

Shrimp Culture Is Promoted in Burma

The Burmese Government is promoting a shrimp culture industry. The state-owned People's Pearl and Fishery Corporation (PPFC), Burma's sole shrimp farming and exporting organization, has built some ponds and more are planned. The PPFC also plans to build a hatchery. Government officials realize the potential value of cultured shrimp as a means of increasing export revenues and foreign currency earnings. Current efforts have concentrated on freshwater shrimp and the first harvest was reported in 1984. The PPFC is currently conducting experiments with marine species and plans to culture large quantities of marine shrimp (Table 1).

Species and Grounds

Approximately 25 shrimp species are known to exist in Burma. Shrimp are harvested offshore by the commercial trawler fleet and in shallow coastal areas by artisanal fishermen. Yellow shrimp, *Metapenaeus brevicornis*, and speckled shrimp, *M. monoceros*, are the main offshore species caught, although some penaeid species are also harvested by commercial trawlermen. Giant tiger prawn, *Penaeus monodon*; banana prawn, *P. merguensis*, and redbait prawn, *P. penicillatus*, predominate in the artisanal catches, but small quantities of *Metapenaeus* spp. are also caught by artisanal fishermen. The PPFC, as the result of studies conducted in the late 1970's and early 1980's, iden-

tified two particularly promising species. The most promising marine species was *P. monodon* and the most successful freshwater species was the giant river prawn *Macrobrachium rosenbergii*.

The Irrawaddy River Delta area, comprised of swamps, mangroves, and other estuaries, offers the best freshwater, brackish water, and marine culture sites. Burma's other coastal regions (the Rakhine coast in the west and the Tenasserim coast, bordering on Thailand, in the east), also have substantial wild shrimp resources. Mining and the utilization of mangroves for charcoal production, however, are destroying the estuarine habitat of postlarval shrimp and polluting potential shrimp culture sites.

Farms and Technology

The PPFC's major emphasis has been on freshwater shrimp. The first successful grow-out studies on *M. rosenbergii* were completed in 1979 at the Thaketa Research Station in the Rangoon District. The Thaketa Station is now Burma's main hatchery for fresh water prawn postlarvae. The hatchery technology used by the PPFC is based on the "clearwater" method. This involves the constant filtration and aeration of water in larval tanks to maintain appropriate temperature, oxygen, and salinity levels, and to eliminate metabolic wastes. This method, which is used in

marine, freshwater, and brackishwater shrimp culture, is distinguished from the "greenwater" method, a freshwater culture technique that relies on phytoplankton culture in tanks to control ammonia build up. The "clearwater" hatchery method is the most common technique used in Asia. Zooplankton, mainly *Artemia*, and phytoplankton are cultured to feed the larval shrimp.

The PPFC operates a semi-intensive farm for *M. rosenbergii* production at Thanatpin. Semi-intensive culture techniques consist of moderate water exchange rates (less than 100 percent per day) in culture ponds. Cultured organic foods (for example, phytoplankton), stimulated by fertilizers, are the primary source of food. To supplement natural foods, cooked fish by-products or coarse grains are added to the ponds. Stocking densities, exceeding 30,000 postlarvae per hectare, also characterize semi-intensive culture. In countries like Burma, farmers using semi-intensive techniques, obtain postlarvae from the wild, but hatchery construction will soon enable farmers to acquire cultured postlarvae.

The circulation of water for the Thanatpin farm's earthen-walled ponds is controlled with sluice gates and a pump system, respectively. Fertilizer, usually manure, is added to the ponds to stimulate natural food growth, although rice bran and oil cake may sometimes be placed in ponds to supplement natural foods. The 40 hectare (ha) Thanatpin farm is expected to achieve yields of 50 t of shrimp a year when operating at full capacity.

The PPFC is also researching marine shrimp species. Experiments are underway at Naukme (Irrawaddy District) and Sandoway (Rakhine District), to raise *P. monodon* by utilizing extensive methods. In Asia, farmers utilizing extensive culture methods often rely on wild postlarval shrimp entering culture sites on incoming tides or during flooding. Depending on the type and location of the culture site, farmers may use irrigation systems and sluice gates to control water flow to the sites. In some instances, wild postlarvae are collected by hand from other sources (rivers, lakes, etc.) and then stocked by farmers in

Table 1.—Important shrimps in Burma¹.

