

NOAA Satellite Helps Find Salmon and Tuna

An environmental satellite operated by the National Oceanic and Atmospheric Administration (NOAA), able to measure the surface temperature of the ocean, is helping tuna and salmon fishers along California's northern coast find productive fishing areas.

Early results of a pilot project using satellite infrared imagery to locate areas of "upwelling" off the coast—areas where colder, nutrient-rich bottom water rises to the surface—indicate that fishers can save both time and fuel in finding these ever-shifting spots favored by salmon and tuna. The technique may also have applications for fishers in many parts of the world. The research project is being conducted by NOAA's National Environmental Satellite Service and the NOAA-supported Sea Grant program at Humboldt State University in Arcata, Calif. NOAA is an agency of the Commerce Department.

Fishers and oceanographers have known for years that as strong winds from the north and northwest blow along California's coast, coastal surface water is moved offshore and is replaced through upwelling. Bottom water, according to Fred Jurick, a Sea Grant marine advisory agent at Humboldt State, is rich in nutrients which, when they come to the surface, cause huge blooms of plankton, the primary food source for marine life. This attracts bait fish, which in turn attract tuna and salmon.

In recent years, efforts to plot the location of upwelling have included taking infrared temperature readings from aircraft. Such attempts often were successful, but had drawbacks such as weather restrictions on operations, limited aircraft range, and high cost.

NOAA's polar-orbiting satellite, equipped with both visual and infrared sensors, passes over the coastal area twice daily, relaying environmental data, including sea surface temperatures back to earth. This information, according to NESS Oceanographer Larry Breaker, is converted into images displaying a number of gray shades, each shade representing a particular interval of temperature. As a result, thermal fronts, where cold,

upwelled water meets the warmer offshore surface water, show up clearly as gray-shade boundaries.

The locations of thermal fronts are transferred to navigation charts, copies of which are then furnished to fishers at various northern California ports. One such user, Ron Andriani, who fishes for albacore tuna out of Ft. Bragg, Calif., has high praise for the satellite-provided information: "In spite of the bad weather last season," he said, "every time I used one of those

charts the fish were right where they were supposed to be. You can't ask for anything better than that."

The NESS-Sea Grant program is only one of several projects utilizing NOAA satellites and aimed at assisting fishers. A second effort shows promise of pinpointing concentrations of algae in water by satellite infrared identification of the chlorophyll in the marine plants. Many kinds of fish tend to congregate in algae-rich waters. The chlorophyll project uses infrared sensors aboard NOAA satellites which are in geostationary orbit above the equator.

CAPITAL CONSTRUCTION FUND RULES PUBLISHED

Tax regulations, both final and proposed, pertaining to the Capital Construction Fund program have been published jointly by the Commerce Department and the Internal Revenue Service. The program permits fishers to accumulate funds for construction, improvement, or, in limited cases, acquisition of fishing vessels by letting them defer paying Federal taxes on income from operation of their fishing vessels. These deferred taxes, in effect, amount to an interest-free loan.

The fishing vessel portion of the Capital Construction Fund program is administered by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service. The regulations were originally proposed in June 1972. Parts have been adopted and are now considered final, while the remainder were materially revised and repropounded.

The final and proposed regulations both appeared in the *Federal Register* on 29 January 1976.

Capital Construction Fund Booklet Available

A booklet for commercial fishers about a program which allows them to accumulate funds for construction or improvement of their fishing vessels has been published by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service.

Capital Construction Fund is a 24-page booklet of most-asked questions, and detailed answers, concerning the NMFS program which provides tax deferrals for commercial fishers to construct, reconstruct, or, under limited circumstances, acquire fishing vessels. The program permits fishers to defer payment of Federal

taxes on taxable income from the operation of their fishing vessels, thus, in effect, giving them an interest-free loan from the Government for the construction or improvement of fishing vessels.

The Department of Commerce booklet may be obtained from NOAA, National Marine Fisheries Service, Financial Assistance Division, Washington, D.C. 20235, or from Financial Assistance Officers at the NMFS regional offices in Seattle, Wash.; Terminal Island, Calif.; Gloucester, Mass.; St. Petersburg, Fla.; and Juneau, Alaska.

Foreign Fishery Developments

NEAFC Discusses Fish Stocks, Sets Quotas

The Northeast Atlantic Fisheries Commission (NEAFC) met in London 11-18 November 1975 and established catch quotas (see table) for North Sea cod, haddock, whiting, sprat, and herring. The status of those species was also discussed, and three nations,

Italy, Finland, and Cuba, sent observers for the first time.

