

agreements that have been reached to assess the impacts of the fishery on target and nontarget resources, including salmonids, marine mammals, and other marine species. They noted their intention to cooperate in gathering information

on the impact of high-seas driftnet fisheries and in gaining multilateral cooperation in addressing this issue.

The two sides also reviewed the close cooperation of U.S. and U.S.S.R. enterprises in the field of fisheries and agreed

that such cooperation should be facilitated to the extent possible in the future. The Committee agreed to hold its next meeting in the U.S.S.R. in 1991 at a location to be announced. Source: U.S. Department of State.

## Foreign Fishery Developments

# Norway's Salmon Farming Industry

## Introduction

Norway dominates the world farmed salmon industry, accounting for over half the world's production of farmed Atlantic salmon. The Government of Norway in 1988 permitted fish farmers to expand the size of individual farms from 8,000 m<sup>3</sup> to 12,000 m<sup>3</sup>. This action is largely responsible for the increase in production of farmed Atlantic salmon from 80,000 metric tons (t) in 1988 to an estimated 110,000 t in 1989. The increase in production placed pressure on world suppliers to reduce prices for this luxury seafood. The long-term effect of this ac-

tion is likely to be severe difficulties for salmon producers and marketers in Norway and elsewhere in the world.

Norwegian salmon culture is an industry with a spectacular record of success. All sectors within the industry—smolt producers, feed manufacturers, salmon farmers, and salmon exporters—have shared in a remarkable era of growth (Table 1). This growth, however, has not been achieved without problems. The sharp Norwegian production increase in recent years—an estimated 110,000 t in 1989 compared with 80,400 t in 1988 and 47,000 t in 1987—has disrupted salmon markets throughout the world. The quantities of salmon reaching commercial size have been difficult for even the skillful Norwegian exporters to market. Combined with increasing competition from other countries, the result has been a decline in world salmon prices that threatens the profitability of the industry.

Norway's production of farmed salmon could have been even higher in 1989. Early that year, some industry representatives were predicting harvests as high as 150,000 t. However, when the rapid increase in world supplies of farmed salmon made prices decline, Norwegian salmon farmers began to scale back their production estimates. By late 1989, prices received by farmers for large Norwegian salmon had fallen to about \$4.90/kg (NOK 32.50/kg)—less than half of their 1987 levels. To prevent further price erosion, farmers limited supplies of fresh salmon in 1989 by harvesting only about 110,000 t of farmed

salmon—still a record level—instead of the estimated 140,000 t of salmon that were approaching market size. This self-imposed restraint on 1989 production means that Norwegian farmers carried over “inventories” of harvestable salmon, raising the possibility that additional supplies of fresh Norwegian salmon would be brought to market in early 1990.

Recognizing the continuing threat to profits in the fresh salmon market, the Norwegian salmon farming industry is taking strong action to shore up prices in the short term and to limit supplies of fresh salmon in the long term. On 4 January 1990, the the Norwegian Fish Farmers Sales Organization (NFFSO) announced plans to buy and freeze up to 40,000 t of salmon. The Organization plans to borrow US\$200 million from private banks to finance the freezing plan, and will impose a levy of \$0.75/kg on all exports of fresh salmon in 1990, to pay off the loan. Odd Ustad, director of the NFFSO, stated that the combination of the freezing plan and the tax on exports should keep 1990 prices of fresh salmon at about \$6.30/kg (42 NOK /kg). This effort, whose direct purpose is to protect prices in the fresh salmon market, will have an important indirect result: it will significantly increase Norway's involvement in the frozen salmon market, an area in which Norway has played only a limited role in the past.

The uncertain market situation in late 1989 and early 1990—as evidenced by decisions to delay the harvest of some salmon and to freeze others—mean that forecasts of Norway's farmed salmon production in 1990 were extremely tentative. The NFFSO has asked salmon producers to reduce their feeding to an absolute minimum in 1990 to limit production and a reduction in smolt production is being sought. Though a 140,000 t

Table 1.—Norway's production and exports of farmed Atlantic salmon, 1971-88, with projections for 1989-90.

Year	Production			Exports	
	Smolts (mil-lions)	Salmon prod. (t)	No. of farms	Quantity (t)	Value (× 10 <sup>6</sup> ) NOK US\$
1971	N.A. <sup>1</sup>	98	5	995 <sup>2</sup>	N.A. N.A.
1972	N.A.	146	5	1,081 <sup>1</sup>	N.A. N.A.
1973	N.A.	171	4	977 <sup>1</sup>	N.A. N.A.
1974	N.A.	601	13	1,101 <sup>1</sup>	N.A. N.A.
1975	N.A.	862	45	1,335 <sup>1</sup>	N.A. N.A.
1976	N.A.	1,431	61	1,832 <sup>1</sup>	N.A. N.A.
1977	N.A.	2,137	84	2,254 <sup>1</sup>	N.A. N.A.
1978	1.8	3,540	116	3,531	N.A. N.A.
1979	2.1	4,142	147	4,792	217 43
1980	4.8	4,153	173	4,188	263 53
1981	6.2	8,422	215	7,829	357 62
1982	7.7	10,266	300	9,718	367 57
1983	12.8	17,000	479	15,758	644 88
1984	16.0	22,300	500	19,888	965 119
1985	18.4	28,655	600	24,492	1,422 166
1986	25.9	45,675	600	39,648	1,724 233
1987	38.2	47,420	600	41,929	2,115 314
1988	75.0	80,370	600	68,026	3,299 486
1989	82.0	110,000	650	N.A.	N.A. N.A.
1990	72.3	140,000	N.A.	N.A.	N.A. N.A.

<sup>1</sup>N.A. = Not available.

<sup>2</sup>Includes wild salmon.

harvest had been forecast (an even larger production capacity already exists), continuing annual increases in Norway's farmed salmon production are no longer assured. Salmon farmers are likely to make 1990 production and harvest decisions based not on the capacity of their farms, but on the demand (price level) in the world salmon market.

### **Aquaculture Highlights**

Fish farmers in western and southern Norway are more successful in profitably raising salmon than their counterparts in northern Norway. In 1988, Norwegian aquaculture specialists estimated that 90 percent of the salmon farms in northern Norway were experiencing economic difficulties and they believe that at least 50 percent were already insolvent. Some analysts attribute the problem to the harsher climate and colder waters prevailing in the northern provinces. Others claim that northern salmon farmers lack the technical expertise necessary to operate their farms successfully. Whatever the reason, one thing is clear: Production costs in southern Norway are generally lower.

The Norwegians' great success in expanding salmon production and exports in 1988 and 1989 led to complaints from European Community (EC) salmon farmers that Norwegian salmon was being "dumped"—sold below its production cost—in EC countries. So far, EC officials have not supported their farmers' protests, but the controversy has received high-level attention: In May 1989, EC Fisheries Commissioner Manuel Marin rejected a request by Scottish constituents to establish a "protection mechanism" against the growing imports of Norwegian salmon; in July 1989, members of the Scottish and Irish salmon farmers organization kept the issue alive when they announced plans to urge the EC to introduce a "minimum price" for imported fresh salmon as part of an anti-dumping program; and in December 1989, the European Commission was considering a full investigation into the pricing of Norwegian farmed salmon in the EC market. The EC may impose import duties on Norwegian salmon.

Norwegian fish farmers have been raising rainbow trout for many years, and

fish farmers have recently begun raising cod, halibut, marine catfish, European eel, Arctic char, and other species of fish and shellfish. About 400 concessions have been issued by the Government of Norway for raising cod, 62 for char, 45 for halibut, 9 for turbot, and 5 for freshwater eels. Norway was expected to produce only about 4,000 t of farmed trout in 1989 (down from 9,300 t in 1988), but cod aquaculture is growing rapidly, although the total crop figures are still small. Results from research on turbot and halibut also appear promising. Much work is needed before farming of marine catfish can begin. Eel and char production, although promising, remain in the formative stages in Norway. This switch to new species could be interpreted as a sound business practice; diversification into new areas to prevent over-reliance on salmon. It could also reflect the desire to "join the bandwagon" at the start of a new era in fish culture, or it could reflect a growing concern that salmon culture may face increasing difficulties. While there is considerable interest in these alternative species, the profitability of such operations has not yet been proven.

Norwegian fish farmers have established joint-venture fish farming operations in Australia, Canada (in British Columbia and New Brunswick), Chile, Iceland, Ireland, Spain, the United Kingdom (Norsk Hydro in Scotland), and in the United States (in Maine and Washington). The Government of Norway's limitations on the issuance of new farming licenses and farm sizes led many companies and capital-rich fish farmers to shift their operations to less-regulated areas overseas. The outward migration of Norwegian experience has been at least partly responsible for the growing competition in the United Kingdom, Canada, and other countries.

There were over 600 farms operating in Norway in 1989. Norway's Minister of Fisheries, Bjarne Mork Eidem (since replaced by Sven Munkejord) announced plans to award 50 new concessions in 1989, including 10 licenses for use in the Sogn Og Fjordane Province, where there already is significant salmon farming. When the salmon industry began expanding more rapidly than anticipated, how-

ever, Fisheries Minister Eidem temporarily suspended issuing new licenses, noting that salmon farmers were concentrating on quantity, rather than quality.

The increase in allowable farm size, however, has allowed Norway's production capacity to expand even without an increase in the number of salmon farms. Based on the production capacity of 300 t of fish per farm, Norway has the capacity of producing over 180,000 t of salmon annually. Production could theoretically increase another 60 percent over the estimated 110,000 t produced in 1989. Such an increase was not expected, however.

A new herring meal plant opened in Stavanger in July 1989, as part of the effort to increase production of feed. The Norwegian Government's corn agency has already increased its imports of corn for use as an additive in fish feed.

### **Salmon Production**

Smolt farmers produced 38 million smolts in 1987, which helped produce the 80,400 t of salmon harvested in 1988 and contributed to the record 1989 production, estimated at 110,000 t (Fig. 1). Smolt farmers increased production to 75 million smolts in 1988, which could yield as much as 140,000 t of commercial-sized salmon in 1990. The growth in the production of salmon smolts (Fig. 1) can be compared with production of farmed salmon when the smolts reach maturity 2 years later. Despite the record production of salmon smolts in 1988, the long-term market requirement in Norway is estimated at 60 million smolts. Smolt production was estimated at 62 million for 1989, and is forecast to increase to 72 million in 1990. This suggests that Norwegian production of farmed salmon could begin to stabilize at between 120,000 t and 140,000 t in 1991-92.

