

## Ecuadorean Shrimp Culture and Exports

### Introduction

Ecuadorean shrimp farmers reported increasing difficulty in obtaining postlarvae to stock their ponds since March 1985. More recent reports from Ecuador indicate that the problem had reached crisis proportions by late summer and that an increasing percentage of the country's estimated 60,000 hectares of ponds were dry because of this shortage.

About 80 percent of Ecuador's shrimp production is farmed and it is possible that production and exports of shrimp declined 25 percent or more during the second half of 1985. Unconfirmed reports suggested that the Ecuadorean Government was considering a closed season on postlarvae collection and export of shrimp, which it may implement in 1986 to allow natural stocks to recover. If such a policy is implemented, it could have an adverse impact on that nation's shrimp shipments to the United States in 1986.

### Shrimp Production

Ecuador's shrimp industry has achieved spectacular growth since 1975 because of the rapid expansion of shrimp farming. Production increased

from only 5,800 metric tons (t) in 1975 to an estimated 36,600 t in 1983 (Table 1), making Ecuador the world's leading producer of farmed shrimp. Investors in Ecuador continued to build ponds in 1984, enlarging the country's capacity to culture shrimp. The Government authorized the construction of a record 24,000 hectares of new ponds in 1984 (Table 2). Although complete statistical data was not available, shrimp production in 1984 leveled off and probably declined slightly to about 32,000 t. Most of the 1984 decline was reportedly due to a poor trawler catch. Statistical data on farmed production was also not available, but most observers were probably at or slightly below 1983 levels<sup>1</sup>. The leveling off of the industry's growth has been primarily caused by the growers' inability to obtain adequate supplies of postlarval shrimp for stocking the ponds. The increasing tendency of some growers to raise their shrimp to larger sizes and to use lower stocking densities

<sup>1</sup>Actual statistical data is difficult to evaluate as many growers altered production data submitted to the Government in an effort to obscure various illegal practices such as under-invoicing export shipments and smuggling through neighboring countries, especially Peru.

Note: Unless otherwise credited, material in this section is from either the Foreign Fishery Information Releases (FFIR) compiled by Suneo C. Sonu, Foreign Reporting Branch, Fishery Development Division, Southwest Region, National Marine Fisheries Service, NOAA, Terminal Island, CA 90731, or the International Fishery Releases (IFR), Language Services Biweekly (LSB) reports, or Language Services News Briefs (LSNB) produced by the Office of International Fisheries Affairs, National Marine Fisheries Service, NOAA, Washington, DC 20235.

Table 1.—Ecuador's shrimp production in live weight<sup>1</sup>, 1975-84.

Year	Production (1,000 t)	Year	Production (1,000 t)
1975	5.8	1980	17.0
1976	7.6	1981	20.1
1977	9.5	1982	29.5
1978	10.0	1983	36.6
1979	12.5	1984	32.2E <sup>2</sup>

<sup>1</sup>Source: FAO "Yearbook of Fishery Statistics" for 1975-83 data and the Ecuadorean Undersecretariat of Fisheries for 1984 data.

<sup>2</sup>E = Estimated.

may have also affected 1984 pond production.

### Postlarvae Sources

Ecuadorean growers rely almost entirely on postlarvae, collected in the wild by artisanal fishermen, to stock their ponds. This dependence on wild stocks makes the growers vulnerable to shortages resulting from the seasonal availability of wild postlarvae. This problem has prompted some of the larger growers to build hatcheries. Over 30 major hatchery projects are either in operation or in various stages of construction. Unconfirmed reports indicated that more hatcheries would be constructed during the second half of 1985, and that in 1986 possibly as many as 20 would be built. Despite these ambitious plans, only a few of the functioning hatcheries are used to stock the ponds of the company which built the hatchery. Most other growers are thus still dependent on wild-collected postlarvae and are affected by the current postlarvae shortage.

Some scientists have speculated that the collection of billions of postlarvae in the wild could be affecting shrimp stocks. To date, however, no one has demonstrated that the postlarvae collection has adversely affected shrimp stocks. The Government is convinced, however, that the destruction of mangrove areas, the principal nursery habitat, has had a discernable impact on shrimp stocks.

### Postlarvae Scarcity

Shrimp postlarvae off Ecuador normally become scarce each April or May

Table 2.—Ecuadorean authorization for shrimp ponds, 1980-84 (Source: Banco Central del Ecuador).