Scientific name	English name	Spanish name	French name
<i>Macrobrachium rosenbergii</i>	Giant river prawn	Cameron gigante	Bouquet geant
<i>Metapenaeus brevicornis</i>	Yellow shrimp	Cameron amarillo	Crevette jaune
<i>Metapenaeus monoceros</i>	Speckled shrimp	Cameron moteado	Crevette mouchetee
<i>Penaeus merguensis</i>	Banana prawn	Cameron banana	Crevette banana
<i>Penaeus monodon</i>	Giant tiger prawn	Cameron tigre gigante	Crevette geante tigre
<i>Penaeus penicillatus</i>	Redtail prawn	Cameron rabo colorado	Crevette queue rouge

¹Source: Holthuis, L. B. FAO Species Catalogue: Shrimps and Prawns of the World. FIR/125 Vol. 1



culture sites. Farmers do not use feeds or fertilizers and rely on the natural productivity of the culture site for the survival and growth of postlarvae.

The Naukme and Sandoway farmers use passive stocking methods, such as allowing tidal flow to wash postlarvae into culture sites. However, they also occasionally purchase postlarval shrimp collected from nearby estuaries.

Burma's PPFC presently has only one other 50 ha freshwater farm (location unknown) in addition to the 40 ha farm at Thanatpin. The Burmese Government plans to construct an additional four freshwater farms of 50 ha each by 1990, for a total of six farms. While this expansion plan appears feasible, the Burmese Government's goal of having 4,000 ha of marine culture farms operational by 1990—in addition to the 300

ha of freshwater farms mentioned above—seems somewhat optimistic.

Development Projects

Burma's \$43-million Inland Fisheries Development Project has two shrimp components. The first is aimed at constructing freshwater and marine shrimp farms with supporting hatcheries. The second part is designed to improve the quality of both wild and cultured shrimp catch by providing better nets and fishing gear to artisanal fishermen, improving the vessels for collecting the shrimp harvest in outlying regions, constructing new collection stations, and expanding a fishery processing plant in Rangoon. To prevent spoilage, ice plants will also be constructed to supply collection stations and transportation vehicles. At present, inadequate collection

infrastructure results in considerable spoilage before the catch can be processed. The Asian Development Bank will loan the Burmese Government \$20 million for the Project, while the remaining \$23 million will be financed by Burma. In discussing the guidelines for Burma's Fifth Four-Year Plan at the Fifth Party Congress, party and state officials emphasized that their goal in promoting a shrimp culture industry is to increase exports.

Shrimp Catch

Burma's shrimp catch increased from 5,155 t in 1984 to 6,931 t in 1985, or by almost 1,800 t (34 percent) (Table 2). Alleged overfishing has already caused some observers to believe that the Burmese shrimp catch will decline in the future. This is based on the decreasing size of the shrimp landed in Burma. The PPFC, however, expects the shrimp catch to double by 1990 to 13,490 t.

Cultured Shrimp

Burma first produced cultured shrimp in 1984, when 7 t of freshwater prawns was harvested. In 1985, about 10 t was harvested. The Government plans a major expansion of the industry and forecasts that harvests of cultured shrimp will reach 1,240 t by 1990. Of this total, 420 t would be freshwater species and 820 t marine species. In calculating these forecasts, the Burmese Government expects shrimp yields on freshwater farms to average 1.4 t (whole weight) per ha per year, while on marine farms, where extensive methods will be used, shrimp yields are expected to average only 0.2 t per ha per year.

Table 2.—Burma's shrimp production: Cultured, wild, and total, 1983-90.

Year	Catch ¹ (t)			Total
	Aquaculture		Wild ²	
	Marine	Freshwater		
1983			4,356.0	4,356.0
1984		7	5,148.2	5,155.2
1985		10	6,921.4	6,931.4
1990 ³	820	420	12,250.0	13,490.0

¹The catch is given in whole weight (heads on).

²Does not include unknown quantities of metapenaeid shrimp which is not purchased by the PPFC.

³Projected.

Wild Shrimp

More than half of Burma's wild shrimp catch is harvested by artisanal fishermen. Penaeid species (the only species the PPFC purchases, processes, and exports) amount to 80-82 percent of the total artisanal shrimp catch. Recent surveys indicate that offshore trawler catch rates of 30-60 kg/hour are attained off Burma's coasts. The highest rates have been recorded just after the monsoon season ends. However, since a large portion of the offshore commercial trawler catch consists of metapenaeid shrimp, a species not purchased by the PPFC, the trawler fleet is forced to either sell its metapenaeid catch to neighboring Thai fishermen, or to local Burmese consumers. Such over-the-side or local sales are usually not reported to the PPFC whose statistics include only the amount of penaeid shrimp species it purchases itself. As a result,

the actual amount of Burma's wild shrimp catch cannot be precisely determined.