Norwegian farmed salmon production has increased dramatically since 1971, nearly doubling every 2 years. In 1987, production slowed because an outbreak of Hitra disease infected nearly half the country's salmon farms. In 1988, however, the pace of production recovered, and the year ended with a harvest of 80,400 t. In early 1989, Norwegian salmon farmers estimated that the year's harvest would reach 140,000 t, an increase

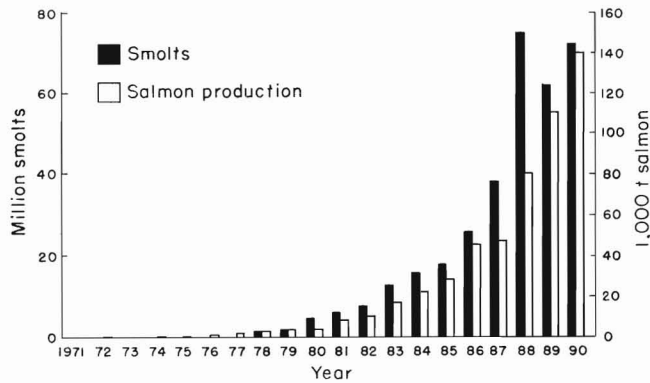


Figure 1.—Norway's production of Atlantic salmon smolts and farmed salmon, 1971-90.

of almost 80 percent over 1988 levels. During the course of 1989, however, the phenomenal growth in world supplies of farmed salmon depressed prices, threatening the viability of the huge Norwegian salmon farming industry. Salmon farmers reacted by scaling back their planned 1989 harvest considerably, to an estimated 110,000 t. This still amounted to a 25 percent increase over 1988. To better control supplies of fresh salmon, Norwegian farmers plan to freeze a significant portion of the salmon which was not harvested in late 1989.

Norway's efforts to restrain the increase of farmed salmon supplies in 1989 will affect the farmed salmon situation in 1990 in two closely related ways. First, the reduced 1989 harvest—scaled down from a forecast of 140,000 t to an estimated 110,000 t—indicates that significant quantities of market-sized salmon were carried over into 1990, increasing harvestable supplies. Second, stockpiles of frozen salmon from late 1989 and early 1990 will be available for export throughout 1990, and may affect frozen salmon prices worldwide. Even without these increased frozen supplies, Norwegian salmon farmers may be able to harvest over 140,000 t in 1990, based on the 75 million smolts produced in 1988. However, the strain on the world salmon market in 1989 indicates that Norway may again limit its production to levels below full capacity. The decreased production of smolts in 1989, compared with 1988, is further evidence that Norway will limit its production

of farmed salmon during the next several years.

### Salmon Farming Economics

Norwegian fish farmers need at least \$600-700 million in new capital annually to finance the next season's crop. Credit problems are already starting to hurt the industry, as fish farmers struggle to obtain funds to finance increased production. Norwegian banks are increasingly reluctant to loan money, given the growing number of bankruptcies in the industry. A number of firms have declared bankruptcy because of bad management practices. Other companies invested too heavily in salmon stocks, with the result that they lacked cash for the next season. An early harvest can be very costly, because immature salmon bring little on the export market. In other instances, firms failed before they could bring their crop to market.

Setbacks have affected inexperienced salmon farmers as well as some very well established leaders in the field. In May 1989, Saga Seafoods<sup>1</sup>, for example, filed for bankruptcy after reportedly losing \$2 million. Saga Seafoods includes salmon farming pioneer Thor Mowinckel as one of the owners. Mowinckel claimed that Saga Seafoods was still in its developmental stage when it was hit by a number of mishaps and the decline in salmon prices. Being Norwegian is no guarantee of success in salmon farming,

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

despite the reputation for success associated with the Norwegian salmon farming industry.

The Government of Norway has also examined ways to provide salmon farmers in northern Norway with direct assistance. As a result of their study, the Government decided to make \$25 million in concessional loans available to salmon farmers in the north, through Norway's Central Bank. Such a program, it was hoped, would ease the industry's credit shortage and improve the profit/loss status for many of the marginal, northern producers.

Operating outlays in Norway's salmon farming sector are expected to remain high for the next 2 years. Inefficient production practices have increased freight and feed costs by millions of dollars. The decision to allow an increase in the size of salmon farms increased salmon production in 1989, presumably enhancing the economies of scale which accrue to some of the larger operations. But many costs—for example feed and electricity—are rising even for large-scale producers.

Conflicts between salmon producers in northern Norway and those located in southern and western Norway have recently surfaced. The higher production costs in the north have strained relations inside this once cohesive industry. Natural disasters, on the other hand, have been more of a threat to southern farmers. The toxic algae bloom that swept the coast of southern Norway in 1988 and 1989, serve to remind Norwegian fish farmers that they remain vulnerable to potentially costly natural threats.

The Government of Norway established size limits of 8,000 m<sup>3</sup> on salmon farms in the 1970s. The limited farm size (which was expected to yield 150-200 t of salmon annually) was designed to protect small farms in northern Norway where the decline in coastal wild fishing had prompted many individual fishermen to turn to salmon culture. The limited farm size was unpopular in southern Norway, however. In late 1988, the Government bowed to pressure from salmon producers in southern and western Norway and raised the size limit on salmon farms from 8,000 to 12,000 m<sup>3</sup>. This theoretically increased the production capacity of individual farms from 200 t per year



to 300 t per year.

One Norwegian company, UFNA/S, however, took advantage of a temporary loophole in the regulations to establish a 282,000 m<sup>3</sup> production facility 10 miles off the Norwegian coast. This facility, which is said to be the largest in the world, is raising salmon for sale along the east coast of the United States. UFNA/S joins a small number of other firms that established larger fish farms before the Government first established a size limitation on salmon farms. A limited number of other firms, unable to obtain a Government-issued operating license, or frustrated with the limits on farm sizes, have invested in salmon farms overseas.

### Research

Research into innovative methods for raising salmon continues in Norway. Land-based facilities are receiving the greatest attention. Under one such scheme, the salmon could be confined to small plastic bags filled with oxygen-enriched seawater pumped ashore from fjords or offshore. Because the fish would be confined to small bags, fewer wastes would be released into the environment and the transmission of illness should be reduced. Elaborate filtration systems could ensure the release of clean water back into the environment. Also, land-based farms would be protected from jellyfish, algae, parasites, seabirds, and seals. The facility could be relatively small, because oxygenation would reduce the need for water. Norsk Hydro's gas division, which developed this concept of land-based farms, is studying the system and hopes to begin marketing the concept in the near future.

While proposed land-based farms address several of the environmental problems caused by large-scale salmon culture, they are also likely to bring higher production costs. Land-based farms require more elaborate facilities than the relatively inexpensive sea-based cages, and more elaborate maintenance, such as filtration and oxygenation of water. Salmon farmers in Scotland who have moved from sea-based to land-based systems have so far reported significantly higher costs.

Development of seagoing aquaculture barges appears to be another idea that is

rapidly becoming a reality. A Norwegian laboratory (Marintek) has designed an aquaculture barge for use in the open sea where rough weather prevails. The vessel would contain 12 salmon raising silos. Each silo would hold about 50 t of mature fish; this will enable the entire facility to produce 600 t of salmon annually. Designers have reduced the weight of the ship to about 450 t. The safety equipment and the anchoring system would be similar to equipment found on normal vessels. The barge would not have any propulsion machinery and would be towed to a place where it could be moored or anchored. Aqua Systems, a Norwegian company, is marketing the system and has already sold one unit to a buyer in Ireland and another to Fedje Havruk, which will anchor the barge off the island of Fedje north of Bergen. A Japanese firm is reportedly seeking to buy a third unit for offshore aquaculture in Japan. An improved version will feature fiberglass nets and undersea pontoons. Its designers believe it offers all of the advantages of a closed system at a reasonable cost.

The costs of airfreight for transporting fresh salmon to markets in Europe, North America, and Asia are universally high, because of the weight of ice used to pack the fish. Researchers at the Tromsø research center recently announced a method to extend the shelf-life of fresh salmon while reducing the cost of transportation. The fresh salmon are first packed in a moist, airtight bag instead of being packed in ice. Carbon dioxide is pumped into the bag, forcing out oxygen, thus inhibiting the growth of bacteria. This extends the shelf-life of salmon from 15 to 20 days and reduces the weight of the shipment, thus saving on the cost of transportation. This new technology should begin paying dividends in 1990.

### Environmental Issues

Environmentalists in Norway are complaining about the high level of antibiotics some producers administer to their fish stocks. The problem reportedly is that viruses might build up a resistance to medicine. When medicines are administered to fish in sea cages, both the medicines and the increasingly resistant viruses could spread beyond the imme-

diately vicinity of a fish farm. The use of antibiotics increased sharply in 1988 after an outbreak of Hitra disease, *Vibrio salmonicida*, which reportedly infected nearly 50 percent of Norway's salmon farms; salmon farmers used 35 t of medicine to combat the disease. In 1989, however, the industry reduced its use of these medicines; only 4 t of antibiotics were administered during the first quarter of 1989. Better vaccines (an alternative to antibiotics) and improved smolt quality reportedly have helped farmers reduce the quantity of antibiotics used in treating their fish.

The pesticide "Nuvan," used to control sea lice, *Lepeophtheirus salmonis*, on salmon smolts and adult farmed salmon, is also harmful to the marine environment. As a result, Norwegian scientists are now trying wrasses—called "cleaner fish"—as a natural source for removing sea lice from salmon. Scientists at the Institute of Fishery Technology Research (FTFI), used goldsinny, rock cook, ballan wrasse, and cuckoo wrasse in cages containing salmon smolts. The results show that salmon grown in identical cages without the wrasse must be deloused with Nuvan frequently. Cages with cuckoo wrasses had to be deloused only once with Nuvan, while cages containing goldsinny and/or rock cook were 70-100 percent free from salmon lice. The wrasses also consumed the algae growing on the mesh nets, helping keep the pens clean.

Many individuals have alleged that an excessive amount of fish waste is being introduced into the environment from fish farming. However, recent research studies have revealed that less than 0.2 percent of the phosphorus and nitrogen discharged into the North Sea from Norway is generated by fish farms. The news helps the fishing industry answer public criticisms that wastes from fish farms upset the coastal ecological balance.

A new blood sickness, SAS, has recently been found at a few salmon farms. Very little is known about this disease and researchers are attempting to discover a cure for it. Biologists are concerned that concentrations of large numbers of fish in a small area will lead to outbreaks of fish diseases which could affect both wild and farmed stocks.



In June 1988, a massive algae bloom (*Chrysochromulina polylebis*) arose off the western coast of Norway and threatened several salmon farms. Although the algae growth dissipated before reaching many farms, salmon facilities had to be evacuated and some salmon was harvested prematurely. The industry lost an estimated \$9 million because of the algae bloom. About two-thirds of that amount was covered by private insurance and one-third was direct losses. Oceanic conditions resulted in the return of another algae bloom during the summer of 1989, but the bloom was not nearly as disruptive as the previous one; it affected about 450-600 t of salmon worth \$4 million, near Stavanger. The algae began to dissipate within a few weeks of its discovery.