Year	Hectares authorized by Province					Grand total <sup>1</sup>
	Guayas	El Oro	Manabi	Esmeraldas	Los Rios	
1980	4,948	625	102	50		5,725
1981	12,992	3,578	461	456		17,487
1982	9,486	2,055	686	172		12,760
1983	10,438	876	859	372		12,544
1984	20,195	2,551	1,230	401	35	24,412
Total <sup>1</sup>	58,419	9,685	3,338	1,451	35	72,928

<sup>1</sup>Totals may not agree due to rounding. The actual area of all constructed ponds was believed to be about 60,000 hectares in late 1984.

and remain so until October or November. In 1985, the usual seasonal decline in the availability of postlarvae was unusually severe. Even early in 1985, when the postlarvae should still be normally plentiful, artisanal fishermen did not find as many postlarvae as usual. In late March and early April 1985, the availability decreased precipitously and continued to worsen. Ecuadorean scientists are not sure what caused this, but most believed that it was related to low sea temperatures.

In March 1985, abnormally cold water appeared off Ecuador and growers reported the most severe shortage of wild postlarvae ever experienced. Ecuadorean scientists measured water temperatures at 20-21°C, compared with normal August temperatures of about 24°C. This was the coldest water to appear off Ecuador for sustained periods of time in several years. The colder water has reportedly affected shrimp spawning, especially for *Penaeus vannamei* and *P. stylirostris*.

The artisanal fishermen collecting postlarvae report not only the sharply reduced availability of shrimp postlarvae in general, but especially those of the desired species. The batches of postlarvae being collected in mid-year reportedly had exceptionally low concentrations of *P. vannamei*. One estimate suggested that less than 15 percent of the postlarvae being delivered by the artisanal fishermen was *P. vannamei*, whereas the normal proportion is about 70 percent. A later report from Guayaquil suggested that the situation was worsening. Postlarvae which used to sell for \$3 per 1,000 were hard to find, even at prices of \$15-25 per 1,000. Ecuadorean growers were contacting hatcheries in the United States and in other countries to locate any available *P. vannamei* postlarvae.

The northernmost Province of Esmeraldas, where seawater temperatures had stayed warmer, appeared to be an exception to the general trend. Growers report that gravid female shrimp continued to spawn and that postlarvae were still available there. Unfortunately, the shrimp stocks off Esmeraldas were not adequate to stock over 50,000 hectares of ponds. Only a few ponds had been

built in Esmeraldas and its distance and isolation make it difficult to transport the postlarvae to the ponds in the south. In addition, Esmeraldas authorities attempted to prevent the transportation of postlarvae out of the province.

Ecuadorean hatchery owners were also reporting a declining availability of postlarvae. One unconfirmed report suggested that even with all the new hatcheries, postlarvae production during the first 6 months of 1985 had been lower than in 1984. The cause of this decline is unknown, but is probably at least partially related to the colder seawater temperatures. The hatcheries relying on wild-caught gravid females had been unable to continue production because fishermen were not finding any gravid females. Some hatcheries were trying to maintain production by importing nauplii to raise to the postlarval stage. Even those hatcheries doing maturation work, however, had declining postlarvae production.

Hatchery managers report a variety of problems which have affected their postlarval production. Most Ecuadorean hatcheries are located near Salinas and Manta where the quality of the seawater is ideal. Most hatcheries were not equipped to heat the water since they did not anticipate that such cold water would appear. One local observer also speculated that the colder water may have changed the composition of the algae and bacteria in the water, thus affecting hatchery production. The hatchery operators had apparently not been able to adjust to the new conditions. Those changes supposedly complicated efforts to deal with the continuing problem the hatcheries have had in controlling diseases. Some of the early 1985 decline in postlarval production was caused by a disease problem at one of the country's major hatcheries. Some observers believed that hatchery production would be sharply higher by the end of the year, but that was still far from certain.

### Impact on Growers

Reports vary as to the seriousness of Ecuador's situation, but all available information suggested that the postlarvae shortage would cause a major decline in Ecuadorean shrimp exports to the

United States during the second half of 1985. The March-April decline in the availability of postlarvae was only being felt by U.S. shrimp importers by summer. Growers produce shrimp on a 105- to 120-day growing cycle. Reports of unusually high numbers of dry ponds began to appear in April and May. Some growers had stocks of postlarvae in nursery ponds to stock their growout ponds, but even those supplies of postlarvae were exhausted. Shrimp exporters had reportedly been drawing on frozen shrimp inventories to maintain shipments. As a result, the impact of the postlarvae shortage was beginning to be felt in export markets by late summer.

The following information concerning the Ecuadorean situation has been obtained by the NMFS Branch of Foreign Fisheries Analysis.

Galo Bustamente of the Centro de Desarrollo Industrial<sup>2</sup> (CENDES) reported in June 1985 that only about 40 percent of the country's shrimp ponds were in production. Bustamente said that CENDES was cooperating with various Government and industry groups to organize a conference in Guayaquil to discuss how Ecuador's shrimp resource could best be protected.