Exports

Burma's total shrimp exports more than doubled in 1984 to 2,610 t from 1,190 t in 1983. Data for 1985 were not available (Table 3). By comparison with neighboring countries, such as Thailand, Bangladesh, and India, Burma's exports are small. Most of the exported shrimp is either frozen (headless shell-on) or dried. Burma's main shrimp export markets are traditionally the United States and Japan. In 1985, Burma exported 743 t of shrimp to the United States, almost a 100 percent increase over the 1984 total of 381 t. Total 1985 exports to Japan were 348 t. Because of the demand in Japan for *M. rosenbergii*, Japanese companies have invested \$4 million in a Burmese freshwater aquaculture farm designed specifically for

export. The farm is expected to produce annual harvests of 450 t of shrimp. (Prior to this project, Burma had established a shrimp trawling joint venture with Japan off the northern Rakhine coast, but it is not yet known if the project was successful.)

Burma, like other Asian shrimp exporting countries, has experienced quality control problems. Poor catch and landing techniques and primitive transportation and processing technology are responsible for the low quality of Burma's shrimp products and the inability of Burmese shrimp exporters to compete on the world markets. A major objective of the Inland Fisheries Development Project is to solve these quality control problems.

Outlook

Despite the Burmese Government's ambitious estimates for rapid growth in its shrimp culture and capture industries, several obstacles may impede this growth. The failure of the Burmese Government to implement adequate management plans to control overfishing may result in rapid depletion of both offshore and artisanal shrimp fisheries. In addition, many potential grounds are being ruined by other forms of natural resource exploitation (i.e., the extraction of mineral and forestry products which pollute and destroy natural shrimp habitats).

Table 3.—Burma's shrimp exports, by country, quantity, and value, 1980-85.

Country	Exports (t)						Exports (US\$1,000)					
	1980	1981	1982	1983	1984	1985	1980	1981	1982	1983	1984	1985
U.S.A.	279.5	416.3	1,503.8	296.5	380.8	743.5	2,278	3,363	11,191	1,990	2,763	4,691
Japan	812.8	1,198.5	623.8	487.1	336.4	348.2	4,565	6,307	4,667	3,991	2,699	2,725
EEC	39.0	62.0	63.0	24.0	NA	NA	161	367	394	245	NA	NA
Other	NA	NA	109.4	382.4	NA	NA	NA	NA	NA	NA	NA	NA
Total	NA	NA	2,300.0	1,190.0	2,610.0	NA	NA	NA	NA	NA	10,500	NA

U.S. Tuna Imports From Latin America, 1978-85

U.S. tuna imports from Latin America set an all-time record in 1985. Since 1979, when the previous record was set, shipments had been substantially lower. Frozen and canned tuna imports from Latin America in 1985 totaled 82,000 metric tons (t), valued at \$77 million (Fig. 1, Tables 1 and 2). The increased shipments were primarily caused by developments in six Latin

American countries and dependencies (Venezuela, Ecuador, Panama, Brazil, the Netherlands Antilles, and the British Virgin Islands), all of which substantially increased their shipments to the United States. The increased imports from these countries more than made up for the continuation of the U.S. tuna embargo on Mexico, which was the principal Latin American supplier to the

U.S. market until it seized a U.S. tuna seiner in 1980.

Regional Importance

U.S. imports from Latin America in 1985 accounted for over 25 percent of all U.S. tuna imports. Only shipments from Asian countries (totaling over 180,000 t and including foreign landings in American Samoa) exceeded Latin American shipments (Fig. 2). African and European countries also shipped tuna to the United States: 27,000 t and 18,000 t or 9 and 6 percent, respectively, of all U.S. tuna imports totaling 314,200 t. The expanded 1985 shipments from Latin America substantial-

ly increased the Latin American market share in the United States. Latin America's 25 percent share of all U.S. 1985 tuna imports was nearly double the region's 1984 share of only 13 percent. The increased Latin American market share was also aided by a decline in shipments from Asia.