The North Sea cod quota for 1976 was set at 236,000 metric tons, the same level as in 1975. Cod catches have declined since 1972 when 350,000 metric tons were landed; by 1974, only

NEAFC catch quotas for various species for 1975 and 1976 in thousands of metric tons.

Species	1975	1976
Cod, North Sea	236	236
Haddock, No. Sea	275	165
Whiting, North Sea	160	160
Sprat, North Sea	na	1400
Herring, North Sea	¹ 488	² 87
Herring, Celtic Sea	25	16.8

¹ICES scientists suggested a quota of 300,000 tons, but the NEAFC Commission decided to establish the 1976 quota as follows: Each NEAFC country which landed more than 50,000 tons in 1976 will have its total reduced by 40 percent of the catch over 50,000. The estimated total of such reductions in 1976 is 200,000 metric tons below the estimated 1975 total NEAFC sprat catch of 600,000 tons.

²For January-June 1976 only. The quota for July-December 1976 was to be determined in April 1976.

³This figure was later revised to 254,000 metric tons for the period 1 July 1975-31 December 1976.

210,000 metric tons were caught. The catch was larger in 1975, and therefore the quota for next year will be set at the same level.

The Commission adopted a 25 percent reduction in the total allowable catch (TAC) for North Sea haddock, and a pro rata reduction in allocations. Haddock catches have increased in the last few years, and following a 177,000 metric ton catch in 1974, the Commission set a quota of 275,000 metric tons for 1975. However, preliminary 1975 catch data indicate catches are well below that figure, and therefore the TAC was reduced.

The North Sea whiting TAC was set at 190,000 metric tons, the same level as in 1975. A lower TAC of 160,000 metric tons was suggested, but the Commission elected to maintain the 1975 level.

The Governments of Norway and Denmark, with the approval of the Commission, agreed to exchange portions of their cod and whiting quotas. In 1975, Denmark was allowed to catch 2,500 metric tons of Norway's cod quota in return for allowing Norway to catch 7,500 metric tons of Denmark's whiting quota. In 1976, Denmark will take 3,500 metric tons of Norway's cod, in return for giving Norway 8,000 metric tons of its whiting quota.

The North Sea sprat quota was set at 60 percent of the 1975 catch, which is estimated to be around 0.6 million tons. Sprat landings have increased appreciably in the last 10 years, from 165,000 metric tons in 1965, to nearly 300,000

metric tons in 1974, and to an estimated catch of 600,000 metric tons in 1975. But because the sprat is a short-lived species, it is feared that overfishing could lead to a rapid decline.

The International Committee for the Exploration of the Sea (ICES) Liaison Committee thus recommended a TAC of 300,000 metric tons, but NEAFC, recognizing the increased unofficial 1975 catch, decided to set the quota for each country at 50,000 metric tons plus 60 percent of its 1975 catch above 50,000 metric tons. It was estimated that this will result in a total 1976 sprat catch of 400,000 metric tons. Denmark, which estimates its 1975 sprat catch to be 300,000 metric tons, has objected to the NEAFC recommendation.

The North Sea herring TAC was set at 87,000 metric tons for the first 6 months of 1976, even though ICES had recommended a complete ban of herring fishing in the North Sea. Herring catches have declined from nearly 1.5 million metric tons in 1965 to 253,000 metric tons in 1974, the lowest recorded figure excepting the World War II years. Incidental catches of North Sea herring are to be limited to 10 percent in the sprat fishery and 5 percent in other fisheries. A special meeting will be called in April 1976 to determine a TAC for the last half of 1976. A Celtic Sea herring quota of 16,800 metric tons was approved by the Commission.

Finland, Italy, and Cuba sent observers to a NEAFC meeting for the first time. Italy, which claimed a long history of fishing in the North Sea, asked for a cod quota of 5,000 metric tons from the North Sea and 3,000 metric tons more from adjacent seas, as well as 500 metric tons of sole and 500 metric tons of plaice. Poland and the German Democratic Republic requested documentation of Italian catches, and when the observer could not provide them, the Commission voted against membership. Italy will continue to fish in international waters and will try to document their catch data.

Finland indicated it had a small North Sea herring fishery yielding only about 1,000-2,000 metric tons per year, but providing 30 percent of Finland's herring consumption. Finland's Parliament is preparing to join NEAFC and

will probably do so at the next Commission meeting.

The Cuban observer reported that his country will conduct exploratory fishing in the NEAFC area by the end of 1976 and plans to start a fishery in 1977. The Cubans are considering joining NEAFC in the future. The Cuban high-seas fleet is presently composed of 24 stern factory trawlers and 4 refrigerated transports. Another 24 trawlers are under construction in Spain. This increase in the fleet will give Cuba the ability to significantly expand its distant water fisheries. The observer said that Cuba has invested over \$600 million to develop its fisheries, and that the goal is to stop all fishery imports by 1980 and to increase the per capita consumption of fishery products to 24 kilograms per year. (Source: U.S. Embassy, Copenhagen, Denmark.)