The owner of a shrimp farm near Guayaquil claimed that his 1985 shrimp production (January-July) was about equal to production during the same period in 1984. He said, however, that as of July, 7 of his 27 ponds were dry and he believed that shipments in July and August would be off by about 10 percent; by January 1986, however, shipments could decline as much as 50 percent. He was hopeful that perhaps as early as November 1985, wild-collected postlarvae would become more available, but this would depend on several unpredictable climatic factors and, even if true, would not begin to affect export shipments until March 1985.

The manager of one of Ecuador's major shrimp companies agreed that shrimp production during the second half of 1985 would be substantially below 1984 levels. He estimated that

<sup>2</sup>Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.

about 25 percent of Ecuador's ponds were dry by July 1985 and believed that production during the second half of 1985 would be about 35 percent lower than during the comparable period in 1984.

One Guayas Province grower reported in early August that over half the ponds in his area were dry and that the percentage was increasing. Growers were then harvesting the ponds stocked in March and April; only a few of the harvested ponds were being restocked.

Press reports from El Oro Province in late June 1985 indicated that some shrimp growers were closing their farms because of the postlarvae shortage. Shrimp farmers in the Province were petitioning the Government to work out a formula to supply available postlarvae from Esmeraldas Province to growers in El Oro and other provinces.

Guillermo Lasso, President of Financiera del Sur (FINANSUR), an important Ecuadorean financial institution, stated in late May 1985 that about half of the country's shrimp ponds were out of production because of the postlarvae shortage. And, an Ecuadorean Government official estimated that the export decline during the second half of 1985 would be about 20-25 percent. Shrimp is Ecuador's leading nonpetroleum export commodity and the Government has been concerned about the declining shrimp production. The official recommended that further construction of ponds be restricted until the postlarvae shortage could be resolved. He believed, however, that while 1985 might be a difficult year, natural cycles and increased hatchery production should make 1987 a "fantastic" year for shrimp growers.

Other observers report widely divergent estimates of dry ponds. Eyewitness accounts suggest that anywhere from 40-70 percent of Ecuador's ponds were dry in early August 1985. As the postlarvae were becoming increasingly scarce, this percentage was expected to almost certainly increase in September.

Another Guayas Province grower claimed that the number of dry ponds was not the only indicator of the postlarvae problem. Many growers had reportedly been stocking ponds at low

densities and had stopped supplemental feeding to cut costs. As a result, yields in even those ponds still in operation may be substantially below 1984 levels.

### Exports

Ecuador exports about 80-90 percent of its shrimp harvest to the United States (Table 3). Those shipments have increased from only 3,700 t in 1975 to 21,100 t in 1984 (Table 4). Ecuador has become the second leading supplier (after Mexico) to the U.S. market. Until the current postlarvae shortage began, some Ecuadorean growers were predicting that Ecuador could overtake Mexico as the most important supplier of shrimp to the U.S. market. U.S. import statistics for the first half of 1985 showed that Ecuadorean shrimp shipments to the United States totaled 10,300 t, only slightly less than the 11,000 t of shrimp received from Mexico during that period. Ecuador exports smaller amounts (about 720 t in 1984) to Japan.

Ecuadorean shrimp exports to the United States declined in 1984, the first drop since 1977 (Table 4). That decline may have been partly due to the scarcity of postlarvae, but increased smuggling through Peru may have affected the statistics, as the Ecuadorean-origin shrimp would be recorded as imports from Peru. Export shipments to the United States in 1985 fluctuated, with January and April below 1984 levels and February, March, and May above 1984 levels. June shipments were about the same in both years (Table 5). Total shipments for the first half of 1985 were about equal to 1984 shipments during that same period. A 20-35 percent decline during the second half of 1985 would have a major impact on Ecuadorean exporters—an estimated \$20-30 million in export earnings could be lost.

### Government Regulations

The Ecuadorean Government has been studying the solutions to the postlarvae problem. As a temporary measure, the Junta Monetaria on 30 May 1985 authorized shrimp growers to import both marine and freshwater shrimp larvae (regulation 256-85). Government agencies also initiated hatchery projects;

Table 3.—Relative importance of Ecuador's shrimp exports to the United States<sup>1</sup>, 1975-84.

Year	Catch (1,000 t)	Exports to the U.S. <sup>2</sup>	
		Amt. (1,000 t)	Percent <sup>3</sup>
1975	5.8	5.9	102
1976	7.6	6.7	88
1977	9.5	6.2	65
1978	10.0	8.0	80
1979	12.5	9.9	79
1980	17.0	14.7	86
1981	20.1	17.9	89
1982	29.5	26.2	89
1983	36.6	37.3	102
1984	32.2E <sup>4</sup>	33.8	95E

<sup>1</sup>Sources: FAO "Yearbook of Fishery Statistics," various years (catch data); Ecuadorean Under-secretariat of Fisheries; and Bureau of the Census, U.S. Department of Commerce (adjusted by NMFS export data).