Commodities and Species

Frozen

Most Latin American countries ship tuna to the United States frozen. About 97 percent of all 1985 tuna imports from Latin America were frozen. The two most important species imported from Latin America were yellowfin and skipjack tuna, but there were also lesser quantities of albacore. Albacore imports

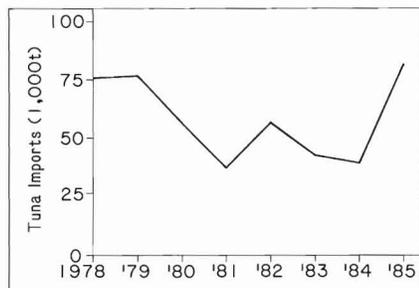


Figure 1.—U.S. tuna imports from Latin America, 1978-85.

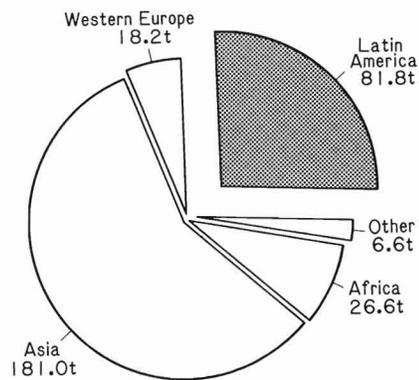


Figure 2.—U.S. imports of tuna by region (total = 314,200 t).

from Latin America totaled 6,000 t in 1985. Breakdowns for yellowfin and skipjack tuna are not available because the U.S. Customs Service has several tariff categories that include both species.

Latin American tuna fisheries are

generally oriented toward foreign markets. Most countries export a sizeable part of their tuna catch, primarily to the United States for canning. Almost all U.S. imports from Latin America are shipped as whole or eviscerated fish. A small amount is processed as loins and

Table 1.—U.S. tuna imports from Latin America (all product forms), by quantity, 1978-85.

Country or Dependency	Imports (t)							
	1978	1979	1980	1981	1982	1983	1984	1985
Venezuela	9,324.3	5,066.1	4,062.0	9,970.7	9,615.1	9,357.7	8,082.0	24,679.7
Ecuador	12,535.4	17,134.5	11,845.2		1.8	864.5	6,707.1	19,765.9
Panama	14,519.8	25,684.9	16,201.7	14,297.3	21,695.1	11,294.2	15,795.0	17,758.4
Brazil	708.3	395.0	4,743.3	6,286.4	14,122.1	13,528.5	6,097.9	13,860.8
Neth. Antilles	7,670.9	11,753.9	11,837.0	2,334.5	913.5	137.2	248.4	3,576.6
Brit. Virgin Isl.						15.2		1,021.1
Uruguay	2,654.2	710.8	1,602.9	1,639.1	1,058.9	466.0	538.1	654.3
Dominican Republ.				19.1		445.8	819.1	269.0
Argentina				12.2	45.8	50.8	11.0	89.0
Peru	40.6	86.6	510.4	23.4	137.2	11.4	13.3	39.8
Trinidad-Tobago		12.5	242.2	522.9	19.7	783.8	349.5	33.4
Chile			3.7	25.4	39.3	1.2	43.0	16.0
Costa Rica	573.2	558.0	450.0		787.6	174.6	600.0	0.6
Guyana								0.5
Cayman Islands			294.8	1,908.9	7,833.5	3,910.8	316.1	
Bermuda	6,300.7	4,380.6		445.7	405.7	0.5	1.3	
French West Indies		59.2	14.7	56.8	0.7	195.0	1.2	
Bahamas	529.7					181.6		
Honduras	4.7					1,245.4		
El Salvador					201.4	247.0		
Barbados				68.0				
Mexico	17,853.1	10,038.1	4,730.7					
Nicaragua	2,988.4	846.0						
Total ¹	75,703.3	76,726.2	56,538.7	37,610.4	56,877.3	42,910.9	39,623.1	81,764.0

¹Totals may not agree due to rounding.

Table 2.—U.S. tuna imports from Latin America (all product forms), by value, 1978-85.