Cooperative Fishery Conference Is Held

The first World Conference on Cooperative Fisheries, sponsored by the International Cooperative Alliance and hosted by the National Federation of Fishery Cooperative Associations of Japan (Zengyoren), was held in Tokyo from 29 September to 3 October 1975. Some 130 participants came from all over the world to represent the following countries: Bangladesh, Brazil, Canada, France, Ghana, Hungary, Iceland, India, Indonesia, Iran, Italy, Japan, Republic of Korea, Libya, Malaysia, Mexico, Morocco, New Zealand, Nigeria, Norway, Philippines, Poland, Tanzania, Thailand, Turkey, and the United Arab Emirates. F.E. Popper, Assistant Director General of the Fisheries Department, FAO, gave the keynote address.

The Conference discussed the following topics: 1) fisheries production and the protection of resources; 2) marketing and processing of fish; 3) modernization of the cooperative fisheries; 4) education, training, and credit requirements; 5) case studies in developing countries; and 6) technical assistance to fishery cooperatives in developing countries.

According to the NMFS Office of International Fisheries, participants generally agreed that international action should take place in the context of the global food problem. The

emphasis of such international action should be to ensure that the fruits of cooperative activity reach the poorer sections of the fishing community. The Conference was informed that FAO is receiving support from the United

Nations Development Program for the organization of regional projects to assist developing countries in establishing programs of support to small-scale fisheries. To Conference participants, it seemed that cooperative

organizations were particularly well suited to carry out such programs. They can, through their educational activities, for example, encourage members to take part in self-help activities.

Bonito Fishing Trials off Madagascar Told

During 1972 and 1973, three Japanese tuna companies and one Malagasy-Japanese joint venture engaged in exploratory and commercial tuna fishing, mainly off the northwest coast of the Malagasy Republic. A report, published in 1974 by the Ministry of Rural Development of the Malagasy Republic, analyzes the fishing effort and the catch, including the monthly fluctuations in yields, size, and species of tuna caught, by these four companies during their initial commercial fishing efforts off Madagascar.

Kaikai Gyogyo Kabushiki Kaisha (KGKK), Toshoku, and Manibico, the three Japanese companies, and the Compagnie Malgache Nippone de Pêcherie (Comanip), the joint company set up under Malagasy law with KGKK, fished for a total of 1,244 days during 1973 (Table 1).

The tuna fishing companies operated out of the ports of Nosy-Bé, Diego Suarez, and Tamatave (see map), but all concentrated their efforts off the northwest coast of the country. The area fished lay between lat. 8° and 16°

S and long. 43° and 51°E, covering an area of about 200,000 square miles. Only in August, did a certain amount of exploratory fishing take place beyond this area, off the west coast of Madagascar and into the Seychelles.

Comanip, the joint venture company, is clearly the dominant force in the Malagasy tuna fishery. While the four companies took a total catch of 5,010 metric tons in 1973, Comanip, operating with 9 vessels for 8 months, caught 3,782 metric tons, or 75 percent of the total. The other three companies worked with many fewer vessels and, except for the Toshoku Company, worked fewer months in 1973 (Table 2).

The daily yield of bonito fluctuated greatly during the year. During the first 6 months, total average catches per vessel surpassed 5 metric tons per day, whereas in the second 6 months, yields did not reach 4 tons per day until December (Fig. 1).

Significant seasonal and geographic variations in the amount of tuna caught were encountered. From January to June, certain areas regularly yielded



Table 1.—Total fishing effort¹ for bonito, for tuna companies operating in Madagascar in 1973.

Company	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
KGKK 12*	36(3)	3(2)											39(3)
Toshoku 13*	14(1)	10(1)	13(1)	12(1)	11(1)	17(1)	13(1)	13(1)	4(1)				107(1)
Comanip 17*					42(5)	111(5)	117(9)	145(9)	147(9)	156(9)	171(9)	157(9)	1,046(9)
Manibico 16*									4(1)	16(1)	16(1)	16(1)	52(1)
Total	50(4)	13(3)	13(1)	12(1)	53(6)	128(6)	130(10)	158(10)	155(11)	172(10)	187(10)	173(10)	1,244(14)

¹The data in this table indicate the number of fishing days. Numbers in parentheses are the number of boats working. The numbers marked with an asterisk give the average number of fishing days per month per company.

Table 2.—Bonito catch in metric tons off the northwest coast of the Malagasy Republic in 1973.