<sup>2</sup>Calculated by converting the available product weight data (Table 4) to live-weight equivalents by multiplying by 1.6, the approximate conversion rate for shrimp tails to live weight. Almost all Ecuadorean shrimp exports to the United States are tails.

<sup>3</sup>Percentages greater than 100 result from various statistical anomalies such as the time lag between harvest and export and imprecision in calculating live-weight equivalents.

<sup>4</sup>E = Estimated.

Table 4.—Ecuador's shrimp exports to the United States in product weight<sup>1</sup>, 1975-84.

Year	Exports (1,000 t)	Year	Exports (1,000 t)
1975	3.7	1980	9.2
1976	4.2	1981	11.2
1977	3.9	1982	16.4
1978	5.0	1983	23.3
1979	6.2	1984	21.1

<sup>1</sup>Source: Bureau of the Census, U.S. Department of Commerce.

Table 5.—Ecuadorean monthly shrimp exports to the United States by quantity (product weight), 1980-85<sup>1</sup>.

Month	Exports (t)					
	1980	1981	1982	1983	1984	1985
Jan.	375	864	1,122	1,704	1,951	1,349
Feb.	548	349	533	1,210	1,589	1,882
Mar.	630	1,115	1,200	1,505	1,542	1,619
Apr.	664	855	1,125	1,865	2,082	1,803
May	851	926	1,792	2,527	1,472	1,742
June	1,068	1,237	2,009	2,382	1,729	1,792
July	675	985	1,210	2,605	2,080	NA <sup>2</sup>
Aug.	651	1,165	1,726	1,695	1,711	NA
Sept.	1,033	897	1,775	2,153	1,927	NA
Oct.	1,070	949	1,310	2,132	1,930	NA
Nov.	735	982	1,280	1,869	1,601	NA
Dec.	876	916	1,334	1,702	1,523	NA
Total <sup>3</sup>	9,160	11,220	16,383	23,300	21,138	NA

<sup>1</sup>These data do not include a significant, but variable, quantity of shrimp believed to have been smuggled out of Ecuador, principally through Peru, to avoid Ecuadorean currency controls. It is believed that these illegal shipments declined in 1985 as a result of changes in Ecuadorean export regulations. Source: Bureau of the Census, U.S. Department of Commerce.

<sup>2</sup>NA = Not available.

<sup>3</sup>Totals may not agree due to rounding.

the most advanced is the new Escuela Politecnica de Guayaquil (ESPOL) project at Manglaralto. Private hatchery construction is more advanced, but it will probably be several years before either Government or private hatcheries can fully supply Ecuadorean growers with postlarvae. The Government thus reportedly believes that it will have to act to safeguard wild shrimp stocks. One possible step would be to close the shrimp fishery (both collection of postlarvae and export of shrimp) during one growing season, probably for 3-4 months.

The Government has also given great attention to the emerging hatchery industry. Hatcheries now have to register with the Government, and all new hatcheries require Government authorization. New regulations place restrictions on sites, distance from neighboring hatcheries, discharges, etc. The Government has also approved new regulations giving a 5 percent tax credit to those growers who build hatcheries capable of supplying at least 50 million postlarvae per year.

#### **Economic Impact**

The impact of the postlarvae shortage on the industry remains unclear. The few growers whose maturation hatcheries are already in operation will be able to continue production. The larger companies without operational hatcheries will be adversely affected, but have the economic resources to weather a short decline in production. The companies most affected will be the newer entrants which had to pay substantially higher prices for land and have mortgages at high interest rates. Some of these companies (as well as some medium-sized companies) may fail if, as projected, export earnings declined by an estimated \$20-30 million. If postlarvae failed to become more available in October-November 1985, production in 1986 could also be affected. The impact will depend on the degree of any continued scarcity of postlarvae, but a prolonged scarcity could have major repercussions on these companies. Smaller growers who have built ponds on their farms will probably be able to survive as they have other crops and are

not completely dependent on shrimp farming.

#### **Hatchery Industry**

The most significant impact of the 1985 postlarvae shortage may be on the hatchery industry. The cost of building a small hatchery capable of producing 10-15 million postlarvae per month ranges from \$0.8-1.0 million. This cost and the previously inexpensive supply of wild-caught postlarvae discouraged most growers from investing in hatcheries. The first hatcheries proved expensive for the growers that invested in them. It cost about \$4-5 to produce 1,000 postlarvae, while artisanal fishermen were able to deliver postlarvae for about half that amount. The 1985 shortage of postlarvae has convinced virtually all major shrimp growers of the need to build hatcheries.