Country or Dependency	Imports (US\$1,000)							
	1978	1979	1980	1981	1982	1983	1984	1985
Venezuela	7,858.7	2,711.3	3,068.9	12,793.5	10,940.2	8,708.4	7,357.5	23,905.8
Ecuador	7,941.9	12,186.3	11,136.4		2.3	677.9	5,099.9	16,915.4
Panama	12,605.9	23,410.3	18,799.2	18,270.8	25,832.8	11,130.6	11,756.2	14,704.7
Brazil	448.3	291.4	5,205.9	7,440.8	15,709.2	12,144.6	6,069.7	11,288.3
Neth. Antilles	7,823.9	10,072.5	14,394.8	4,576.0	1,177.4	121.7	473.8	6,436.0
Brit. Virgin Isl.						9.3		1,344.4
Uruguay	4,434.0	985.1	3,383.0	2,749.4	2,264.1	615.9	966.7	1,254.5
Dominican Republ.				35.2		687.3	1,333.4	438.5
Argentina				26.8	92.1	91.2	18.8	202.1
Peru	53.3	107.4	777.6	19.2	277.9	15.5	28.0	84.1
Trinidad-Tobago		21.7	523.0	710.3	35.1	1,053.5	444.9	72.8
Chile			4.4	35.6	65.7	3.3	105.3	68.2
Costa Rica	499.9	464.4	382.5		826.8	131.1	582.0	1.5
Guyana								1.3
Cayman Islands			277.5	2,279.2	9,197.8	3,723.8	256.6	
Bermuda	1,599.5	1,337.3		520.6	448.5	2.4	3.8	
French West Indies		97.3	53.0	124.2	1.1	258.0	1.6	
Bahamas	175.2					269.5		
Honduras	5.6					1,120.5		
El Salvador					181.0	145.0		
Barbados				222.2				
Mexico	16,221.7	9,976.3	5,110.8					
Nicaragua	1,598.4	715.8						
Total ¹	61,266.2	62,377.0	63,117.0	49,803.7	67,052.0	40,909.5	34,498.2	76,717.5

¹Totals may not agree due to rounding.

discs by low-cost local labor. The amount of tuna shipped as loins and discs has decreased since 1979 when 1,900 t was shipped in this form, mostly from Mexico and Ecuador (Table 3).

The shipments of loins and discs ceased after 1980 when embargoes were placed on Mexico, Ecuador, and Costa Rica following their seizures of U.S. tuna seiners in jurisdictions not recognized by the United States (Table 4). Exports to the United States were resumed in 1984 when small quantities were shipped. Ecuador was the only Latin American country exporting loins and discs to the United States in 1985 with shipments totaling 420 t.

Canned

Several Latin American countries (Mexico, Ecuador, Venezuela, Brazil, and Costa Rica) can tuna, but these countries produce that commodity mainly for their domestic markets. The one exception is Ecuador, which developed export markets for canned tuna in Colombia and Venezuela. Latin Ameri-

can canners have generally had difficulty exporting their products because of quality control problems and high production costs. Canners in most countries have to import canning materials, processing equipment, oil, and other supplies. The cost of these imports substantially increases production costs.

U.S. imports of canned Latin American tuna are small, but are increasing. The United States imported 2,800 t of canned tuna from Latin America in 1985, compared with only 430 t in 1984 and 12 t in 1983 (Table 5). Almost all 1985 shipments were from Ecuador and, to a lesser extent, Venezuela. The Latin American country with the largest tuna canning industry is Mexico but, because of the 1980 tuna embargo, Mexico cannot ship tuna to the United States (Table 4). Data on production costs in the Mexican tuna canning industry are unavailable, but some observers believe that, when and if the embargo is lifted, Mexico could begin to export substantial quantities of canned product to the United States. Mexican companies are believed to have large inventories of canned tuna, but the specific quantities involved are unknown. One unconfirmed report suggests that Mexican inventories could contain as many as 1 million cases. Discussions with Mexico on the removal of the tuna embargo have touched on the possibility of Mexico restraining shipments of these inventories to the United States.

Major Suppliers

Four Latin American countries (Venezuela, Ecuador, Panama, and

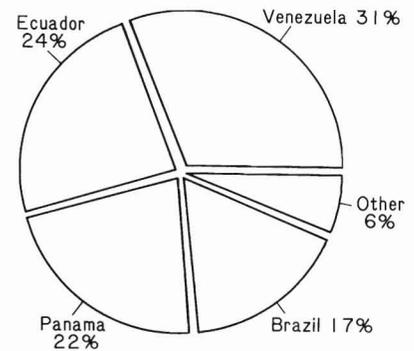


Figure 3.—U.S. tuna imports from Latin America by country, 1985 (total = 81,800 t).

Brazil) shipped 76,000 t of tuna to the U.S. in 1985, over 93 percent of all tuna shipments from the region (Table 1 and Fig. 3). All four countries have been long-time suppliers of tuna to the United States. Both Venezuelan and Ecuadorian shipments set new records in 1985. Major 1985 developments in these and several other important Latin American countries are listed below.