Company	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Toshoku 1 vessel	46.5	67.2	81.0	80.6	71.0	89.8	63.0	34.4	15.5	—	—	—	549.0
KGKK 3 vessels	487.7	—	—	—	—	—	—	—	—	—	—	—	487.7
Comanip 9 vessels	—	—	—	—	247.7	748.7	356.7	248.2	459.3	409.4	623.6	688.1	3,781.7
Manibico 1 vessel	—	—	—	—	—	—	—	—	—	49.6	72.4	69.0	191.0
Total	534.2	67.2	81.0	80.6	318.7	838.5	419.7	282.6	474.8	459.0	696.0	757.1	5,009.4

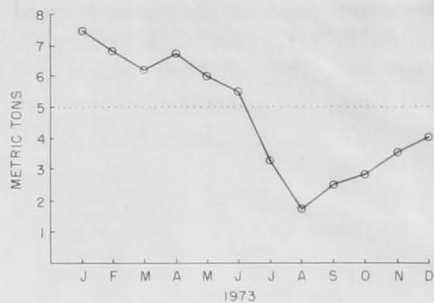


Figure 1.—Change in daily yields of bonito for 1973.

daily average catches above 5 metric tons, while from July to November, no such high yield areas were reported. In December, the yield from some zones again reached 5 metric tons per day (Fig. 2).

Bonito (*Katsuwonus pelamis*) and yellowfin tuna (*Thunnus albacares*) made up over 99 percent of the catch in 1972 and 1973. On the average, yellowfin tuna represented only about 10 percent of the total catch. The percentage of yellowfin in the total catch fluctuated notably. During the first part of the year, yellowfin never constituted more than 3.5 percent of the catch, while during the second 6 months it averaged 17-18 percent.

Based on the 2 years of exploratory and commercial tuna fishing by the three Japanese tuna companies and the Japanese-Malagasy joint venture, five conclusions were reached in the report: 1) Daily yields in the tuna catch reach a minimum in August and are highest from January to June, when average yields per vessel are above 5 metric tons per day; 2) the best yields were located in the northern sectors of the waters fished, near Aldabra and Cosmoledo Islands (see map); 3) bonito was never found in large quantities near the Madagascar coast, but yellow-

Table 3.—Table of contents of "Results of Bonito Fishing off Madagascar in 1973."

Part I Bonito or Skipjack

- A. Fishing Effort
- B. Overall Results
- C. Analysis of Fluctuations in the Yield
- D. Characteristics of the Stocks Fished
- E. Recommendations for the Gathering of Statistical Data

Part II The Bait

- A. Effort Expended and Results Obtained
- B. Individual and Specific Characteristics of the Bait
- C. Quantitative Aspects of Bait Fishing
- D. Bait Consumption
- E. Recommendations for Checking Bait Stocks

Part III Conclusions

- A. Tuna Activity
- B. Recommendations on Checking Bait Stocks.