Norwegian scientists are concerned about the possibility that escaping farmed salmon will spread disease or dilute the genetic pool of wild stocks. The Directorate for Nature Management has proposed a temporary moratorium on the issuance of licenses for new salmon farms.

A recent study reports that escaped cultured salmon are intermingling with wild stocks in coastal spawning grounds. A survey conducted in 1988 calculated that over 25 percent of all fish in 54 coastal watercourses were "farmed" salmon that had escaped. The number of escaping salmon reportedly doubled between 1987 and 1988.

Although researchers have not yet detected any ill effects in the wild population, due to the intermingling, they are convinced that genetic damage will occur unless protective measures are taken. Until long-term solutions are developed, however, the Directorate has recommended that a moratorium on the construction of new aquaculture sites be enacted. Representatives of Norway's salmon farming industry, however, maintain that the industry has already done much to reduce the number of escaping fish, and they dispute the estimated numbers of escaping salmon. They maintain that more land-based facilities should be built, but that a moratorium on all fish farm construction is unnecessary. In 1989, the concern over excessive supplies of farmed salmon began to overshadow this debate over

limits on new salmon farms—the market dictated that production should expand more slowly.

### Overseas Marketing

Many Norwegian salmon growers are beginning to worry about the future of the industry. These fish farmers stress not the technical issues involved in salmon production, but note instead the growing quantities of Norwegian salmon reaching world markets, and the declining prices. They believe that the industry has expanded too quickly and that the reputation for high quality associated with name "Norwegian salmon," will begin to erode as this superb seafood becomes a "supermarket" commodity. The anticipated increase in production raises the danger of markets becoming glutted with salmon. Salmon prices fell 10 percent in 1988 and a rapid decrease in prices followed in 1989. Some industry analysts, on the other hand, believe that a variety of factors, such as expanding demand, will limit price declines, and that the concerns of Norwegian salmon farmers are exaggerated.

Though there is difference of opinion about the room for growth in the Norwegian salmon farming industry, there is growing consensus that the growth needs to be better controlled. Some industry spokesmen focus on export controls, advocating tougher Government regulations to ensure that the farmed salmon market continues to expand in an orderly fashion. One idea would extend the 1990 plan to impose a tax of \$0.75 on each kilogram of fresh salmon exported. The revenues from the tax would finance a farmed salmon management program. Funds would be used to pay salmon farmers who did not harvest all of their crop during a given year, as a means of keeping wholesale prices stable. This recommendation, however, is controversial. Even its proponents concede that some way must be devised to make sure that the program does not violate international rules against price fixing.

Although Norway pioneered Atlantic salmon farming, the growth of salmon farming in the United Kingdom, Ireland, the Faroe Islands, Iceland, and Canada, has steadily eroded Norway's domi-

nance. Other countries, most notably Chile and Japan, are also rapidly increasing production of Pacific salmon. Norwegian fishery officials note that Norway could easily lose further ground in the next few years because of the high cost of raising salmon in Norway. Few firms can raise salmon for under \$4.00/kg; for the vast majority of producers, the costs are significantly higher. Farmed salmon sold for under \$5.25/kg in 1989, which made it difficult to produce profits on a consistent basis, especially considering the strong pressure on world markets to reduce the price of salmon. Some competitors—such as Chile, with its huge fishmeal industry—have lower cost structures than does Norway.

In January 1988, a Norsk Hydro unit concluded an agreement with Skaarfisk, another Norwegian firm, establishing a new sales company specializing in farmed salmon. The new company, called Skaarfisk-Mowi, has become the largest single exporter of Norwegian farmed salmon, with an annual turnover of over \$100 million, which accounts for about one-quarter of the country's total exports of farmed salmon. Most of Skaarfisk-Mowi's exports are sold to France and West Germany (75 percent), followed by the United States (15 percent), and Japan (slightly less than 10 percent).

Norway's decision to produce increasing quantities of frozen salmon—up to 40,000 t in early 1990—may have a marked affect on the world market for frozen salmon, especially in Japan. The U.S. Embassy in Tokyo reports that large-scale Norwegian exports of frozen salmon will face strong resistance in the Japanese market. Japanese buyers are apparently unwilling to accept large quantities of frozen salmon at the (early 1990) price of \$5.50/kg (NOK 36/kg). Instead, Japanese buyers may press for prices in the \$3.50-\$4.40/kg range, since the Japanese market is already oversupplied. Norwegian wholesalers seem unlikely to reduce their prices to such a degree. Nevertheless, the potential for low-priced Norwegian imports will give Japanese buyers significant leverage when 1990 prices for U.S. frozen chum, coho, and sockeye salmon are negotiated. (Source: IFR-90/03.)

## Germany's Fisheries and Fish Markets

The Federal Republic of Germany (FRG) is the world's seventh largest importer of edible fishery products. Like several other European Community (EC) nations, the FRG relies increasingly on fishery imports to supplement its declining domestic catch. Imports now account for almost 80 percent (by quantity) of edible fishery products consumed in West Germany. The value of fishery imports has increased substantially since the mid-1980's, rising from a stable level of about \$0.8 billion per year during 1980-85, to \$0.9 billion in 1986, and \$1.1 billion in 1987. Imports increased to an estimated \$1.2 billion in 1988, and should continue to expand in value and variety as German consumers become accustomed to a wider variety of fishery products.

German fisheries consumption has almost fully recovered from the setback it suffered in 1987, when televised reports about nematode parasites in fresh fish temporarily upset the market. The recovery in consumption levels has brought new trends. Quality conscious German consumers have continued to purchase large quantities of traditional species such as herring, but have also increased their purchases of higher-priced specialty fish and shellfish.

### Domestic Fisheries

West Germany's domestic catch declined from 330,000 metric tons (t) in 1981 to 202,000 t in 1987, a 58 percent decrease. Loss of traditional fishing grounds, following the extensions of fishery jurisdictions, and decreasing catch quotas in European waters contributed to the steady decline. Unlike other European nations, the FRG does not have a significant fishing effort outside of the North Atlantic. During the 1980's, Germany's overall catch declined primarily because of reduced catches around Greenland and the United Kingdom (UK). EC fishing around Greenland is regulated by annual bilateral agreements. In recent years, Greenland has reserved a growing share of its resources for its own fishing fleet. Meanwhile, German quotas for cod and several other important species in EC waters have also been

reduced. Catches in the North Sea, Germany's most important fishing area, have held steady but have not increased to make up for losses in other areas. As a result, the German fleet of deep-sea trawlers, factoryships, and coastal fishing vessels now supplies less than one-quarter of the fishery products consumed in West Germany.

In 1987, the value of the West German catch was about \$150 million. The largest landings were: 45,000 t of Atlantic cod, 29,000 t of haddock, 26,000 t of mussels, 17,000 t of shrimp, 16,000 t of mackerel, and 14,000 t of herring. The FRG Government has discussed expansion of the herring and mackerel fisheries, to reduce imports of these species, but EC fisheries policy currently prevents additions to the FRG fishing fleet. Thus, the FRG's domestic catch is not expected to increase significantly in the next few years.

### Aquaculture

While the value of Germany's wild fisheries catch has declined in recent years, the value of its aquaculture production has steadily increased. The 9,000 fish farms in the FRG produced about 25,000 t of fish in 1988, with a value of over \$70 million—or almost half the value of the domestic catch, according to Wolfgang von Geidern, Secretary of the FRG Economics Ministry. Although the quantity of fish produced is only a small portion of the 770,000 t of fishery products consumed in West Germany, aquaculture is becoming an important source of high-value fresh and smoked fish. The FRG's growing aquaculture industry now supplies over half of the nation's consumption of trout. Lacking the superb natural sites available for salmon production in Norway, fish farmers in the FRG are instead developing high technology tank farms and sophisticated methods of raising trout. New food additives—which are somewhat controversial—allow trout to be colored so that their flesh looks like salmon.

### Fish Consumption

West German consumption of fishery products, 12.6 kg per capita in 1988 (Fig. 1), is considerably lower than consumption in more coastal neighboring countries such as Denmark and the Nether-

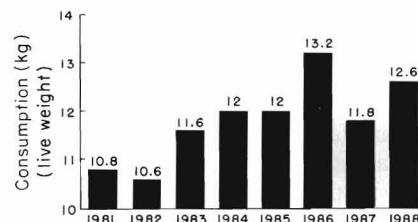


Figure 1.—FRG per capita fisheries consumption, 1981-88, live weight in kilograms.

lands (about 20 kg). This difference reflects regional contrasts within Germany. Consumers in northern (coastal) areas eat as much as 30 kg of fishery products per year, compared with only about 5 kg per year in southern (inland) regions.

Prices to the consumer of most fishery products are somewhat higher than prices of competing foods, thus slowing the potential growth of fisheries consumption. In 1987, average FRG retail prices were \$1.01/lb. for fresh herring, \$3.07/lb. for pollock fillets, and \$3.70/lb. for whole cod. Prices for selected nonfishery foods were \$1.30/lb. for chicken, \$2.50/lb. for beef, and \$2.78/lb. for pork cutlets.

Per capita consumption of fishery products in the FRG expanded from 10.8 kg in 1981 to 13.2 kg in 1986, a 20 percent increase (Fig. 1). During those years, Germans increased their consumption of fishery products for reasons of health and convenience. Imports replaced domestic supplies of fishery products, bringing more variety to the German market. Consumption of frozen fishery products increased particularly rapidly as these products became more diverse. As late as 1982, over half of the frozen fishery products consumed in Germany consisted merely of fish fingers. By 1986, the frozen fisheries market was 30 percent larger than in 1982 (over 90,000 t), and included a greater proportion of fish fillets, shellfish, and new convenience fishery products. The growth in consumption of both fresh and frozen fishery products led some observers to estimate that German consumption would increase to 15 kg per capita by 1988, a prediction which failed to materialize.

The increase in German fisheries con-

sumption stalled in 1987, when a parasite scare upset the market for fishery products. Environmentally conscious West Germans had increased their consumption of fishery products partly because of the healthful image of fish. The mid-1987 television and newspaper reports of parasitic worms (nematodes) found in several products—including the most popular one, marinated herring—struck a serious blow against this image. Demand for fish decreased (temporarily) by 60 percent. There was a danger that some consumer groups, especially in southern Germany, would stop buying fish altogether. Many consumers apparently linked the presence of nematodes in herring to increasing pollution in the North Sea, where most herring is caught. For these consumers, nematodes were a sign that fishery products, once symbolic of healthful nutrition, had become potentially hazardous.