Venezuela

Venezuela in 1985 became the leading Latin American supplier of tuna to the U.S. market. Shipments totaled 24,700 t in 1985, three times the 8,100 t imported by the U.S. in 1984. Most of the imports from Venezuela were frozen yellowfin tuna, but 1985 shipments also included over 400 t of canned tuna, up from only 1 t in 1984. In the past few years, Venezuela has acquired Latin America's second largest tuna seiner fleet. In 1985, Venezuela operated about 20 purse seiners with a carrying capacity of 22,000 short tons and a small baitboat fleet. Venezuelan companies operate 10 additional foreign-registered seiners in the Eastern Pacific, with a carrying capacity of 11,200 short tons. The Venezuelan fleet was second only to the Mexican fleet. Unlike the Mexican fleet, however, the Venezuelan fleet has been acquired without massive state subsidies and, with the important exception of low-cost fuel, is not currently

Table 3.—Latin American exports of tuna loins and disks to the United States, 1978-85.

Country or Dependency	Exports (t)			
	1978	1979	1980 ¹	1985
Costa Rica	15.2			
Ecuador	6.4	325.7	214.3	421.0
Mexico	1,331.3	1,528.5	575.7	
Neth. Antilles		37.5		
Total ²	1,352.9	1,891.7	790.0	421.0

¹No data for 1981-83 and only 0.5 t exported in 1984.
²Totals may not agree due to rounding. Source: U.S. Department of Commerce, Bureau of the Census.

Table 4.—U.S. tuna embargoes on Latin American countries, 1976-86.

Country	Effective date	Date rescinded	Statute ¹	Tuna and products
Costa Rica	2-01-80	2-26-82	MFCMA	All
Costa Rica	4-24-86	In force	MFCMA	All
Ecuador	11-21-80	4-19-83	MFCMA	All
Mexico	7-14-80	In force	MFCMA	All
Mexico	2-01-81	5-21-86	MMPA	Yellowfin and tuna products
Peru	1-01-78	7-01-83	MMPA	Yellowfin and tuna products

¹MFCMA = Magnuson Fisheries Conservation and Management Act, MMPA = Marine Mammal Protection Act.

Table 5.—U.S. canned tuna imports from Latin America, 1983-85.

Country or Dependency	Imports (t)		
	1983	1984	1985
Argentina			39.2
Brazil		12.8	
Chile			4.5
Ecuador		403.8	2,347.2
French West Indies		0.6	
Netherlands Antilles	0.6	2.6	
Peru	11.4	13.3	39.8
Venezuela		1.4	418.8
Total ¹	12.0	434.5	2,849.5

¹Totals may not agree due to rounding.

subsidized by the Government.

Venezuelan tuna fishermen complain that Government policies, such as those requiring part of their catch to be sold domestically, have actually impeded the industry's development. Many Venezuelan companies have acquired used U.S. vessels. Venezuelan tuna companies are reporting record profits, in part because their seiners were purchased at low prices and because they can buy diesel fuel at prices substantially below international levels.

Venezuelan companies export more than half of their catch and can the rest for domestic consumption. Tuna has replaced sardines as the most popular canned fish product in Venezuela. As part of an agreement signed with the Venezuelan Government in 1983, the country's fishermen are required to land at least 40 percent of their catch in Venezuela to supply the domestic market, leaving only 60 percent for export. (Unconfirmed reports suggest that Venezuelan fishermen underreport their catch in order to reduce the amount of the catch which must be reserved for domestic use and increase the share which can be exported. Venezuelan officials are concerned about the illegal trade and as of April 1986 had reportedly restricted exports to increase the availability of tuna on the domestic market.)

Additional supplies of tuna are received from foreign fishermen who land some of their catch in Venezuela in exchange for the right to purchase diesel fuel below international prices. Some U.S. fishermen have developed successful charter arrangements with Venezuelan companies, but others have reported difficulty with contractual relationships they have attempted in Venezuela. The Venezuelan tuna industry has recovered from a difficult period following the devaluation of the bolivar in 1982 and 1983 when the country's controlled tuna prices fell substantially below international levels. The Government now maintains the controlled domestic price near the world price. Aside from the United States, Venezuela's major tuna market is Western Europe, which imported nearly 14,000 t of Venezuelan tuna in 1984, the latest year for which

data are available. Unlike many other Latin American exporters, however, Venezuela has not yet begun to export tuna to Japan.