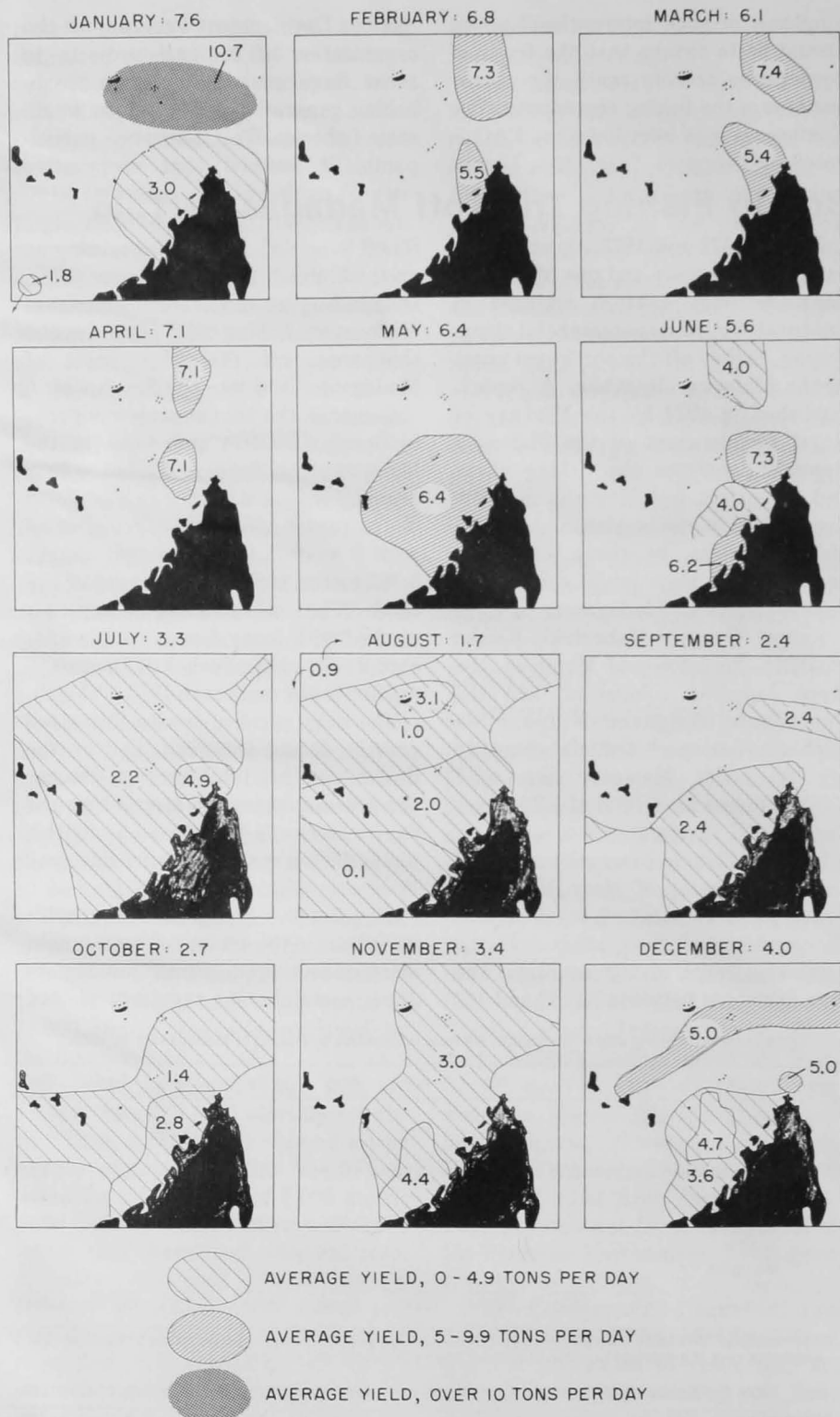


Figure 2.—Yields of zones fished off Madagascar in 1973. Numbers represent tons of tunas caught. Figures outside boxes (next to month) give monthly averages of the yield per day and yield per boat. Figures on the maps give daily average yields of the zone shown.

fin tuna was caught during October, November, and December in this area in larger quantities than on the high seas; 4) the bonito's reaction to the bait may well be more important in the final yields than the size of the school of

fish; 5) waters near Nosy-Bé (see map) contain enough bait stocks to supply about 10 or possibly more vessels; however, because of the small stock area, regular checks should be carried out on the stocks of bait fish.

The table of contents (Table 3) is included to indicate the other subjects discussed in the report.

Requests for the report, "Bonito Fishing off Madagascar in 1973," should be sent to: La Direction de l'Elevage et de la Pêche Maritime, Ministère du Développement Rural, Tananarive, Malagasy Republic.

ECUADORIAN SHRIMP INDUSTRY PROSPERS

The Ecuadorian shrimp industry is continuing to experience a very prosperous year. Ecuadorian export data indicates that through October 1975, 3,289 metric tons of shrimp were exported, compared to 2,350 metric tons for the same period in 1974. This represents an increase of 40 percent. The great bulk of Ecuadorian shrimp exports are shipped to the United States. Through October 1975, U.S. shrimp imports from Ecuador totaled 3,136 metric tons (Table 1) or approximately 95 percent of all Ecuadorian shrimp exports¹.

Table 1.—Ecuadorian shrimp exports to the United States, January-October 1974-75 in metric tons.

Month	Exports	
	1975	1974
January	198.2	200.4
February	143.3	220.9
March	183.9	279.1
April	169.5	188.2
May	332.0	304.8
June	543.5	338.1
July	511.4	265.1
August	424.4	294.7
September	362.9	200.8
October	266.9	171.4
Total	3,136.0	2,463.5

Source: U.S. Department of Commerce, Bureau of the Census, "Imports for Consumption."

Lower shrimp exports in October reflect a normal seasonal decline in the Ecuadorian shrimp fishery. Most of Ecuador's shrimp is exported by four companies, which have handled 65 percent of all shrimp exports through the first 10 months of 1975. The four firms have averaged 520 metric tons of shrimp each. The remaining 1,056 metric tons of shrimp has been shipped by 13 other firms.

Ecuadorian exports for the first 10 months of 1975 surpassed the 2,722 metric tons exported in all of 1974.

¹Slight statistical errors may exist because of the time lag between the date of Ecuadorian export shipments and U.S. import reports.