The increasing price of postlarvae has also changed the economics of hatchery investments. At \$3 per 1,000 postlarvae, hatcheries were not an attractive investment, given the many technical difficulties associated with their operation. At 1985 prices of \$15-25 per 1,000 postlarvae, many investors were increasingly viewing hatcheries as profitable investment opportunities. One estimate suggests that it still costs about \$4-5 to produce 1,000 postlarvae. Many hatchery managers believe that they can eventually lower those costs. But even with costs of \$5 per 1,000 postlarvae, hatcheries with postlarvae to sell could turn a significant profit. As a result, the 1985 shortage should, in the long run, serve as a powerful stimulus to the already booming Ecuadorean hatchery industry.

#### **Forecast**

Prospects for 1986 were uncertain. Much will depend on climatic factors such as sea temperatures and precipitation which cannot be predicted. Growers were hoping that wild-caught postlarvae would begin to become more available in October or November 1985. If this happened, shrimp harvests at near normal levels could be resumed by February or March 1986. Because many additional ponds have been built since 1983, harvests above 1983 levels are theoretically possible. While postlarvae

usually begin to appear in increasing quantities during late October or early November, it was far from certain they would in 1985. If cold water continues to persist off the coast, the scarcity of postlarvae may continue for some time. If so, Ecuadorean production could continue to decline and 1986 shipments could be below 1985 levels. It is unlikely that the many new hatcheries will yet be able to fully supply growers if the scarcity of wild-collected postlarvae continues in 1986. Industry sources continue to stress, however, that with over 60,000 hectares of shrimp ponds, Ecuador could produce about 70,000 t of shrimp per year if adequate supplies of post larvae were available. (Source: IFR-86/50R1.)

#### **Norway's 1984 Fish Catch Down; Exports, Value Up**

Although the total 1984 Norwegian fish and shrimp catch was 14 percent below 1983 (2.5 million vs. 2.9 million t), fish and shellfish exports, other than round-frozen capelin roe, mackerel, and Greenland halibut, reached US\$254 million. The total export value was US\$288 million, up from US\$255 million in 1983, according to the Norwegian Information Service (Norinform).

Overall, the herring fisheries (capelin, herring, brisling, mackerel, Norway pout, blue whiting, etc.) dropped 18 percent, and the cod fisheries were down from 1983 by slightly over 3 percent. Of the main fisheries groups, only shellfish showed a catch increase (slightly over 9 percent) in 1984, owing to larger shrimp catches.

#### **Capelin**

Capelin, however, was the main reason for the overall catch decline. Reduced reserves and more stringent quotas brought the capelin catch down 36.7 percent to 944,000 t from 1,492,000 t in 1983. In 1983, capelin accounted for more than 50 percent of the total Norwegian catch, but in 1984 its share was just 37.4 percent.

The cod catch, 263,000 t, was down 7 percent from 1983. In value, the cod fisheries are decidedly Norway's most

important at US\$111 million, more than US\$33.3 million above the value of shrimp and capelin. The 1984 shrimp catch reached 82,000 t, a 9.3 percent increase over 1983 and the value rose by 10.7 percent to US\$80.2 million. That made the shrimp fishery Norway's second most important, as capelin dropped to third place.

### Exports

In 1984, 21,000 t of saithe and 19,888 t of Atlantic salmon were exported, a 26 percent increase. Other export figures were 25,000 t of shrimp, 5,700 t of akkar (small octopus), 4,400 t of haddock and cod, and 550 t of plaice. Redfish exports almost doubled, reaching 81 t. Norwegian fish were exported to 32 countries, the biggest customer being West Germany with 11,900 t.

### Aquaculture

The Norwegian fish culture industry exported goods valued at over US\$122 million. In 1984, Atlantic salmon was the most important at 22,000 t or 30 percent more than 1983. Over 90 percent of Norwegian salmon is exported. The EEC was the most important market but exports to the United States increased at the greatest rate. Last year saw a doubling of Atlantic salmon exports to the United States.

The first-hand value of Norway's salmon and trout for 1984 was US\$106 million, US\$22 million more than in 1983. However, some fish farm facilities are experiencing disease problems. In Lofoten, in north Norway, a disease called "Hitra" has caused large losses for the producers and there are fears that it could spread northward.

The Fisheries Directorate's Ocean Research Institute in Bergen is studying fish disease problems and has produced important results. A treatment for salmon louse helped large sectors of the industry. Also, a serum for vibriosis has been prepared, while progress has been made in combatting acid water. Salmonid hatchery techniques have been improved, and a method was developed in 1983 for the farming of cod. During 1984, 120,000 young cod were produced, but too little is yet known about environmental conditions during their

early years.

However, Institute Professor Dag Møller believes that the Norwegian fish-farming industry is too narrow and vulnerable. He says that hatchery systems which reduce mortality, a comprehensive campaign against fish diseases, and, not least, the development of new farm fish species such as halibut, plaice, turbot, lobster, clams, and oysters will be the most important tasks in the time ahead.