The Government and the fisheries industry in the FRG reacted vigorously to the threat posed by the nematode crisis. Within weeks of the televised reports that had frightened consumers, the Government had implemented exacting regulations for the inspection and preparation of fish. With few exceptions, fish had to be eviscerated as soon as they were caught; fillets and steaks had to be individually inspected by hand using specified illumination equipment. One variety of fresh herring (“green herring”) could no longer be sold whole and most fish had to be frozen at  $-18^{\circ}\text{C}$  for 24 hours before being sold. (By August 1988, the Government had expanded these regulations as described below). The Government also provided close to \$1 million (one-fourth of which came from EC funds) for a promotional effort to renew consumer demand for fishery products.

FRG fishery companies and marketing associations joined the effort to restore consumer confidence. The new health regulations were widely publicized, and advertising campaigns featured German celebrities enjoying fish. The Fischwirtschaftliche Marketing Institut (FIMA) distributed new recipe books and booklets such as one entitled “1,000 Facts about Fish,” seeking to promote the health benefits of fish and to also spark interest in unfamiliar fishery products.

Consumers responded to these measures well; by 1988 the consumption of fishery products had increased to 12.6 kg.

Government and industry efforts helped keep the nematode crisis from becoming a catastrophe but did not prevent sizable losses in the fisheries sector in 1987. Fishermen, processors, wholesalers, and retailers lost an estimated \$500 million. Per capita consumption decreased from a record 13.2 kg in 1986 to 11.8 kg in 1987. Sales of herring (accounting for about one-third of the fisheries market) decreased by 25 percent compared with 1986. The setback was harsh because FIMA had forecast a comparable increase in consumption for 1987. But already during the 1987 Christmas season, when Germans traditionally eat a large amount of fish, sales of fishery products had begun to improve. The damage to the market during the “crisis year” (1987) was less severe than was originally feared.

With a few exceptions, the market for fishery products continued to recover during 1988 and 1989. Per capita consumption reached 12.6 kg in 1988, and was forecast to exceed 13.0 kg in 1989. While the market as a whole seemed to be strengthening, aftershocks of the nematode crisis showed that consumers remained cautious about fishery products. In early 1988, sales of fish in southern Germany decreased suddenly (again, temporarily) after Stuttgart newspapers reported that fish containing dead nematodes were being sold. The dead parasites posed no real health danger, but they were unappetizing reminders of the earlier crisis. Later in 1988, a Hamburg-based fisheries retailer responded to the ecologically conscious climate in the FRG when it announced that it would no longer market any fish (except plaice) originating from the North Sea. There was nothing objectively wrong with North Sea fish, company spokesmen said, but its negative image was hurting overall fishery sales. (Curiously, another company in the multinational group continued to sell North Sea fish.)

In August 1988, the FRG Government enacted detailed health regulations for fishery products sold in Germany. These regulations, which are likely to be the model for EC-wide fishery health regula-

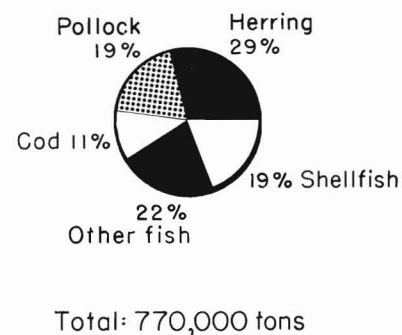


Figure 2.—FRG market for fishery products, by quantity, 1988.

tions after 1992, extended the measures enacted soon after the nematode scare. In addition to requirements for immediate gutting and freezing of fish, the regulations specify, among other things, that: 1) Parts of fish which contain live or dead nematodes must be removed immediately, and may not be sold to consumers. (One exception to this regulation is smoked herring, where the seller must indicate in writing that the fish may contain dead nematodes.); 2) Edible fishery products must contain less than 200 mg per kg of histamines; and 3) Shellfish must contain less than 400  $\mu\text{g}$  per kg of algalic toxins.

### The Fisheries Market

The “post-nematode” market for fishery products in the FRG appears to be undergoing profound changes, but certain basic features remain unaltered. Despite growing diversity in the FRG market, the 3 leading species—herring, pollock, and cod—still account for almost 60 percent of consumption, by quantity (Fig. 2). Herring dominates the market. Herring consumption—over 250,000 t in 1986—declined to 216,000 t in 1987 after the nematode scare but increased again in 1988 to 225,000 t. In 1988, West Germans consumed 148,000 t of pollock (saithe) and 83,000 t of cod. Other popular species included tuna (63,000 t), redfish (56,000 t), and hake (53,000 t).

The changes in the FRG fisheries market have not yet transformed consumption figures, but two new trends are clear.



First, formerly conservative German consumers are demanding a wider variety of fishery products—including higher-priced items. Because of the change in the mix of products being sold, the value of fishery products consumed is probably increasing more rapidly than indicated by the per capita consumption figures. Second, in the wake of the nematode crisis, consumers are very particular about the quality and origin of the fishery products that they buy.

The FRG fresh fisheries market—accounting for about half of total fisheries consumption—is moving to accommodate changing market conditions. Many small retailers now carry specialty fresh fish—including salmon, trout, monkfish, sea bream, and sea catfish—alongside better known species such as cod, redfish, pollock, and plaice. Suppliers of fish have felt the need to diversify. Some retailers now carry several varieties of fresh shellfish. Of the 147,000 t of shellfish consumed in 1988, the most important products were mussels, shrimp, and squid. Many German consumers are willing to pay a premium for lobster, shrimp, mussels, and crawfish. One FRG company that used to supply only herring, has switched to production of fish and shellfish salads, a type of product which is growing in popularity.

Restaurants are offering more varied and more international fish menus, catering to the many Germans who have traveled abroad. For all fresh products, assurance of quality is essential. Some retail displays list the origin (where the fish was caught) alongside the name of the product. The leading FRG trade publication, *Fischmagazin*, has stressed these changes in the fresh fisheries market, pointing out that both traditional and specialty fresh fishery products now need to be carefully presented as environmentally pure, high-quality items.

Sales of frozen fishery products in the FRG—both as convenience foods and specialty dishes—accounted for about 20 percent of the fisheries market in 1988. Large supermarkets and department stores offer many varieties of frozen fishery products, both unprocessed and prepared as meals. German consumers purchase frozen cod, plaice, pollock, mackerel, redfish, and haddock mostly

as fillets. One deep-freezing plant supplies convenient, ready-to-cook frozen fish products. On the other hand, the FRG's largest fisheries wholesaler has focused partly on the specialty side of the market with a 50-item series billed as "Fish specialties from France."

While fresh and frozen fishery products are growing more popular, canned and preserved products are losing ground. The share of canned and preserved products—including canned tuna, herring packed in tomato sauce, and sardines packed in oil—declined from 33 percent of total consumption in 1987 to 29 percent in 1988. In this product category, fishery companies are responding to changing German tastes by packing herring and other fish in a variety of sauces and marinades. Smoked fishery products—mostly herring and eels—continue to hold about 6 percent of the market.

### Imports

As West Germany's domestic catch has declined, its consumption of fishery products has increased (Fig. 3). FRG fishery imports reached \$1.2 billion in 1988 and accounted for three-fourths of consumption, by quantity. The FRG imports substantial quantities of a wide variety of fishery products (Table 1). In 1987, imports supplied high percentages of the FRG's two most important species: 94 percent of its herring and 60 percent of its pollock supply.

### EC Imports

The European Community supplied over half (by value) of the \$1.1 billion of fishery imports into the FRG in 1987, the latest year for which detailed data were available (Fig. 4 and Table 2). Proximity and lack of tariffs for intra-EC trade are obvious advantages for EC nations which export to the FRG. As the EC prepares for the single market in 1992, intra-EC trade is being facilitated even further. Health regulations for fishery products are being standardized (following the example of the regulations introduced in the FRG), and deliveries of fishery products across borders are becoming less complicated.

The consolidation of the EC will continue to favor two of the largest suppliers of fishery products to the FRG—Den-

Table 1.—FRG edible fishery imports, by quantity in metric tons and by value in U.S. dollars, 1986-87.

Product category	Imports			
	1986		1987	
	1,000 t	\$1,000	1,000 t	\$1,000
<b>Fish</b>				
Herring				
Fresh, frozen	98	52,701	81	52,321
Salted	12	13,469	10	13,338
Freshwater				
Fresh, frozen	34	131,954	36	172,655
Other				
Whole, fresh	76	115,137	70	131,720
Whole, frozen	31	41,530	31	57,355
Fillets, fresh	10	23,240	7	22,650
Fillets, frozen	90	162,210	83	186,412
Salted, dried, smoked	12	57,033	11	78,401
Canned	63	152,433	65	176,130
Other	1	13,437	1	16,146
Subtotal	427	763,144	395	907,128
<b>Shellfish</b>				
All types				
Fresh, frozen, dried	36	81,380	24	98,402
Canned	14	69,182	13	90,333
Subtotal	50	150,562	37	188,735
Grand total	477	913,706	433	1,095,863

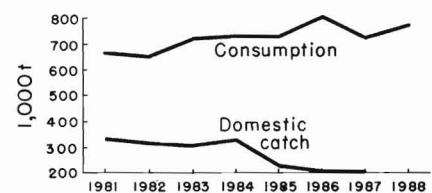


Figure 3.—FRG fisheries consumption compared with domestic catch, 1981-88.

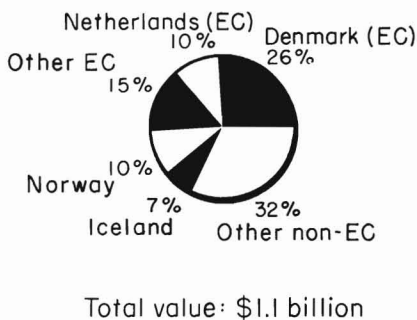
mark and the Netherlands. West Germany imported 115,000 t of fishery products worth \$284 million from Denmark in 1987. The largest import, by quantity, was (mostly fresh) herring, which declined from 49,000 t, worth \$36 million in 1986, to 37,000 t, worth \$26 million in 1987. High-value imports from Denmark included whole frozen fish (16,000 t, worth \$34 million) frozen fillets (12,000 t, worth \$35 million) and salted, dried, or smoked fish (3,000 t, worth \$45 million).