Total 1975 exports was expected to exceed the 1973 export figure of 3,720 metric tons, although it was believed unlikely that the record 1969 shipments of 4,982 metric tons would be matched. The high level of exports in 1969 was due to the record catch of 8,700 metric tons that year which has never since been equaled (Table 2). Export performance for 1975 would presumably have been higher were it not for a new law which requires that 20 percent of the Ecuadorian shrimp catch be marketed domestically, where prices are lower than those received for exported shrimp. While it is not possible to determine the extent to which the

Table 2.—Ecuador's shrimp catch, 1962-1973¹, in thousands of metric tons.

Year	Catch	Year	Catch
1962	4.7	1968	6.6
1963	5.2	1969	8.7
1964	5.0	1970	6.2
1965	5.7	1971	5.9
1966	5.3	1972	² 5.9
1967	6.0	1973	² 5.9

¹Source: FAO, "Yearbook of Fishery Statistics," 1962-73.

²FAO estimate.

Ecuadorian shrimp industry is complying with the new law, it is believed that exports through October would have already exceeded 3,600 metric tons were it not for the new marketing requirement.

Italians Troubled by African Fishing Bans

While Italian fishers received some good news from the special September 1975 meeting of the International Commission for the North Atlantic Fisheries (ICNAF)¹ in Montreal, Canada, a number of recent events have severely affected their operations. Many of the Italian fishing fleet's traditional fishing grounds have been closed by the extension of fishery jurisdictions by African countries. Italian fishers have also been involved in a dispute with Tunisia in which a number of Italian fishing vessels were seized and one crew member was killed.

The increased restrictions on fishing operations off Africa have forced Italian fishing vessels to travel as far as South Africa and North America to find fishing grounds². Italian fishing trips to either of these areas exceed 100 days, or more than twice the duration of the 40-50 day trips required for Italian fishing operations off West Africa. The cost of operating vessels increased in proportion to the length of the trip. This has created economic problems for the Italian fishing industry.

The Italian high-seas trawler fleet has reportedly been reduced by one-third. Other Italian fishing vessels have been tied up in their home ports because there were no grounds in which they could profitably operate.

¹The Italian quota was slightly increased from 4,150 tons in 1975 to 6,800 tons in 1976.

²The reopening of the Suez Canal may make Italian fishing in either the Red Sea or the Indian Ocean a future possibility.

Counting both operating and laid-up vessels, the Italian freezer fleet comprises 85 vessels with an aggregate gross registered tonnage (GRT) of 65,000. The fleet is composed of 50 ships under 600 GRT, 12 between 600 and 1,000 GRT, and 20 between 1,000 and 1,500 GRT.



In an effort to assist the fishing industry, Italy has pursued fishery negotiations with a number of African countries, including Senegal, Mauritania, and Tunisia.

According to Senegal's semi-official newspaper, *Le Soleil*, that country has ratified the fisheries agreement concluded with Italy in January 1975. In exchange for allowing Italian vessels of greater than 700 GRT to fish in Senegalese waters and offload in Senegalese ports, Italy will make long-term, low-interest credits available for the development of the Senegalese fishing industry. Although the amount

and terms of the credits have not been determined, they will be used for the construction of Senegalese boats in Italy and to assist Senegalese fish processing companies. A joint commission will be convened to work out the details, the U.S. Embassy in Dakar reports.

According to the NMFS Office of International Activities, until October 1975, Senegal had refused to ratify the fisheries agreement due to the unresolved question of an Italian loan. In order to pressure the Italians, Senegal

had denied permission for vessels in excess of 700 GRT to operate in the 110 mile exclusive fishing zone which it claimed in 1972. This prevented the larger, more efficient Italian vessels from operating in Senegalese waters. Italy's negotiations with Mauritania have been suspended. According to press reports, however, Mauritania has indicated an interest in concluding a fisheries agreement in exchange for Italian investments in Mauritanian industries. Italian shipowners have declared themselves willing to contri-

bute by purchasing fishing licenses. The Italian Fisheries Federation (Federpesca) has asked the Minister of the Treasury to take the necessary steps to resume the negotiations. (Source: *Pesca Italiana*.)

The Governments of Italy and Tunisia reached agreement on the licensing of Italian fishers operating in Tunisian waters. Italy has agreed to pay approximately \$4 million for the licenses, and has also agreed to loan Tunisia \$64 million to purchase Italian goods.