### The Future

Norwegian fisheries prospects in the next few years are reportedly better than they have been for a long time, mainly because the reserves of some of the most important species show considerable growth. After the recent difficult years of scant resources and strict quota regulations, there are now grounds for optimism, says Minister of Fisheries Thor Listau.

Reserves of Norwegian Arctic cod

and haddock are clearly increasing. The International Oceanographic Research Council recommended a small increase in the quotas for those species in 1985, and indicated substantial increases in later catch quotas. Catch quotas of 300,000 t in 1986 and 600,000 t in 1987 have been proposed for the Norwegian Arctic cod, and corresponding proposals for haddock were 100,000 t and 180,000 t.

Norwegian herring reserves are also increasing. Recent studies on the RV *G.O. Sars* in the Barents Sea indicate that stocks in the area are equal to more than 6 million hectoliters. Similar studies were carried out last year and the scientists say that the trend is very positive. Although some herrings are caught in the capelin fisheries, they survived the winter of 1984 very well. The 1983 year class is the most vigorous of the Norwegian spring spawning herring for the past 20 years researchers maintain.

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## Latin American Fisheries, 1984

All major Latin American fishing countries except Argentina reported improved fish catches in 1984. Latin American fishermen caught 10.8 million metric tons (t) in 1984, up 19 percent over the 9.0 million t taken in 1983 (Fig. 1). The 1983 catch was severely depressed by the 1982-83 El Niño event in the Eastern Pacific, one of the most devastating such events ever recorded.

All of the major countries most affected by El Niño (Chile, Peru, Ecuador, and Mexico), reported sharp catch increases in 1984. The 1984 catch was not far below the 11.3 million t catch of 1982, the largest fisheries catch reported by Latin American countries since the collapse of the Peruvian anchovy fishery in 1972. Fishery officials in many of these nations believed that the 1985 catch would be as large or even larger than the 1984 catch. The most important developments in the six largest

Latin American fishing countries are given below.

### Chile

Chile is Latin America's most important fishing country (Table 1). Chilean fishermen reported substantial catch increases in both 1982 and 1983. The country's catch did not decline after the 1982-83 El Niño, but Chilean scientists are still concerned about the long-term impact of the event.

Chilean companies have made major investments in recent years. They have had to adjust to the decline of the anchovy fishery by redirecting fishing efforts to sardine and mackerel stocks. Private fishing companies have made the necessary changes in vessels, gear, and strategy with little or no assistance from the Chilean Government. Many vessels added to Chile's growing fleet have been used vessels bought from hard-pressed

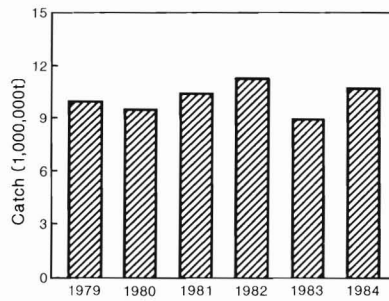


Figure 1.—The Latin American fisheries catch, 1979-84.

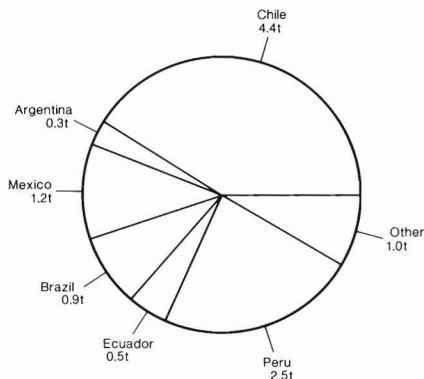


Figure 2.—The 1984 Latin American fisheries catch by major nation in millions of metric tons.

Peruvian fishermen. The Chilean Government has promoted diversification of the industry and several interesting programs are underway, including demersal trawling off the southern coast, krill fishing with the Japanese, and various salmon and molluscan culture projects. The industry remains, however, dominated by the northern reduction industry.

### Peru

Peruvian fishermen reported the largest 1984 catch increase of any Latin American country. Small pelagic stocks recovered sharply from the 1982-83 El Niño event. The El Niño and associated climatic and meteorological disturbances caused widespread destruction in coastal communities, damaging piers and other shore installations as well as roads and bridges needed to transport the catch. The fishing industry is still