Ecuador

Ecuador was the second leading tuna supplier in 1985. Ecuadorean companies shipped 20,000 t of tuna to the U.S. market in 1985, almost triple the 6,700 t shipped in 1984. The sharp increase in shipments signifies that Ecuador has finally recovered from the lingering effects of the 1980-1983 U.S. tuna embargo (Table 4). Although the embargo was removed in 1983, export shipments remained well below pre-embargo levels through 1984. Most of Ecuador's 1985 exports were skipjack tuna. In 1985, Ecuador remained the most important Latin American supplier of canned tuna to the U.S. market.

Ecuadorean shipments of canned tuna grew almost 500 percent in 1985, from only 400 t in 1984 to 2,350 in 1985. Ecuador had an active fleet of 30 seiners and 4 baitboats, primarily small vessels. The fleet's carrying capacity in 1985 was only 7,100 short tons. In addition, three U.S.-owned seiners, registered in Vanuatu, fished off Ecuador during 1985. U.S. companies have previously been active in the processing industry, but have now withdrawn. A U.S. tuna company sold its share of the Ecuadorean joint venture INEPACA¹ to local investors in December 1985.

After the United States imposed the tuna embargo in 1980, Ecuadorean tuna companies attempted to market their catch in other Latin American countries. This strategy was partially successful until the region's economic crisis, which developed in 1982 and 1983, forced several countries to impose strict import controls. Some success, however, was achieved and exporters have diversified their markets, shipping canned tuna to Colombia and frozen tuna to various European countries, particularly Spain. Ecuador, like Venezuela, has not yet succeeded in exporting tuna to Japan.

¹Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.

Panama

Panama was the third leading supplier of tuna to the United States in 1985, shipping 17,800 t, mostly frozen yellowfin tuna. Panama's tuna fleet consisted of six U.S.-owned seiners with a carrying capacity of 7,800 short tons in 1985, but one of these vessels sank. A Panamanian-flag seiner was reportedly the most successful vessel operating in the Eastern Pacific during 1985. Many countries also transship tuna at Panama's Taboquilla Island.

Foreign tuna vessels utilize the port facilities at Balboa, but few use the World Bank-financed fishing port at Vacamonte, which reportedly has not been dredged in recent years. Panama has no domestic tuna-canning industry. Local investors have been considering the construction of a cannery for several years, but declining world tuna prices since 1982 have discouraged such an investment. Like Venezuela, Panama exports significant amounts of tuna to Western Europe—over 12,500 t in 1984; exports to Japan are small.

Brazil

Brazil was the fourth most important supplier of tuna to the United States in 1985. The United States imported 13,900 t of tuna, an increase of 125 percent over 1984. Almost all of Brazil's 1985 shipments were skipjack tuna. While all 1985 U.S. tuna imports from Brazil were frozen, Brazil does have a substantial canning industry which processes tuna for the domestic market. Tuna is reportedly becoming the country's most popular canned fish product. The Brazilian tuna fleet is composed of over 85 small vessels, mainly baitboats, with an increasing number of longliners and seiners.

A Brazilian shipyard, the Companhia Brasileira de Armazenamento, recently launched a seiner with a carrying capacity of 155 t, the largest fishing vessel ever built in Brazil. The major Brazilian tuna grounds are off the country's central and southern coast. The fleet is centered in the port of Itajai. The development of the Brazilian tuna industry has been aided by various joint ventures with Japanese companies, including one with Taiyo Gyogyo. Japan

and Korea (ROK) have been active in the industry. In 1984, Brazilian companies leased 12 foreign-owned vessels. The great majority of Brazil's tuna exports are shipped to the United States, although small quantities are also exported to Western Europe.

Netherlands Antilles and British Virgin Islands

U.S. tuna imports from both the British Virgin Islands and the Netherlands Antilles increased sharply in 1985 from low 1984 levels. The British Virgin Islands, which shipped no tuna to the United States in 1984, provided 1,000 t in 1985. The Netherlands Antilles in 1985 shipped 3,500 t to the United States, up from 200 t in 1984. The Netherlands Antilles shipments were primarily through St. Maartens, a transshipment point (located close to Puerto Rico) that has been active for several years. Frozen albacore was the predominant commodity shipped by both countries. Neither country has a tuna fleet. The tuna exported in 1985 from both countries was probably caught by Korean and Taiwan companies operating longliners, perhaps through local joint ventures. Most of the catch is shipped to Puerto Rico for canning.