Colombian Shrimp Catch and Exports Reviewed

The 1975 Colombian shrimp catch may increase slightly over the 1974 level of 5,300 metric tons, early reports indicate. For the entire year, it is believed that the 1975 catch should approach 5,400 metric tons. After a sharp increase in 1967 and 1968, the Colombian shrimp catch declined precipitously in 1969 (Fig. 1 and Table 1). All subsequent annual catches have

Table 1.—Colombia's shrimp catch, 1961-75, and shrimp exports to the United States, 1960-74, in thousands of metric tons.

Year	Shrimp catch ¹	U.S. imports ²	Year	Shrimp catch ¹	U.S. imports ²
1960	—	0.9	1968	6.8	1.4
1961	1.8	0.8	1969	2.9	1.7
1962	1.8	1.0	1970	5.2	2.2
1963	1.8	0.8	1971	4.2	2.2
1964	1.9	0.8	1972	3.8	2.7
1965	2.7	0.8	1973	3.8	2.7
1966	2.1	1.0	1974	5.3	2.8
1967	6.2	1.2	1975 est.	5.4	—

¹Catch data for 1961-73 are from FAO's "Yearbook of Fishery Statistics"; 1974-75 data are from the U.S. Embassy, Bogota.

²U.S. import data are from "Fisheries of the United States," U.S. Department of Commerce, NOAA, NMFS.

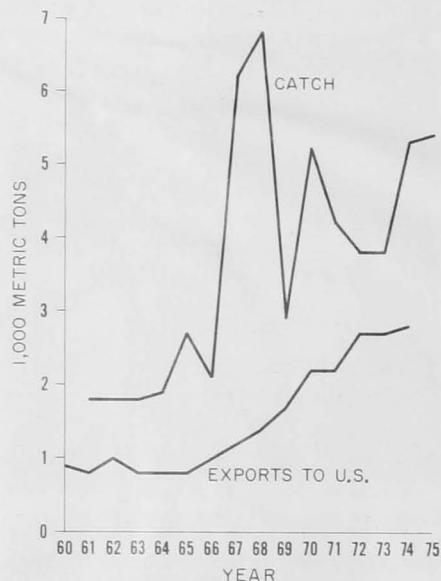


Figure 1.—Colombia's shrimp catch, 1961-75, and shrimp exports to the United States, 1960-74, in thousands of metric tons.

been significantly below the record catch of 6,800 metric tons in 1968.

Of the estimated 1975 catch, current projections indicate that about 4,600 metric tons will be caught in the Pacific and 800 metric tons in the Caribbean (see map). The principal port for Pacific shrimp operations is Buena Ventura, where over 100 shrimp vessels are based. Most of the catch is

white shrimp ("camaron blanco" or "langostino"). In all fishing areas and seasons *Penaeus occidentalis* constitutes over 80 percent of the landings. Trawling is carried out at 3-15 fathoms, but mostly in less than 8 fathoms. All Colombian shrimping operations in the Caribbean are conducted by the Vikingos Company, which uses Japanese vessels and crews.

New techniques in shrimp cultivation and harvesting are now being developed in Colombia and should increase future shrimp catches. Since 1973, the Marine Research Center in Cartagena has been studying the possibilities of shrimp farming and has reportedly obtained excellent results.

U.S. imports of Colombian shrimp

Table 2.—Colombian shrimp imports to the United States, January-June, 1974 and 1975, in metric tons.

	1974	1975
January	240	70
February	180	70
March	202	138
April	243	283
May	336	180
June	297	292
Total	1,498	1,033

Source: U.S. Department of Commerce, Bureau of the Census, "Imports for Consumption."

have increased steadily since 1965, but began to level off in 1972 (Fig. 1 and Table 1). Current import figures are significantly below comparable 1974 import levels (Table 2). At present virtually all Colombian shrimp exports are shipped to the U.S. market¹ and this situation is likely to continue.

¹Only 0.6 ton of shrimp was exported to Curacao in 1974.

Publications

Fishery Economists Initiate Newsletter

Publication of a new **Fisheries Economics Newsletter** has been announced by its U.S. correspondent, J.G. Sutinen of the Department of Resource Economics, University of Rhode Island, Kingston, RI 02881. Secretary of the newsletter is Neil McKellar, Chief Economist, White Fish Authority, Edinburgh, Scotland.

Published twice a year in The Hague, Netherlands, the newsletter has two purposes: 1) Compile and publish an international list of fishery economists,

and 2) publish abstracts of studies in fisheries economics. Subscription information and abstracting instructions are available from Sutinen, who is also seeking names and addresses of persons working in fisheries economics. Abstracted publications should involve some aspects of fisheries and economics, says Sutinen, and they can be purely theoretical, applied, or both, or contain an economic analysis of fisheries policy.

