern ports, especially Safi, which reportedly received only 16 percent of the amount of fish needed to operate the processing plants at full capacity. The obsolescence and limited range of the Moroccan fishing fleet prevented the fishermen from operating in distant waters to compensate for the decreasing catches on their traditional sardine fishing grounds.

Studies have shown that there are enormous quantities of trumpet fish (*Macrorhamphosus* spp.), a "trash fish" which is now being thrown away. The fish meal industry is trying to reduce trumpet fish, and if these efforts are successful, this unutilized species could help to make Morocco an important fish meal producer and open up a new fishery.

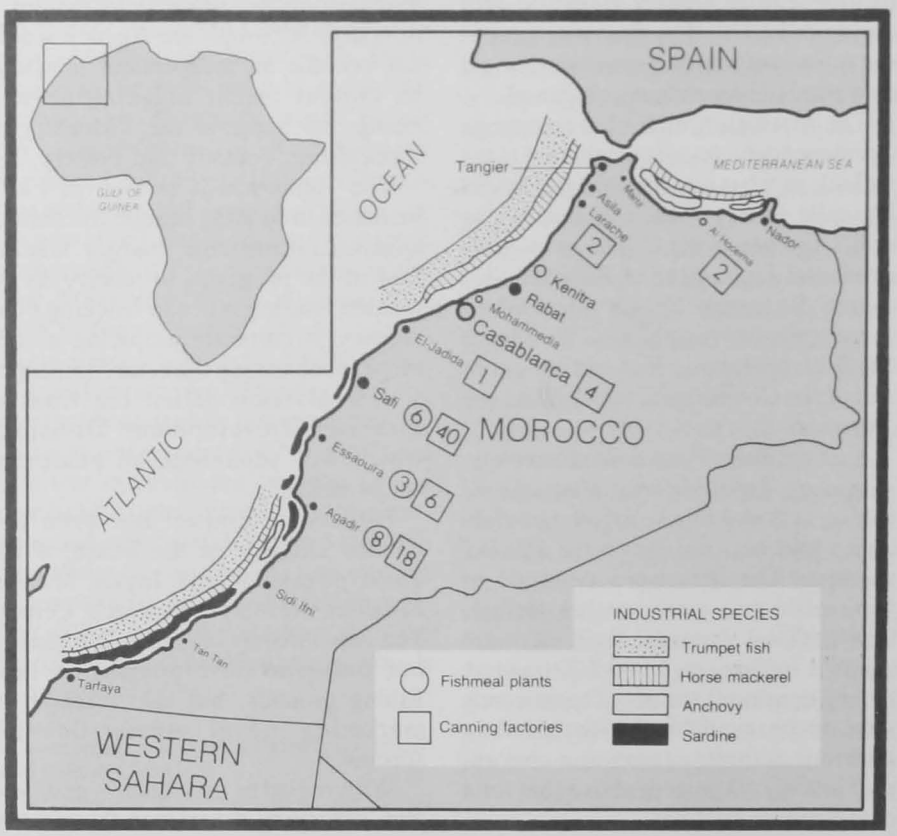
Mackerel and anchovy landings remain small; these fish are canned for export. Tuna was once caught in quantity off the coast of Morocco, but is no longer being landed in large amounts.

Table 1.—Morocco's sardine catch and total fish catch, 1971-75.

Year	Catch (1,000 t) Sardines	All fish	Percent[1]
1971	183.3	226.7	80.8
1972	185.0	246.4	75.1
1973	349.3	398.3	87.7
1974	224.2	288.1	77.8
1975	167.4	210.5	79.5

[1]Sardine catch as a percentage of the total fish catch.
Source: FAO "Yearbook of Fishery Statistics", 1975.

Figure 1.—Morocco's principal fishing ports, processing facilities, and fishing grounds.



[1]This report was prepared by William B. Folsom, U.S. Regional Fishery Attache for Africa, and Susan D. Foster, Foreign Affairs Aid, Branch of International Fisheries Analysis, National Marine Fisheries Service, NOAA, Washington, DC 20235. A full report, "Fisheries of Morocco, 1975," by W. B. Folsom (No. 77-08-010, 130 p.) is available from the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161 for $6.00.
[2]ONP data do not agree with FAO statistics.

Two Moroccan companies, however, have been established to fish for tuna in the Gulf of Guinea[3]. Morocco's small shrimp and lobster fisheries could both be expanded and the product exported.

GROUNDS AND SPECIES

The major development in Morocco's fisheries in 1976 was the opening of the waters off the Western Sahara (formerly Spanish Sahara, Fig. 2) to Moroccan fishermen.[4] These new fishing grounds are believed to contain 1.7 million t of sardines—three times the amount found on Morocco's traditional sardine ground. This resource could make Morocco one of the world's largest sardine producers.