**Table 1.—Latin America's fisheries catch, 1980-84.**

Country or dependency	Catch (1,000 t)					Major species
	1980	1981	1982	1983	1984 <sup>1</sup>	
<b>Caribbean</b>						
Antigua	1.6	1.8	2.0	2.2		
Bahamas <sup>2</sup>	5.0	4.4	4.7	5.2		Lobster
Barbados	3.7	3.4	3.5	6.5		
Bermuda <sup>2</sup>	4.1	1.9	2.2	0.5		
Brit. Virgin Isl.	0.3	0.3	0.3	0.3		
Cuba	186.5	164.8	195.2	198.5	198.0	Lobster
Dominica	1.4	1.5	1.5	1.5		
Dominican Rep.	10.7	12.0	13.2	13.2		
Grenada	1.8	1.7	1.8	1.8		Flying fish
Guadeloupe	8.0	8.3	8.8	8.7		Mackerel
Haiti	4.0	4.0	4.0	4.0		
Jamaica	9.1	7.8	7.9	8.7		
Martinique	4.7	4.7	4.7	4.7		
Montserrat	0.1	0.1	0.1	0.1		
Netherl. Antilles	1.9	1.8	1.8	1.9		
Puerto Rico	2.6	2.7	2.2	2.2		
St. Kitts	1.9	1.9	1.9	1.9		
St. Lucia	2.4	2.4	2.4	2.6		
St. Vincent	0.5	0.5	0.5	0.5		
Trinidad-Tobago	4.5	4.5	4.5	4.5		Mackerel
Turks and Caicos	1.1	1.1	1.1	1.1		Lobster/conch
U.S. Virgin Isl.	0.7	0.6	0.9	0.6		Mackerel
<b>Subtotal</b>	<b>256.6</b>	<b>232.2</b>	<b>265.2</b>	<b>271.2</b>	<b>270.7E<sup>3</sup></b>	
<b>Central America</b>						
Belize	1.3	1.3	1.4	1.5		Lobster/conch
Costa Rica	14.9	12.6	10.9	10.9		Tuna/shrimp
El Salvador	14.0	20.3	13.5	7.6		Shrimp
Guatemala	3.5	4.3	4.3	4.3		Shrimp
Honduras	6.4	6.3	5.0	8.4		Lobster
Mexico	1,222.5	1,536.2	1,323.9	1,070.0	1,219.0	Shrimp/tuna
Nicaragua	7.0	5.9	5.0	4.5		Shrimp/lobster
Panama	216.4	149.5	112.9	166.1	113.5	Shrimp/anchovy
<b>Subtotal</b>	<b>1,486.0</b>	<b>1,736.4</b>	<b>1,476.9</b>	<b>1,273.3</b>	<b>1,369.7E</b>	
<b>South America</b>						
Argentina	385.3	359.6	475.0	416.3	260.0E	Hake/shrimp
Bolivia	4.4	5.6	5.6	5.6		
Brazil	819.8	828.7	828.9	844.5	875.0E	Lobster/shrimp
Chile	2,816.7	3,385.4	3,673.0	3,978.1	4,445.0	Sardine/mackerel
Colombia	76.2	94.7	71.4	57.5	80.6	Shrimp
Ecuador	643.5	731.0	654.1	307.3	500.0E	Shrimp/tuna
French Guiana	1.1	1.2	1.5	1.4		Shrimp
Guyana	26.6	23.4	25.8	27.6		Shrimp
Paraguay	3.3	3.4	3.4	3.5		
Peru	2,734.0	2,740.3	3,484.0	1,486.8	2,500.0E	Sardine
Suriname	3.0	3.4	2.9	3.6		Shrimp
Uruguay	120.4	147.0	119.1	144.1	129.0	Hake/croaker
Venezuela	186.6	191.9	212.4	226.9	280.1	Shrimp/tuna
<b>Subtotal</b>	<b>7,820.9</b>	<b>8,515.6</b>	<b>9,552.1</b>	<b>7,503.2</b>	<b>9,111.4E</b>	
<b>Grand total</b>	<b>9,563.5</b>	<b>10,484.2</b>	<b>11,294.2</b>	<b>9,047.7</b>	<b>10,751.8E</b>	

<sup>1</sup>1984 data are available only for major countries. For other countries, 1983 data were used to obtain the totals and an indication of general trends.

<sup>2</sup>These islands are not physically located in the Caribbean, but are included in the Caribbean totals for organizational simplicity.

<sup>3</sup>E = Estimated by the NMFS Foreign Fisheries Analysis Branch.

recovering from that damage as well as adjusting to changes in species composition.

Unlike Chilean fishermen, Peruvian fishermen have not made the changes necessary to utilize the much larger mackerel stocks now found off Peru. The Instituto del Mar believes that the mackerel biomass may be as much as 9 million t. Those stocks are now being

fished by the Soviet Union and other communist countries outside the 200-mile zones of Peru and Chile.