Abstracts may be submitted to Sutinen directly, with the following data: 1) Name of the publication in English and the original language; 2) name, address, and affiliation of the author(s); 3) number of pages; 4) original language of the publication; 5) summary in English, French, or German, not exceeding 10 typewritten lines (about 100 words); 6) name and volume of the journal or other periodical where the publication appeared, the year it appeared, and the page numbers. If a book or monograph, give the name and location of the publisher as well as the date published. The first two issues of the newsletter contain abstracts of 1974 and 1975 publications and the first copy was issued in February 1976.

UNITED KINGDOM FISHERIES REPORTED

Three annual fishery reports from the United Kingdom have recently been published and are briefly summarized. **Herring Industry Board Fortieth Annual Report, 1974.** Total landings of fresh herring by U.K. vessels in 1974 were 147,900 metric tons, 6 percent lower than in 1973, when 157,300 metric tons were landed. The value of the 1974 catch, however, was 13,220,000 pounds (US\$27.3 million) up 39 percent from the previous year. The report discusses the depletion of herring stocks, U.K. conservation methods, and catch quotas imposed by the Northeast Atlantic Fisheries Commission (NEAFC). The report also includes sections on marketing, research, catch and fisheries development, and several tables on the herring fishery. For a copy of the 50-page report, write to: Herring Industry Board, 10 Young Street, Edinburgh, EH2 4JQ, United Kingdom.

White Fish Authority Annual Report

and Accounts, 1974-75. This 32-page report summarizes U.K. white fish landings and the status of the industry from April 1974 to March 1975. During this period, prices for cod and cod-related fish for each month were lower than those of the corresponding month a year before and, because of increased costs and inflation, the entire industry has had financial problems. There was a decline in landings by all sectors of the fleet in 1974, except by the Scottish inshore fleet, whose catch of industrial species increased. Total British landings were 745,000 tons in 1974, compared with 773,000 tons in 1973, and value dropped almost 1 million British pounds sterling to 128,750,000 pounds (US\$266 million). The report also has sections on vessels, government subsidies, training, and other subjects, as well as tables and graphs on trade, prices, vessels, landings, and most aspects of the U.K. white fish industry. For a copy, write to: White Fish Authority, Sea Fisheries House, 10 Young Street, Edinburgh EH2 4JQ.

Fisheries of Scotland Report for 1974. The Scottish fishing industry experienced the problems of higher fuel costs, oversupply in some species, and slackening demand in the last half of 1974. Approximately 258,000 metric tons were landed by Scottish fishermen in 1974, almost the same amount as in 1973. Shellfish and herring landings both declined in 1974. This 53-page report also examines the conservation of stocks, financial assistance to industry, surveillance and enforcement programs, and fisheries research. For a copy, write to: The Department of Agriculture and Fisheries for Scotland, Edinburgh, United Kingdom.

Salmon Culture Facility Described

An economic study has found that an aquaculture system developed at the University of Rhode Island could raise salmon for stocking purposes for about half the cost of many currently used systems and in about one-half the time. Charles R. MacDonald, research assistant in aquaculture management, John M. Gates, assistant professor of resource economics, and Thomas L. Meade, associate professor of animal science, reported their findings in a publication entitled, **A Production Cost**

Analysis of Closed System Culture of Salmonids, which was sponsored by URI's Sea Grant Program. Studies which led to development of the unique closed aquaculture system at Kingston, R.I. were also funded by Sea Grant.

According to the report, about one million salmon "smolts," which are 6- to 7-inch salmon suitable for stocking streams or aquaculture operations, could be produced yearly for about a dime each with a scaled-up version of the URI aquaculture facility. An initial investment of about \$250,000 would cover construction costs and the first year's operating expenses, they said. The production costs would be about half that of traditional open raceway systems, they said, because complete environmental control can be maintained in the URI system.

The proposed aquaculture facility, designed by MacDonald, would consist of two culture systems, one for hatching eggs and growing fingerlings to a size suitable for stocking into the other, where they would grow to smolt size. Both fingerlings and smolts would be held in large tanks.

The URI aquaculture operation employs a water reuse system which eliminates the need to discharge polluted water from the facility into coastal waters and enables siting of the smolt production facility miles from water sources and costly shoreline land. URI's facility is located at Kingston, about six miles from the ocean.

The study considered projected annual costs of operating the facility, costs of construction, landscaping, materials and equipment, which included tanks, pipes and fittings, pumps, valves, and laboratory equipment. Also considered were depreciation and repairs, projected salaries, wages and fringe benefits, and electricity requirements. MacDonald said, however, that inflation which has occurred since the study was completed would have to be considered in future estimates of costs of smolt production facilities.

The report also contains diagrams of the smolt production facility. It may be obtained free of charge by requesting report number P456 from the Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882.