Although Morocco does not have the technical ability and fleet to make the best use of these resources, its Office National des Pêches (ONP) has a plan for the management of the zone. Foreign fleets wishing to operate in these rich waters will be required to conclude agreements with Morocco. The ONP Director has indicated that Moroccco intends to benefit from landings of not only its own companies but of a large fleet of perhaps 500 vessels flying the Moroccan flag[5]. At present, Morocco does not have a fishing port where large factory trawlers, which operated off the Western Sahara and were previously based at Las Palmas, can offload their catches. A new, well-equipped port will be needed if the Saharan resources are to be fully developed, and both Cabo Bojador and Dakhla (Fig. 2) have been suggested as possible sites; Morocco sent several trawlers to Dakhla in 1976. Adequate facilities already exist at Las Palmas in the Canary Islands, but the Moroccans want to avoid dependence on a foreign port. A cold storage plant will also be required to hold the fish prior to export.

Figure 2.—Western Sahara area now claimed by Morocco, showing the partition line as defined in the 14 April 1976 accord signed by Mauritania and Morocco.

Raids by Polisario guerillas are now inhibiting efforts of Morocco and Mauritania to cooperate on economic development programs, and little has been done so far to utilize the vast fisheries resources of the Western Sahara.

PROCESSING

Antiquated fishing vessels, poor handling, lack of refrigeration, and outdated processing plants result in heavy damage to fish which could otherwise be used for human consumption. About half of the total catch is reduced to fish meal. Only 30 percent is canned, 15 percent is sold locally as fresh fish, and the rest is frozen by a developing freezing industry.

The development of the freezing industry in Morocco has been hampered by a lack of ice, since ONP joint venture company vessels have priority in the supply of ice; domestic ice production is insufficient to meet the demands of both the freezing industry and the ONP joint venture companies. There is also competition between the canners and the freezing industry for raw fish. Despite this, there are five freezing companies at Agadir which produce 98 percent of Morocco's frozen fish.

The freezing industry is more efficient than the canning industry as it uses 26 percent more of the raw fish and uses very little imported material; the canning industry utilizes imported materials (tin, oil, cardboard cartons) for a large part of the final product. Proponents of the freezing industry also point out that it creates jobs; over 100 persons are employed full-time and another 1,000 to 1,500 are employed seasonally for 120 to 160 days a year. If the fish used for freezing was distributed between the canning factories, there would be no need for extra workers and therefore more than 1,000 workers presently working in the freezing industry would become unemployed.

OFFICE NATIONAL DES PÊCHES

The Office National des Pêches (ONP) is a semi-governmental agency established in 1969. The ONP is responsible for developing and modernizing Morocco's fisheries, and has helped artisanal fisherman buy new fishing gear and establish fishery cooperatives. The ONP worked to enact a maritime investment code designed to stimulate investments in new fishing vessels. Joint venture fishing operations with several nations have been established through the ONP, thus bringing new technology and methods to Morocco's fisheries. In addition, through the efforts of the ONP, a 70-mile fisheries zone has been established. Morocco's fish consumption, which was only 4.2 kg per capita in 1970, has been stimulated by the formation of a special firm created by the ONP. The firm, ASMAK, sells fresh and chilled fish in the interior of Morocco. The ONP also conducts fisheries research.

The ONP director, Dahmane Layachi, was recently elected to Parliament as the delegate from Rabat, and he was to leave his post at the ONP in October when Parliament convened.

EXPORTS

Canned sardines are Morocco's principal export commodity and account for nearly half of all fishery exports. Exports of canned sardines have fallen from 62,000 t in 1973 to only 36,000 t

[3]One of these companies, Thonapeche, was established in 1975 by the Office National des Pêches. The company acquired two 42-m tuna vessels and was negotiating for another larger vessel. Thonapeche will eventually operate a fleet of nine tuna vessels.

[4]Following the withdrawal of Spain from the Spanish Sahara in early 1976, Morocco and Mauritania created a mixed commission to help develop the resources of the ex-Spanish Sahara. According to Article III of the Economic Cooperation Accord of 14 April 1976, both parties agreed to work together to develop the fisheries off the ex-Spanish Sahara.

[5]*Pêche Maritime*, 20 February 1977.

Table 2.—Morocco's exports of canned sardines to France, Zaire, and the Philippines, 1973-75.

Year	Exports (1,000 t)		
	France	Zaire	Philippines
1973	13.39	6.29	7.59
1974	15.16	5.23	1.12
1975	7.82	2.04	3.81

Source: Office des Changes, "Statistiques du Commerce Exterieur," 1973, 1974, and 1975. Ministere des Finances, Royaume du Maroc.

Table 3.—Moroccan fishery exports to the United States, 1974-76, by quantity (metric tons) and value ($1,000).