As these figures show, Denmark is an

**Table 2.—FRG edible fishery imports by country of origin and value in hundreds of Deutschmarks and U.S. dollars, 1986-87.**

Country of origin	Year			
	1986		1987	
	1,000 DM <sup>1</sup>	\$1,000	1,000 DM	\$1,000
<b>EC</b>				
Denmark	526,948	243,745	510,391	284,427
Netherlands	225,537	104,324	205,718	114,641
France	104,675	48,418	104,288	58,117
UK	45,359	20,981	47,935	26,713
Italy	38,270	17,702	35,946	20,032
Ireland	29,742	13,758	30,403	16,943
Spain	26,367	12,196	27,660	15,414
Belg./Lux.	25,610	11,846	26,276	14,643
Portugal	32,069	14,834	20,699	11,535
Greece	5,402	2,499	5,506	3,068
Subtotal	1,059,978	490,302	1,014,822	565,532
<b>Non-EC</b>				
Norway	207,773	96,107	203,744	113,541
Iceland	139,083	64,334	145,848	81,277
Faroe Isl.	69,359	32,083	66,155	36,866
Poland	62,768	29,034	65,253	36,364
Canada	44,539	20,602	48,717	27,149
U. S. A.	17,142	7,929	23,665	13,188
Morocco	22,355	10,340	22,061	12,294
Sweden	18,648	8,626	15,970	8,900
Argentina	18,774	8,684	12,783	7,124
USSR	18,508	8,561	12,366	6,891
Japan	9,290	4,297	10,006	5,576
Yugoslavia	2,617	1,210	3,989	2,223
Other	284,495	131,596	321,100	178,940
Subtotal	915,351	423,404	951,655	530,331
<b>Grand total</b>	<b>1,975,329</b>	<b>913,706</b>	<b>1,966,478</b>	<b>1,095,863</b>

<sup>1</sup>DM (Deutschmarks) 1986 \$1 = 2.162 DM; 1987 \$1 = 1.794 DM.



**Figure 4.—FRG edible fishery imports by value and country of origin, 1987.**

important source of value-added fishery products. For example, Danish processors purchase salmon of low production quality from Norwegian fish farmers; the salmon is then smoked and exported to

West Germany, where it sells at reasonable prices compared to top-quality Norwegian farmed salmon. Denmark also supplied over 14,000 t of trout to West Germany in 1987.

West Germany imports many of the same fishery products from the Netherlands as it does from Denmark. Of the 50,000 t of imports worth \$115 million from the Netherlands in 1987, 12,000 t, worth \$36 million, were whole frozen fish; 15,000 t, worth \$7 million, were herring; 2,000 t, worth \$9 million, were frozen filets; and 2,000 t, worth \$6 million, were salted, dried, or smoked fish. Salted herring (7,000 t worth \$10 million) and shellfish (3,000 t worth \$10 million) were also important.

The Netherlands is the FRG's most important supplier of "Matjes," the name for a delicacy made with cured and pickled fresh herring. Recently, the Government of the Netherlands (with assistance from the EC) approved a 5-year, \$3.4 million marketing effort for Dutch herring. The effort will focus primarily on West Germany, where millions of consumers will receive promotional materials and recipe brochures touting fresh, parasite-free herring from the Netherlands.

Like firms in other EC nations, Dutch companies have facilitated their access to the German market by establishing subsidiaries in the FRG. One interesting example of this phenomenon is a Dutch company established in the FRG to import specialties from Chile—shrimp, king crabs, salmon, and trout.

Within the EC, West Germany's third and fourth largest suppliers of fishery products are France (23,000 t worth \$58 million in 1987) and the United Kingdom (6,000 t worth \$27 million). The FRG imported \$26 million (9,000 t) of whole fresh fish, and \$21 million (2,000 t) of shellfish from France. The United Kingdom supplied \$12 million worth of fresh and frozen whole fish, including 4,000 t of pollock. The FRG imported \$8 million worth (1,500 t) of freshwater fish from Italy and \$5 million (7,000 t) worth of (mostly frozen) herring from Ireland.

### Non-EC Imports

West Germany's most important "third country" (non-EC) suppliers of fishery

products are, not surprisingly, other nearby European nations: Norway, Iceland, the Faroe Islands, and Poland. Norway (which qualifies for reduced tariffs because of its fishing agreements with the EC) dominates this market. Like Denmark and the Netherlands, Norway supplies a large quantity of herring to the FRG—13,000 t worth \$8 million in 1987. Norway also supplies frozen fish filets (15,000 t worth \$8 million) and fresh farmed salmon (5,000 t worth \$39 million). To ensure a presence in the FRG market after 1992, Norwegian fishery companies have joined Denmark, France, and the Netherlands in establishing subsidiaries in West Germany.

Iceland, second to Norway among non-EC exporters to the FRG, supplies a significant amount of whole fresh fish to the FRG (28,000 t worth \$35 million in 1987). Iceland was the FRG's single largest supplier of redfish (18,000 t or three-quarters of FRG imports) and pollock (5,000 t or one-quarter of FRG imports). Iceland also supplies herring and halibut. The Faroe Islands and Poland both supplied part of the FRG's large market for frozen fish filets, primarily hake and pollock.

The largest non-European supplier of fishery products to the FRG is Canada, with 10,000 t of exports worth \$27 million in 1987. Shellfish (600 t worth \$7 million) led Canadian exports to the FRG, followed by frozen salmon (1,000 t worth \$5 million), and herring (6,000 t worth \$4 million).

The United States was the FRG's fourteenth largest supplier of fishery products in 1987, the latest year for which statistics were available from German sources, accounting for only about 1 percent of FRG imports (Table 2). While U.S. exports make up a small proportion of German imports, these exports have increased significantly in recent years, from \$7.9 million in 1985 to \$12.6 million in 1988 (Table 3).

Salmon dominates U.S. exports to Germany, accounting for over 40 percent of the value of U.S. exports in 1988. As indicated in Table 3, the bulk of such salmon exports consist of chum and pink salmon, which are priced lower than sockeye or chinook salmon because of their smaller size and softer flesh. In

**Table 3.—FRG edible fishery imports from the United States, by product and value, 1985-1988<sup>1</sup>.**

Product	Imports (US\$1,000)			
	1985	1986	1987	1988
<b>Fish</b>				
Salmon, frozen				
Chum	3,719	2,768	2,034	2,643
Pink	20	29	333	1,078
Sockeye	119	230	1,056	339
Silver	0	141	50	31
Chinook	1	0	241	6
Steaks <sup>2</sup>	845	326	812	241
Subtotal	(4,704)	(3,494)	(4,526)	(4,338)
Salmon, other				
Roe	733	1,663	2,167	2,047
Canned	22	67	134	178
(Salmon, total)	(5,459)	(5,224)	(6,827)	(6,563)
Alaska pollock	0	418	867	325
Eels	368	236	356	318
Halibut fillets	0	192	26	109
Cod	0	0	128	0
Other fish	1,648	1,242	2,104	3,466
Subtotal	7,475	7,312	10,306	10,781
<b>Shellfish</b>				
Squid				
Loligo	0	68	17	688
Other	337	137	203	187
Crabs, Alaskan	33	84	326	259
Shrimp	2	26	243	293
Lobster	0	0	90	101
Sea urchin	0	0	0	17
Other shellfish	13	70	332	246
Subtotal	385	383	1,211	1,791
Grand total	7,860	7,695	11,517	12,572

<sup>1</sup>Source: U.S. Bureau of the Census. There is a discrepancy (about 14 percent) between these totals and those reported in the "Annual Report on German Fisheries, 1987/1988."  
<sup>2</sup>Mostly from chum salmon.

1988, there was an abundance of chum salmon (also used for salmon steaks and for salmon roe), prompting exporters to market large quantities in Germany. In contrast, the bulk of sockeye salmon landed in Alaska is shipped directly to Japan, so there are relatively small quantities available for export to Europe.

**Table 4.—Selected FRG fishery imports from the United States, compared with the imports from the largest suppliers, by value in thousands of U.S. dollars, 1987.**

Product	Country of origin		
	United States	Largest Suppliers	
Frozen salmon	4,526	Canada	5,000
		Denmark	4,000
		Norway	3,000
		Total	16,600
Eels	356	Denmark	10,000
		Netherlands	5,000
		Total	35,000
Squid			
Loligo	17	Thailand	2,000
Other	203	Spain	300
		Total	7,800
Shrimp	243	Netherlands	9,000
		Bangladesh	7,000
		Thailand	5,000
		China	3,000
		Total	50,000
Lobster <sup>1</sup>	90	Canada	1,000
		France	250
		Total	3,000

<sup>1</sup>Includes live, whole frozen, pieces frozen; exports from France are Norway lobsters.

Frozen salmon exports from the United States compete with those from Canada, Denmark, and Norway (Table 4).

Other important U.S. exports include squid, shrimp, and Alaskan crabs. Both squid and shrimp exports from the United States compete with much larger exports from Thailand (in both cases), the Netherlands, Bangladesh and China (in the case of shrimp). U.S. squid exports, though small compared with total FRG imports, surged from \$0.2 million in 1987 to \$0.9 million in 1988, reflecting the large increase in the U.S. squid catch (from 37,000 t in 1987 to 58,000 t in 1988), as well as other world squid mar-

ket factors. Both squid and shrimp from countries such as Thailand are generally lower priced than equivalent exports from the United States. In addition, products from such developing countries face preferential tariffs when entering the EC market. For example, processed shrimp from the United States is charged a tariff of 20 percent, compared with 6 percent in the case of Thailand or Bangladesh.

### U.S. Export Opportunities

The U.S. Foreign Commercial Service reports that the following products have good sales prospects in the FRG market: Alaska pollock (considered a good substitute for cod), lobster, jumbo shrimp, oysters, and mussels. Alaska pollock exports declined in 1988, despite the fact that the U.S. catch of the species more than doubled. This fluctuation may reflect the relative price and supply of cod—1988 import figures for Germany were not yet available.

The heavy promotion of lobster from the United States at the 1987 ANUGA food trade fair in Cologne, West Germany, probably accounts for the expanded sales of this product in 1987-88 (Table 3). At the 1989 ANUGA fair, 5 (out of 37) U.S. exporters again displayed lobsters. A U.S. company is reportedly providing holding tanks to German seafood stores and supermarkets, opening up the possibility of live lobster sales in Germany. Lobsters would be flown directly from New England to Germany. The German lobster market (Table 4) is strongest around the Christmas holidays. (Source: IFR-89/98, prepared by Brian D. McFeeters.



## Japan's Driftnet Fisheries Conflict With Squid Jiggers

Japanese fishermen conduct extensive driftnet fishing operations within Japan's Exclusive Economic Zone (EEZ), mostly using large numbers of small vessels with short nets. However, large-scale salmon, tuna, and billfish driftnet fisheries also operate within the EEZ. Large-scale Japanese squid driftnet fishing began in 1978 in an area overlapping the Japanese 200-mile zone and the high seas. Squid driftnetting was prohibited in that area by the Japanese Government after complaints by squid jigging fishermen that they could not operate profitably in competition with driftnetters in the same area—an area the squid jiggers had occupied first. To resolve the conflict, the Government separated the two groups by establishing a separate squid driftnetting area outside the jigging area. Japan's only domestic conflicts over driftnet fishing have been the result of economic competition between highly regulated fisheries.