Peru's fishing industry is still dominated by the fishmeal industry which was nationalized in 1973. The Ministry of Fisheries has, for several years, financed the massive budget deficits reported by the state-owned fishmeal company (PESCA PERU), but administrative

changes implemented by Fisheries Secretary Ismael Benavides have at last enabled PESCA PERU to become profitable. Peru's canning industry continues to report serious economic difficulties caused by the weak international market for canned sardines. Some companies are reporting considerable success with the new fishery for scallops and the developing shrimp culture industry in northern Peru.

### **Mexico**

Mexican fishermen reported a moderate catch increase in 1984. Much of the increase resulted from improved pelagic catches along the Pacific coast. Included in the 1984 total was a record tuna catch of over 80,000 t. Mexico launched the second phase of its major effort to develop the fishing industry which was begun in 1977.

### **Development Plan**

The current 5-year National Fisheries and Marine resources development Plan (1984-88) is a much more modest plan than the original 1977-82 plan because of the country's fiscal crisis which began in 1982. Under the latest plan, the Government hopes to increase the fisheries catch from 1.1 million t in 1983 to 2.5 million t by 1988. Major expansion is planned for the state-owned fishing company, Productos Pesqueros Mexicanos.

Most of the important fisheries continue to be reserved for the country's cooperative fishermen. Private investors, however, would like to see the regulations governing the cooperatives changed to allow more direct private investment (such changes are being studied by the Congress). The Government estimates that the development plan should enable Mexico to increase export earnings from \$570 million in 1984 to \$690 million by 1988. Some observers, however, point out that long-term trends in Mexican exports are unclear.

### **Shrimp**

Shrimp is Mexico's leading fisheries export commodity. It is not yet known if Mexico could significantly expand its shrimp trawler catch. Many observers

believe that shrimp stocks, especially those that support the more important Pacific coast fishery, are already being utilized at or near capacity. Mexico could conceivably increase shrimp production and exports by culturing shrimp, but legal constraints which prevent private individuals from culturing shrimp have restricted the industry's development. Perhaps more importantly, the expanding production of cultured shrimp and other market factors have caused a substantial decline in shrimp prices since early 1983. If prices remain low, Mexico will have difficulty meeting its export target of \$690 million by 1988. Other important export-oriented fisheries also face serious problems. Mexico continues to report difficulty exporting tuna, while abalone and lobster resources reportedly are declining.

### **Brazil**

Brazilian fishermen reported a small catch increase in 1984. Many companies, however, reported sharply higher earnings as a result of increased shrimp and lobster catches and exports. Brazilian scientists believe that both fisheries, especially the lobster fishery, were affected by the prolonged drought in northeastern Brazil. The 1984 rains reportedly resulted in increased catches.

Exports to the United States, Brazil's major market, totaled \$132 million in 1984, a 30 percent increase over the \$97 million shipped in 1983. Brazil continues to attract foreign shrimp and tuna fishermen through various joint venture and leasing arrangements. The Government believes that one of the most promising prospects lies in the developing shrimp culture industry. Officials believe that shrimp culture may eventually emerge as a major component of the country's fishing industry and has authorized over \$13 million in loans for various shrimp culture projects. The Government is currently administering the second largest fisheries development program underway in Latin America. The \$130 million program is partially financed by the Inter-American Development Bank.

### **Ecuador**

Reports from Ecuador are incom-

plete, but fishermen did report much better catches in 1984 than in 1983, especially for small pelagic species and tuna. The country's most important fishery is shrimp, most of which is cultured. Shrimp trawler fishermen reported lower 1984 catches and most shrimp farmers reported production at or slightly below 1983 levels. The principal problem faced by the shrimp farmers reportedly was a shortage of postlarvae to stock the ponds. Many companies are now planning hatcheries to guarantee a reliable source of postlarvae. It will probably be several years, however, before hatcheries will supply a sizeable proportion of the approximately 24 billion postlarvae that growers need annually. Many farmers reported reduced profit margins as a result of spiraling production costs. Industry spokesman are also disappointed that the new Government had not made many changes that had been hoped for in fiscal and export policy.

### **Argentina**

Argentina has one of the world's largest underutilized fisheries resource. The Government's fisheries development program, however, has been complicated by continuing difficulties with the United Kingdom over the Falkland Islands. The British maintain a 150-mile Exclusion Zone around the Falklands, restricting both Argentine fishermen and Argentine efforts to limit foreign fishing in the area.

The extensive foreign fishing, which has expanded since 1982, has been especially harmful to Argentina. Many countries fishing in the South Atlantic, especially Poland, market their catch on the international market in competition with Argentine companies. As a result, there has been a substantial decline in the prices received by Argentine exporters. Several Argentine companies, faced with declining export prices and spiraling domestic costs, have had to close. The one bright spot for Argentina has been the rapid growth of the shrimp fishery along the central coast. Several companies report that only the profits obtained in the shrimp fishery have allowed them to continue to operate. (Source: IFR-85/15.)