Year	All fish exports		Canned sardines		Percent[1]	
	Quantity	Value	Quantity	Value	Quantity	Value
1974	539.7	1,750.4	252.6	339.2	47	19
1975	631.1	990.0	213.9	298.4	34	30
1976	553.2	1,208.3	398.3	508.8	72	42

[1] Sardine exports as a percentage of the total Moroccan fishery exports to the United States.
Source: Bureau of the Census, U.S. Department of Commerce.

in 1975. Several factors other than declining catches are responsible for this decline. The European Economic Community (EC) has indicated its intention to establish a limit on the price of Moroccan sardines to protect the sardine markets of member countries. The price limit would not, however, be imposed on Spain, Portugal, or Greece, Morocco's main competitors on the EC market, because these three countries are expected to eventually join the EC.

Sardine exports to France, Morocco's most important market, decreased from 13,400 t in 1973 to only 7,800 t in 1975 (Table 2). This was attributed to competition from lower-priced Portugese products (especially since the nationalization of the Portuguese fishing industry), rising production costs, and the increase in the cost of imported materials, such as tin and cardboard, which account for 36 percent of the cost of a carton of canned Moroccan sardines. The unemployment of large numbers of foreign workers in France (the principal consumers of sardines) resulted in decreased purchasing power of these consumers and further decreased the demand for sardines. Wealthier French consumers turned to tuna, and in the Federal Republic of Germany canned herring was substituted for sardines to some degree. In addition, the special bilateral tariff agreements between Morocco and France were in conflict with EC policy, and Morocco feared that they might be substantially altered or eliminated entirely.

Moroccan canners apparently attribute the drop in canned sardine sales to the increased export of frozen sardines, especially to France. The canning industry has even suggested that Morocco import frozen fish to keep the canneries operating at full capacity. Some fishing industry spokesmen, however, maintain that exports of frozen fish are destined for a particular market and that most Moroccan frozen fish is not canned abroad. This line of reasoning is borne out by the fact that although Morocco limited exports of frozen fish during the second half of 1975 to only 814 t, canned sardine exports did not increase. The ban on exports actually proved detrimental to the Moroccan industry as a whole because Italian frozen sardine exports to France increased to fill the void left by the absence of Moroccan products; nearly 19,000 t were imported during the first 9 months of 1975, whereas only 3 years before, no Italian frozen fish was sold in France.

Morocco has been attempting to compensate for decreased sales to Europe by increasing exports to Africa and Asia, although the markets there are less lucrative and the prices lower. In Asia, the Japanese have engaged in speculation to protect their own fisheries export market, by buying Moroccan sardines in bulk and reselling them on the Asian market. As a result, the Philippines, the largest market for Moroccan sardines in Asia, accused the Japanese of "dumping" $3 million worth of canned sardines and mackerel on the market in 1975. The Philippines established tariff barriers in response to complaints by the Philippine fishing industry, which have hurt Moroccan sardine exports. Exports to the Philippines decreased from 7,600 t in 1973 to only 1,130 t in 1974 and 3,800 t in 1975 (Table 2).

Sales of canned sardines in Africa depend to a large extent on the quantity of Spanish sardines available and on unstable economic conditions in Africa. The economic difficulties of Zaire during the past 3 years, caused by the nationalization of many sectors of the economy and decreasing world copper prices, resulted in a sharp decline of sardine exports to Morocco's most important market in Africa. Zaire imported 6,300 t in 1973, but only 2,000 t in 1975.

United States imports of Moroccan sardines are gradually increasing[6]; 1976 imports amounted to 398 t, an increase of 46 percent over 1975 imports of 214 t (Table 3). Moroccan sardines, however, made up less than 2 percent of total 1976 U.S. canned sardine imports of 25,800 t.

Morocco is an excellent area for U.S. investors or exporters able to develop Morocco's marine resources. Opportunities exist for investors interested in establishing joint ventures with Moroccan partners in the areas of canning or filleting and freezing fish. Joint ventures might also be established for deep-water shrimp and lobster fishing, but a considerable period of experimental fishing will be required in order to locate suitable fishing grounds for these two species.

Exporters of cold-storage or freezing plants, plant machinery, fishing vessels, gear, engines, nets, electronic gear, etc. also have tremendous opportunities for sales in Morocco. In order to compete effectively, however, interested companies must be able to correspond in French and must have sales literature written in French. In preparing a sales proposal, the interested firm should realize that decisions can take months; personal visits will often generate more sales than a simple exchange of correspondence.

[6] U.S. imports of canned sardines (both in oil and not in oil) from all sources have fluctuated considerably in the past few years. In 1973 and 1974 U.S. imports were about 30,000 t, but imports declined to only 14,000 t in 1975. Shipments began to increase again in 1976 when over 25,000 t were imported.