### Background

Japanese fishermen have used driftnets in Japanese waters under prefectural license for about 100 years. Currently, driftnets are legally used to catch nearly all surface-feeding fish in Japanese waters—sardines, saury, Spanish mackerel, mackerel, "kisu" (silver whiting, *Sillago japonica*), "managatsuo" (similar to butterfish), flying fish, and sea bass, to name a few. A very important exception is squid (discussed later). In addition, large-scale driftnets (<0.5 km) are used under license from Japan's Ministry of Agriculture, Forestry and Fisheries (MAFF) to fish for salmon, tuna, and marlin, both inside and outside the Japanese EEZ.

The total number of driftnet vessels operating within Japan's 200-mile zone can only be roughly estimated. The coastal prefectures issue fishing permits, by species, to any vessel under 20 gross tons that fishes with driftnets. Because these vessels may fish for several species, each vessel may hold multiple permits. The number of vessels permitted by the prefectures is unknown but the Fisheries Agency of Japan (FAJ) estimates it to be in the thousands, possibly as high as ten thousand. The typical fishing vessel licensed by the prefectures is small—usually less than 10 tons. Consequently the length of their driftnets, although not restricted by law, usually ranges from 100 to 1,000 m.

Large-scale driftnetters, on the other hand, are licensed by the MAFF. There are about 900 vessels that fish for salmon, tuna, and billfish. The exact number of driftnet vessels in the 1989 large-mesh tuna and billfish fishery is not yet known (vessel registration only began 1 August 1989, and was still open for applications), but will likely reach 460, the number estimated in 1987. The Japanese Government permits 440 vessels to fish for salmon with driftnets within its EEZ. In summary, there are about 900 large-scale driftnetters and perhaps as many as 9,000-10,000 small-scale driftnetters fishing in Japanese waters.

### Net Lengths

The nets used by salmon driftnet vessels fishing within the 200-mile zone are limited to lengths of <10 km, whereas the limit outside the EEZ is 15 km. Nets used in the large-mesh tuna and billfish fishery are not limited and the vessels fish the same nets inside the Japanese EEZ that

they use on both the North and South Pacific high seas. These nets may be from 30 to 50 km long.

### Squid Driftnet Fishing

Large-scale Japanese squid jigging operations had been concentrated in one area of the North Pacific since 1975—lat. 40-44°N by long. 144-156°E, half inside the Japanese EEZ. Beginning in 1978, other fishermen (trawlers, salmon fishermen, and longliners forced out of the Soviet 200-mile zone as a result of Japanese-Soviet fishery negotiations) began using driftnets to catch squid in the same area. The relatively high catch rates of the driftnetters, compared with the jiggers, caused complaints from the jiggers. They argued that the concentrations of squid necessary for jigging to be profitable would be quickly reduced by driftnetting operations. They would not be able to operate profitably if they had to share the grounds with the driftnetters, who did not need such concentrated squid catches to make a profit. The jiggers had originally discovered the squid grounds, which were inside a larger area to which their jigging operations were restricted. The driftnetters, however, did not face the same fishing area restrictions as the jiggers.

### Resolution

The conflict was resolved when the FAJ separated the two groups by requiring squid driftnet fishermen to operate south of lat. 40°N and east of long. 170°E (the jigging area north of lat. 20°N and west of long. 170°E) under a Ministry licensing system established in 1981. (The lat. 40°N limit is to prevent salmon interception and is seasonally extended northward as the salmon move north.) Conservation was not the reason driftnetters were forced out of the area. Flying squid (red squid or "aka ika", in Japanese) live less than 2 years and are only caught by both driftnetters and jiggers at the end of their life cycle. (Source: IFR-89/102, prepared by Paul E. Nie-meier, Foreign Affairs Specialist, Foreign Fisheries Analysis Branch, National Marine Fisheries Service, NOAA, Silver Spring, MD 20910.

## Japan's Recreational Boating and Fishing

Recreational boating in Japan is gradually expanding as a result of increasing affluence, but remains a leisure industry far below its potential. The stimulus that recreational fishing and the proliferation of marinas could impart is effectively thwarted by Japan's land-use laws, commercial fishing rights, restrictions on gear types, and compensation requirements. These combine to preclude not only legal recreational fishing, but also the development of facilities necessary to support such activity.

For nearly 400 years, fishing in Japanese waters was the vested right of commercial fishermen. The notion of fishing for fun was juridically acknowledged for the first time in 1972 when the Fisheries Agency of Japan (FAJ) charged the prefectural governments with the regulation of recreational fishing. But, under heavy pressure from commercial fishermen to keep recreational fishing from interfering with their normal operations, the prefectures restricted recreational fishing activities to the most basic methods. Japan revised its fisheries laws again on 1 October 1989 to expand opportunities for recreational fishermen. Yet, absent a radical reorientation of attitude toward coastal development, the current change will do little to stimulate boating or fishing as leisure sports in Japan.

### Regulations and Custom

Fishing in Japanese waters has traditionally been the sole domain of commercial fishermen. Until 1972, in fact, recreational saltwater fishing was illegal. Even now, it is a pastime existing on the margin and at the sufferance of the important and politically-powerful commercial fishing industry. A complex web of federal and prefectural fishing regulations, buttressed by custom, tightly restrict yachting and fishing. The practical

result is that commercial fishermen control the right to fish and, so far, have been willing to tolerate only a rudimentary form of charter boat fishing.

The Government of Japan (GOJ), through its Ministry of Agriculture, Forestry, and Fisheries (MAFF), issues fishing permits to commercial fishermen. The permits grant the right to engage in fishing as a business, but do not confer exclusive fishing rights or legal property rights. However, because permits are necessary to own fishing vessels and because they can be inherited, they are treated as private property. Permits are routinely bought and sold for substantial sums.

### Prefectural Governments

In addition to issuing permits, MAFF delegates to the prefectural governments the right to organize cooperatives which control (by area limits or gear type restrictions) all fishing activity within the prefecture. Invariably all licensed fishermen must belong to one of these cooperatives and membership is selectively limited (e.g., by stipulations that all members must live in a specific area, or must fish using some specified gear type). Similar types of cooperatives (e.g., trap net fishermen, squid driftnet fishermen, tuna longline fishermen, etc.) are organized into national federations. The federations, in aggregate, represent and effectively control all Japanese commercial fishing activity.

Through the system described above, the number of fishermen, fishing areas, and type of fishing have been tightly controlled for many years. In the postwar years, when growing numbers of people began to hire commercial fishermen to take them sport fishing, the natural response of the bureaucracy was to seek an accommodation that assured harmony

between commercial and recreational fishermen. Thus, it became necessary to acknowledge this technically-illegal activity in order to regulate it. The MAFF authorized Japan's prefectural governments in 1972 to allow recreational fishing under conditions specified by local authorities. Naive observers might have expected a consequent boom in recreational fishing and boating. Not surprisingly (in view of the local political influence of the fishermen's cooperatives), however, the prefectures uniformly adopted regulations which allow only the most rudimentary forms of recreational fishing. For example, recreational fishermen may use boats only for stationary hook-and-line fishing. Trolling, the foundation of the multi-billion dollar American boating industry, is specifically prohibited in Japan except for Hokkaido, where an experimental salmon troll fishery has been permitted since 1988 to see if a recreational fishery can be developed.

### Chartered Vessels

The practical consequence of the circumstances described above has been the proliferation of recreational fishing using chartered vessels which are licensed simply for transportation. Though it remains small in scale by U.S. standards, charter-boat fishing is growing so fast that the Japanese Diet passed a law in December 1988, to "Normalize Recreational Fishing." The new law, which went into effect on 1 October 1989, requires that all owners of chartered recreational fishing vessels register their vessels and provide the government with information on their businesses. Boats used privately by the owner need not be registered but they also are limited to fishing under the conditions noted above. The new law aims at documenting the impact of sport fishing and assuring that it does not develop to the detriment of commercial fishermen. It offers little to encourage the expansion of recreational boating in Japan.

### Structural Impediments to Recreational Boating

In addition to fishing regulations, Japan's land-use laws and customs support commercial fishing to the exclusion of sport fishing. These combine to

severely inhibit the development of port facilities and other infrastructure that support a sport fishing industry. Nearly every meter of Japan's extensive coastline is owned or controlled by government entities. All port areas are reserved for the use of either the transport industry (under Transport Ministry supervision), or the fishing industry (under MAFF supervision). Other coastal land (50 m shoreward and 50 m seaward) is owned by national or prefectural governments.

Japan's Fishing Port and Harbor Law (Law No. 137 of 1950) authorizes the Minister of Agriculture to designate fishing ports and to permit construction of structures and/or use of the sea surface in areas so designated. MAFF delegates this authority to the prefectural governments and the prefectures in turn delegate the cities and towns for the public benefit. All land use in fishing ports, therefore, is ultimately subject to the approval not only of MAFF, but also of prefectural and municipal governments. The latter are especially sensitive to the needs of well established local commercial fishing interests. Consequently, private development of land within a port and harbor area is virtually impossible. The required approvals by local, prefectural, and national authorities assure that only public development necessary to satisfy local demand is allowed, and that local constituent groups have effective veto power. Recreational facilities such as marinas and yacht harbors can be developed only if recreational fishing is seen as a boon to the local economy and to the established commercial fishing industry. In addition, even if the commercial fishing industry became convinced of the desirability of recreational fishing, an elaborate system of compensation for "lost revenue" (including "lost opportunity") makes development of recreational facilities prohibitively expensive. For example, a large GOJ-sponsored marine resort project in Tokyo Bay is currently stalled in negotiations with commercial fishing groups over compensation.

### Conclusions

Japanese fisheries census statistics show that the number of "recreational fishing experiences" (both fresh and salt

water) grew from 2 million in 1977 to 31 million in 1983 to 35 million in 1988. The number of noncommercial fishing vessels (both charter and private) only increased from 74,549 in 1983 to 115,863 by 1988. It is clear that consumer demand for recreational fishing opportunities is high. Yet the development of its corollary—private recreational boating ("my boat" in Japanese)—has been stunted by strict fishing laws and lack of facilities. Complex regulations have provided effective political cover for commercial fishing interests which are almost uniformly antipathetic to development of a recreational boating industry.

Once again, the interests of Japanese consumers and would-be American exporters are in happy coincidence. Freed of artificial constraints, the potential for development of yachting, power boating, and recreational fishing in all its forms in Japan is almost limitless. Development of recreational boating and fishing on a Western scale and along Western lines could be a boon for Japan's economically depressed fishing ports and their populations. Two steps are essential to create a situation where everybody wins: 1) Widespread legal tolerance of trolling and other boating activities considered normal elsewhere in the world and 2) revision of land-use laws and development practices to facilitate development of boating and marine recreation facilities. (Source: IFR-90/10, prepared by Todd T. Schneider, Foreign Affairs Specialist, Office of International Affairs, NMFS, NOAA, Silver Spring, Md 20910.