Uruguay

U.S. tuna imports from Uruguay totaled about 700 t in 1985, the third year in a row in which shipments have been below 1,000 t. These statistics are difficult to evaluate as U.S. canneries report substantially higher receipts from Uruguay. In 1985, for example, canneries in Puerto Rico reported receiving 8,500 t of tuna from Uruguay. Such statistical anomalies probably result because three Asian countries (Japan, Korea, and Taiwan) operate tuna longliners in the South Atlantic and transship some of their catch in Montevideo.

Unlike other Latin American countries, Uruguay's 1985 exports to the United States were made up entirely of albacore, the most valuable of the three common species shipped by Latin American countries to the United States. In the past few years, Uruguayan joint ventures with Asian countries have begun to operate a few longliners which have

been transferred to Uruguayan registry. Various difficulties, however, have plagued these ventures. Some of the vessels involved have fled and Uruguayan authorities have asked INTERPOL to help recover them.

The Asian-registered vessels are not permitted to fish within 200 miles of the coast, which is reserved for Uruguayan vessels. The Asian longliners conduct distant-water operations and land their catch at La Paloma or Montevideo. While officially reported U.S. imports have been declining, exports to Japan have increased. In 1985, Japan imported over 2,100 t of tuna from Uruguay, most of it shipped frozen.

Mexico

Mexico has traditionally been the most important Latin American supplier of tuna to the U.S. market. In 1978, for example, the United States imported over 18,000 t of tuna from Mexico, making it the most important Latin American supplier that year (Table 2). This traditional relationship was, however, interrupted in July 1980, when the United States embargoed tuna imports from Mexico because Mexico seized a U.S. tuna seiner fishing in the Mexican 200-mile Exclusive Economic Zone (Table 4). The United States does not recognize claims by coastal countries to manage highly migratory species like tuna within 200-mile coastal zones. As a result of the embargo on Mexico, there have been no U.S. tuna imports from Mexico since 1980.

The United States is now considering lifting the embargo, but the economics of exporting tuna to the United States have changed. Before the embargo, Mexico had an advantage over all other Latin American countries in that tuna landed at Ensenada, the country's major tuna port, could be inexpensively trucked across the border to nearby canneries in southern California. Most of these canneries, however, are closed and Mexico will have to compete on more equal footing with other Latin American tuna exporters, which ship their catch to canneries in Puerto Rico.

The Mexican tuna industry has had difficulty in adjusting to the loss of the U.S. market, although Mexican officials

claim publicly that the U.S. embargo has not hurt the industry. The actual level of Mexican tuna exports is difficult to assess as current tuna export data are not readily available. The Secretaria de Pesca claims that an all-time record of 35,000 t was exported in 1985, mostly to France, Italy, and Japan. The Mexican tuna catch has increased, reaching an all-time record of 85,000 t in 1985, a 33 percent increase over the 64,000 t taken in 1984. Most of the catch is currently marketed in Mexico and the Mexican Government has had to subsidize both the fishing and marketing.

The Mexican fleet has grown dramatically since 1980, and was comprised of 86 vessels with a total capacity of 71,500 short tons in 1985. Most of these recently acquired vessels are modern seiners with carrying capacities of 1,000 short tons or more, capable of distant-water fishing. Most of these purchases were made by private investors taking advantage of heavily subsidized government loans. Mexico's problems in marketing its catch has caused great difficulties for the fishermen and private companies which purchased vessels in 1981 and 1982. For example, about 25 of Mexico's 86 tuna vessels, with a total carrying capacity of over 19,000 short tons (about 25 percent of the fleet), were inactive in 1985. The active vessels are receiving extensive government support.

Most of the Mexican catch is generally yellowfin tuna, but the relative shares of skipjack and yellowfin tuna vary substantially from year to year. The yellowfin tuna catch in 1985 was 79,200 t, an unusually high percentage—nearly 95 percent of the total catch. The success of the yellowfin tuna fishery is important to Mexico because the larger species is easier to export. The high percentage of yellowfin tuna is probably due to the fact that skipjack tuna commands a lower price and is more difficult to export. Mexican fishermen are thus adjusting fishing strategy to target yellowfin tuna, reportedly fishing extensively on porpoise. Fishermen use the porpoise schools to locate yellowfin tuna as the species often schools in association with porpoise. The same relationship, however, does not exist with skipjack tuna. (Source: IFR-86/30.)