## Chile's Salmon Culture Industry

Salmon culture is Chile's fastest growing economic activity. At current growth rates, the salmon culture industry could well become the leading sector of the country's dynamic fishing industry, supplanting Chile's massive fishmeal industry. Chilean salmon farmers expected to harvest over 16,000 metric tons (t) in 1990, double the estimated 7,500 t harvested in 1989 (Table 1). Salmon culture is a new industry in Chile and farmers only achieved harvests of more than

1,000 t in 1986. Several large foreign companies have subsequently entered the industry, permitting the substantial increases now being reported.

The participation of some of the major salmon culture companies in Norway, the U.K., and Japan has meant an infusion of technology and capital which is enabling the Chilean industry to emerge rapidly from small scale operations to an increasingly important sector of the country's fishing industry. Some observers believe that harvests by 1993 could be close to 30,000 t, and that the Chilean industry will eventually rival the massive Norwegian industry which currently harvests about 150,000 t annually. The Chilean coast is similar to the Norwegian coast, and there are large numbers of well sheltered potential sights for expansion along the coast south of Chiloe Island where the industry is now centered.

### Yields

Farmers are reporting excellent yields with growth rates exceeding some of the best Scottish and Norwegian operations, at least partially due to the warmer water temperatures in the Chiloe area. Chilean production costs are generally below those of their major competitors, primarily because of lower feed costs. The industry initially cultured coho salmon, but the involvement of Norwegian and British companies has made possible diversification into Atlantic salmon. Many

Table 1.—Chilean salmon harvests, 1981-89, in metric tons.

Year	Pacific salmon			Atlantic salmon	Sea-farmed trout	Total
	Chinook	Coho	Cherry			
1981		1				1 <sup>1</sup>
1982		184				184
1983		94				94
1984		109				109
1985		500				500
1986		1,144				1,144
1987		1,780		41		1,821
1988	3	4,075		165	100	4,343
1989E <sup>2</sup>	50	5,300		1,320	870	7,540
1990P <sup>3</sup>	200	9,900	75	4,950	1,500	16,625
1991P	300	13,900	75	7,100	2,000	23,375
1992P	700	14,700	75	8,500	2,500	26,475
1993P	1,000	16,300	75	8,000	3,000	28,375

<sup>1</sup>Some sources report harvests of up to 70 mt in 1981

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

<sup>3</sup>P = Projected. Note: Various sources offer widely different projections on future Chilean harvests. The 1990-93 data in this table should be viewed as very rough projections of harvest levels.



farmers are also working with chinook salmon and sea-farmed trout ("salmon-trout"). Eventually harvests of sockeye and cherry salmon are also possible.

### Markets

Farmers initially marketed their harvests largely fresh in the United States, but since 1988 they have shifted coho exports primarily to Japan, mostly shipped frozen (Table 2). The increasing production of Atlantic salmon is mostly air-freighted fresh to the United States. Prospects for European sales are less clear because of relatively high freight charges to Europe and competition with European producers. Some officials are concerned over problems such as "brown-tide" outbreaks and a still untreatable disease

Table 2.—Chile's salmon and trout exports to principal markets, 1980-89, in metric tons.

Year	Japan		U.S.		E.C.	
	Salmon	Trout <sup>1</sup>	Salmon	Trout	Salmon	Trout
1980						140
1981	5				96	164
1982	51				28	143
1983	33			70		70
1984			32	73		117
1985			155	30		413
1986	45		743	108		483
1987	28		1,173	48		449
1988	1,064		1,588	166	N.A. <sup>2</sup>	N.A.
1989 <sup>3</sup>	(3,662)	(258)	(783)	(68)	N.A.	N.A.

<sup>1</sup>Separate data for trout not available before 1987. Trout data includes both sea and freshwater operations.

<sup>2</sup>N.A. = Not available.

<sup>3</sup>January to June

which affects primarily cohos. Many farmers are also concerned about the

impact of the steadily increasing world supply of farmed salmon on prices. Some industry leaders believe that Chilean farmers may be expanding their operations too rapidly before the impact of increasing world production on the future price structure is clearly understood. A recent market analysis (GLOBEFISH Research Programme, Volume 1) suggests that rising demand and a variety of other factors will prevent any precipitous price decline. Even in an environment of declining prices, however, Chilean producers are well situated to compete successfully because of their low cost structure, high quality standards, species diversification, and successful penetration of both the Japanese and U.S. markets. (Source: IFR-90/02.)

## Ecuador's Shrimp Culture Industry

Ecuadorean press reports suggest that 1990 will not be a good year for shrimp farmers. The country's farmers reported lower shrimp shipments in 1989 and prospects for 1990 were not encouraging, although farmers did report higher November shipments. The country's troubled shrimp industry encountered significant difficulties in 1989. Many of these problems related to environmental conditions which may become increasing severe in coming years.

Ecuadorean shrimp farmers exported 41,200 metric tons (t) of shrimp in 1989 (through November) about 12 percent less than during the same period of 1988. Ecuador's major export market is the United States and most of the decline has been due to lower U.S. shipments. Ecuadorean exports to European countries, on the other hand, have been generally stable or increasing. While overall shipments are lower, farmers reported improved results in November. Shipments

in November alone totaled 4,300t, about 12 percent above 1988 shipments. It is not yet known whether this increase portends any change in the overall declining production trend.

Farmers reported several new problems in 1989 as well as intensifying long term problems. Many of these problems relate to environmental quality, a tendency which does not auger well for the industry's future.

The use of fertilizer to support the growth of phytoplankton on which the shrimp feed also supports the growth of other organisms. One is a protozoan which infects the gills of the shrimp. This alters the shrimp's normal negative phototropism and causes individuals to surface more frequently than normal, making them more vulnerable to sea gull predation. Farmers are now reportedly developing methods for reducing predation.

Oil spills are causing problems for both

farmers and hatchery operators. Hatcheries on the Santa Elena Peninsula in Guayas Province, a major concentration of hatcheries, reported the loss of 200 million larvae worth about \$1 million due to spills from the Peninsula oil terminal that contaminated coastal waters. Losses of wild larvae and other ecological damage in the region was probably substantially larger.

Shrimp fishermen in the Gulf of Guayaquil complained of losses resulting from the overburdening of the Gulf ecosystem with organic material, sewage from Guayaquil and agricultural runoff from the Guayas River basin. The problem was particularly severe in 1989 because of unusually low rainfall and diversion of water from the Guayas River for agriculture which has expanded significantly in recent years. Shrimp farmers also require substantial quantities of water. The problem is compounded by dredging in the Gulf shipping lanes.

Despite the problems being reported in the press, individual shrimp farmers were still optimistic about the industry's future. While competition from China and other Asian producers is an increasing problem, industry experts are convinced that Ecuador has a strong competitive position. Ecuadorean farmers enjoy perhaps the most ideal growing

conditions available in the world and should theoretically be able to compete with any other country. Many believe that China's success on world markets is based on exporting at prices below actual production costs resulting from the need to generate hard currency earnings.

Local observers believe that once Ecuadorean farmers learn how to handle hatchery-produced larvae, major production increases are possible. In addition, the anticipated poor availability of wild larvae in 1990 will probably provide a strong market for the country's inadequately financed hatchery industry. A year of strong profits could enable several hatcheries to stabilize their finances as well as improve their production methods. Eventually, normal climatic fluctuations will increase the availability of wild larvae. While this will assist farmers, it makes it difficult to operate a stable hatchery industry. Once established, however, a financially stable hatchery industry combined with continued improvements in growing methods should allow farmers to increase production in 1991 or 1992.

What most concerns farmers is the impact of increasing world shrimp supplies on prices. While Ecuadorean farmers are convinced that they can compete with farmers in other countries, international shrimp prices in real terms have declined by about 50 percent since 1980. The margins of even efficient Ecuadorean farmers have been significantly narrowed. Farmers are concerned that further major price declines could seriously affect the industry's future. (Source: IFR-90/08.)

## Colombia Inaugurates Tuna Processing Plant

Colombian President Virgilio Barco inaugurated the new FRIGOPESCA<sup>1</sup> tuna processing plant in the Caribbean port city of Cartagena on 14 January 1990. The plant is located in Cartagena's Mamonal Industrial Zone (MIZ). Tuna caught in the Pacific Ocean is being

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

landed at the plant for cooking, deboning, and cleaning, after which it is frozen and shipped to a U.S. tuna cannery in Mayaguez, Puerto Rico.

FRIGOPESCA was created in 1983 from FRIGOCAR, a company founded in 1975 to slaughter beef and export meat products to the European Economic Community (EEC). The EEC restricted access to Colombian beef, however, because of hoof and mouth infestation and FRIGOCAR was unable to export as planned. The FRIGOCAR plant processed only 200 t of beef in 1989, all of which was consumed domestically. FRIGOPESCA investors decided that fishery operations could provide an alternative use for the costly facilities built by FRIGOCAR. Colombia has barely begun to tap its tuna and other marine fishery resources. Investors recognized the potential export and domestic market for seafood.

FRIGOPESCA signed a contract with a U.S. tuna company in 1989. The U.S. company reportedly agreed to provide the technology required to develop a tuna processing plant and buy all the tuna processed by FRIGOPESCA. The project converting FRIGOCAR facilities cost about \$2 million, about half of which was put up by a Colombian development promotion group (IFI) and the Santo Domingo investment group. The remainder was financed by the Banco Ganadero.

Three U.S.-flag seiners were currently catching tuna in the Pacific, including Colombian-claimed waters, for delivery to the plant. FRIGOPESCA and other tuna processing plants in the region (Ecuador and Costa Rica) take advantage of relatively low wage rates for the labor intensive operations of preparing tuna for canning. FRIGOPESCA's Cartagena plant was processing 7 t of tuna per day. The company expected to increase daily production to about 60 t per day by April or May 1990. While important to the local economy, FRIGOPESCA will only be a minor supplier to Puerto Rico where some canneries require 1,000 t of tuna daily. FRIGOPESCA employed a staff of about 150. The company will ultimately require 300 additional employees when it begins operating at full capacity. FRIGOPESCA expects the value of tuna

exports to increase from about \$12.5 million in 1990 to \$30.0 million by 1994.

President Barco used his opening speech as an opportunity to publicize Colombia's economic potential and criticize pessimistic economic projections. He said that the country is not paying attention to gloomy economic forecasts and that Colombia is continuing to progress despite its security and economic problems. Barco especially applauded Cartagena, calling the city one of Colombia's industrial capitals along with Bogota, Cali, and Medellin. He said Cartagena's MIZ, with its 60 participating companies, is a major growth area driving the country's economic expansion. He also noted steps taken by MIZ officials to reduce pollutants being released into Cartagena Bay.

President Barco, directly addressed Cartagena's political and business leadership at the ceremony. He listed various projects that the Departmental Government had undertaken during 1987-89 to repair/expand its road system and provide electricity to 17,500 families. He supported plans to construct a new transportation terminal in Cartagena, and promised assistance from the National Government in addressing beach erosion problems at Cartagena's Bocagrande tourist hotel area. He also expressed appreciation for the Canadian Government's plans to provide \$12 million in assistance for pollution abatement efforts at "De La Virgen," a saline basin east and adjacent to Cartagena. Significant fish kills have occurred in the basin in recent years. (Source: IFR-90/06.)

## Japan-Vietnam Fishery Relations

Japanese imports of Vietnamese fishery products have increased from about 5,400 metric tons (t), valued at \$27 million, in 1984, to almost 20,000 t, worth nearly \$100 million, in 1988. In addition, a joint fisheries venture between Japan, Vietnam, and the Soviet Union was set to begin in 1990; it will allow Japan to purchase, over-the-side, 15,000 t of Soviet-caught walleye pollock.

The value of Japan's fishery imports from Vietnam has increased an average

of 36 percent every year since 1983. Japan imported nearly 20,000 t of fishery products, worth about \$100 million, from Vietnam in 1988 (Table 1). These imports ranked 20th, or almost 10 percent, by value, of Japan's total fishery imports in 1988. The largest commodity Japan imported from Vietnam was frozen shrimp. In 1988, Vietnam supplied nearly 3 percent of Japan's \$2.6 billion shrimp imports and was the ninth largest supplier of this commodity. A total of 11,500 t was bought by Japan for \$76 million, or about 78 percent of the total value of Japan's fishery imports from Vietnam. Other commodities purchased from Vietnam were frozen cuttlefish ("Mongoi-ika") (1,252 t, worth \$5.8 million), and dried cuttlefish (274 t, valued at \$2.6 million). Japan did not export any fishery commodities to Vietnam in 1988.

Japan planned to purchase in 1990 pollock over-the-side from Soviet fishermen off western Kamchatka Peninsula through a joint venture with the Soviet Union and Vietnam. Japan will be utilizing a pollock catch quota granted by the Soviet Union to a Vietnamese firm.

To speed up economic rehabilitation, Vietnam's Sea Product Export Corporation (SEAPRODEX)<sup>1</sup> established the joint venture "SEASAFICO" in 1988 with the Soviet Union's Sakhalin Fisheries Kolkhoz (cooperative). The Sakhalin Kolkhoz helped SEASAFICO obtain a fishing catch quota in the Soviet 200-mile zone. On 15 January 1990, the Kita Taiheiyō Gyogyō Company (North Pacific Fishery Company), established by the Hokuten Trawlers Association (HTA) of Japan, signed an agreement with SEASAFICO to purchase its Soviet-caught pollock over-the-side. The agreement originally called for the Japanese to purchase 24,000 t (later reduced to 15,000 t) of roe-bearing pollock to be caught off western Kamchatka at a reported purchase price of \$441/t. The purchase season ran from 5 February to 31 March 1990. The departure of Hokuten trawlers from Japan was postponed until 14 February 1990, because the Soviet Fisheries Ministry delayed the release of the pollock quota to SEASAFICO as well

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

Table 1.—Japanese imports of Vietnamese fishery products by commodity, quantity, and value, 1984-88.

Commodity	Imports									
	1984		1985		1986		1987		1988	
	t	\$1,000	t	\$1,000	t	\$1,000	t	\$1,000	t	\$1,000
Frozen shrimp	5,104	26,210	6,974	32,791	9,361	44,898	11,743	62,168	16,475	76,129
Frozen cuttlefish	242	851	540	1,923	651	2,567	915	3,849	1,252	5,774
Dried cuttlefish	0	0	44	165	531	2,893	599	4,036	274	2,596
Other	57	189	124	399	270	1,244	1,000	5,353	1,963	13,711
Total	5,403	27,250	7,682	35,278	10,813	51,602	14,257	75,406	19,964	98,101

as the issuance of the subsequent fishing permits to Japanese vessels. The first contingent of three Hokuten trawlers reportedly began purchasing roe-bearing pollock on 17 February 1990, from about 10-16 Soviet trawlers off western Kamchatka. The HTA fishermen planned to purchase 600 t of pollock over a 3-day period. They would then be replaced by three other Hokuten trawlers for 3 more days. In all, 49 Hokuten trawlers were expected to participate in the purchase.

The Government of Japan announced on 23 January 1990, an additional import quota of 100,000 t of pollock to accommodate the above joint venture purchase,

as well as Japan-Soviet joint venture purchases of pollock resulting from the two countries' annual bilateral groundfish agreement. The joint venture is particularly valuable to the Japanese. It provides access to Soviet fishing grounds and jobs for Japanese fishermen, especially Japan's Hokuten trawlers, which are being phased out of the Soviet zone and which have been excluded from the U.S. zone since 1988. (Source: IFR-90/26, prepared by Todd T. Schneider, Foreign Affairs Specialist, Office of International Affairs, Foreign Fisheries Analysis Branch, NMFS, NOAA, Silver Spring, Md 20910.

## Canada Announces Fisheries Assistance

The Canadian Government has announced the highlights of a C\$584 million (US\$496 million) fisheries adjustment program for Atlantic Canada. Included are: 1) The rebuilding of fishery stocks by increasing surveillance and enforcement, 2) assistance for displaced fish processing workers, and 3) help in diversifying the economies of Atlantic fishing communities. The Canadian Minister of Fisheries and Oceans, Bernard Valcourt, unveiled the long-awaited package to aid the troubled Atlantic fisheries at two separate news conferences in St. Johns, Newfoundland, and in Halifax, Nova Scotia, on 7 May 1990. Valcourt announced the details of the half billion Canadian dollars package to be spent over 5 years in Nova Scotia and Newfoundland Provinces. Prince Edward Island

and New Brunswick Provinces were not covered in the announced program, but Valcourt was scheduled to visit New Brunswick on 8 May and fishermen there were expecting him to reveal what assistance Ottawa intends to provide for the industry in that Province.

Of the C\$584 total, C\$426 million will be in newly allocated funds focused in three major programs: Rebuilding fishery stocks, "Adjusting to current realities," and Economic diversification.

Rebuilding stocks: (C\$150 million). Most of this money will go to scientific research and fishery surveillance and enforcement. Canada will also intensify its diplomatic efforts with West European countries to stop fishermen of those nations from overfishing. For those found guilty of overfishing in Canadian waters, fines will go as high as C\$0.5 million, a hundredfold increase over the current maximum of C\$5,000. In addition, any-



one who destroys or disrupts fishery habitats may face fines of up to C\$1.0 million.

“Current realities”: (C\$130 million). This segment of the program will provide as much as C\$120 million toward extended unemployment insurance benefits and early retirement for older workers. The number of fishing licenses will also be reduced through the implementation of a mandatory certification program for fishermen called “professionalization.” In addition, there is now a freeze on the issuance of new fishing licenses in all four Atlantic Provinces. (Newfoundland and Labrador had previously been exempt.)

Economic diversification: (C\$146 million). This segment of the program will be administered by the Atlantic Canada Opportunities Agency. Key components include funds for the development and marketing of undertutilized fishery species, the promotion of new, nonfishery industries, and research into improving product quality.

The remaining components of the adjustment program, totaling C\$158 million, had been announced previously by Ottawa. In April 1990, Atlantic Airways of St. Johns, Newfoundland, was awarded a C\$28-million contract to provide aerial surveillance of Canada’s 200-mile limit. The balance of C\$130 million will go to seven Atlantic fishery communities, three towns in Nova Scotia, and four in Newfoundland which have been hard-hit by closures of fish-processing plants. These funds will be used for retraining laid-off workers and for community development.

Valcourt acknowledged that the aid package will not solve the industry’s problems overnight. He told reporters that the program is not a quick fix to the current crisis, but represented the diffi-

cult first step towards the revitalization of the Canadian Atlantic fisheries. He said that the package will pull the industry back on its feet by giving it stability and direction for long-term growth and development. According to the Minister, despite the additional funding to help fishery workers, the industry will have to be scaled back and not be used to maximize job availability as in the past. While Valcourt hopes the action plan will bring much needed stability to the troubled industry, others are not so optimistic. Most fishermen are taking a dim view of their future since another focus of the adjustment package will be a reduction in the number of Atlantic Canadians who make their living from the fishing industry.

Ottawa’s blueprint for a streamlined fishery received a generally negative reaction from community leaders, fishermen, and politicians. There were critical comparisons of the aid package to the C\$1 billion that Ottawa gave drought-stricken western grain farmers in 1988. Others connected to the fishery are pondering how the extra funding to diversify the economy will help their communities. Towns like Canso, Nova Scotia, one of several towns that have been devastated by the downturn in the industry, have been trying for the past 10 years to attract new development to no avail. In addition, some older laid-off workers are pessimistic that the funds for retraining will be of use to them, since there are no jobs, other than in the fishery in isolated outposts like Grand Bank, Newfoundland. Others say that they have worked in the fishery too long to learn new skills.

Canadian union leaders also expressed their apprehensions. Larry Wark, regional representative of the Canadian Auto Workers Union (CAW) voiced his concern over the government’s intention

to reduce the number of workers in the industry. Wark fears that when the cyclical fishery eventually rebounds, there will be too few fishermen and too few processing plants. His union colleague, Rick Cashin, President of the CAW-affiliated Newfoundland Fishermen’s Union, however, took a different view. Cashin echoed Valcourt’s sentiments on the need for scaling back the industry, saying that there have been too many people who have turned to the fishing industry as a means of getting social benefits to the detriment of those who have been in the industry over the long-term.

Regional politicians also criticized the aid program. Newfoundland Premier Clyde Wells said that there was not enough money for economic development, or income support for fishery workers. Nova Scotia Premier John Buchanan expressed his disappointment with the package since he was looking for more funds for economic diversification. While, at first glance, most seemed disappointed with the aid deal, others are waiting to find out the exact details of the various programs before voicing their reaction. Many connected the fishery seemed ready with their criticism the instant the aid package was announced. Expectations for the package were high, perhaps unrealistically so. Given comments made by the industry and politicians before the announcement, it is unlikely that any assistance provided by the government would have been acceptable. The bottom line is that most fishermen in Atlantic Canada want the fishery to be like it was 3 years ago (when it was prosperous), while the Federal Government believes that change is essential if the industry is to survive. (Source: IFR-90/31.)