

*Devaluation can mean more dollars for the U.S. fisherman, opening up expanded world markets.*

## Export Opportunities for U.S. Fishery Products

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### INTRODUCTION

Strong and growing world demand for fishery products and the recent favorable realignment of international currencies, from a U.S. viewpoint, combine to create attractive export opportunities for U.S. fishery products. This means expected growth for the traditional items on our export list and, too, an expanded opportunity for the exporting of fishery products derived from underutilized species, that is, species not traded in the U.S. domestic markets to a large degree.

The export possibilities for U.S. seafood products have been expanding considerably. Economic growth and rising incomes worldwide have sparked a growing demand for seafood products, particularly in the industrialized nations. Traditional sources of supply have been hard put to keep pace with

Table 1.—Percentage changes in value of key foreign currencies in relation to United States dollar.

Country	4/1/71 to 12/31/71	3/1/71 to 2/28/73
Japan	+ 16.9	+ 36.8
West Germany	+ 13.6	+ 26.2
France	+ 8.6	+ 20.6
Denmark	+ 7.5	+ 19.4
Norway	+ 7.5	+ 19.4
Sweden	+ 7.5	+ 13.5
Italy	+ 7.5	+ 11.2
United Kingdom	+ 8.6	+ 3.8
Canada	+ 0.8	+ 1.4
Iceland	0.0	0.0
Mexico	0.0	0.0

Source: International Trade Analysis Staff, Bureau of International Commerce, as of April 17, 1973.

the rising demand and buyers are actively searching world markets for new sources. International currency realignments, over the past 14 months, have lowered U.S. prices abroad and have made U.S. products more attractive to many foreign buyers. Table 1 indicates the change in the values of currencies, relative to the dollar, for major nations that have trade with the U.S. in fishery products.

### JAPAN'S IMPORTS OF FISHERY PRODUCTS INCREASING

Increasing demand for fishery products has been especially strong in Japan. The average Japanese urban household spends about \$1.60 for fishery products for each \$1.00 spent for beef, pork, and chicken combined. During 1965-1970 expenditures for fishery products per urban household in Japan rose from \$95 to \$148. The gain reflected higher prices more than a greater quantity consumed, but is nevertheless a clear indicator of increasing demand strength. Japan has been importing increasing quantities of fishery products from a dozen major sources, including the United States. In 1970, Japan's fishery products imports were valued at \$318 million, of which \$24 million was from the U.S. In the 1960-1970 period, imports of fishery products into Japan increased

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at an average yearly rate in excess of 35 percent.

### HEAVIER DEMAND AND IMPORTS IN EUROPE

Throughout Europe demand for seafoods has been rising. It has been particularly strong in the Mediterranean countries. In Italy, for example, consumption of frozen fish rose 18 percent over the 3-year period, 1969 to 1971. During the 1960's consumption of fishery products in Spain doubled and it increased more than 50 percent in Greece during the same period. It is notable that increases in seafood imports have supported gains in consumption in many of the European nations, as can be seen from Table 2.

Table 2.—Imports of fresh and frozen fish (1,000 metric tons).

Country	1960	1969	1970
France	33.2	86.2	n.a.
Italy	66.1	100.8	n.a.
Spain	1.5	n.a.	32.7

### SLOWER GROWTH IN WORLD CATCHES

Concurrent with the growing world demand, catches of fish for human consumption have tapered off. In the 1950's world catches increased by 5.6 percent per year. In the 1960's the rate of increase dropped to 3.1 percent per year.

### OPPORTUNITIES TO EXPAND ESTABLISHED MARKETS

The U.S. exported \$158 million in fishery products during 1972. Shrimp, salmon, and fish oils were the three major categories, accounting for slightly more than two-thirds of this total. However, the remaining third of our exports included many fresh and frozen, dried, salted, and canned products.



**Table 3.—Selected United States exports.**

Fish products	1966		1972		% Change	
	(1,000 lb.)	(1,000 dol.)	(1,000 lb.)	(1,000 dol.)	Volume	Value
Salmon						
Fresh/frozen	19,845	10,625	34,685	28,451	+ 74.8	+ 167.8
Canned	20,484	14,561	21,358	20,899	+ 4.3	+ 43.5
Shrimp (all)	9,406	10,238	37,434	41,126	+ 297.9	+ 301.7
Fish oil	77,255	7,401	193,198	15,275	+ 150.1	+ 106.4

U.S. exports of fishery products have increased considerably in the past decade. The trend shows that between 1962 and 1972, poundage of edible fishery products exports increased about 11 percent per year, while the annual trend increase for imports was 6 percent. Value wise, the trends in U.S. fishery products exports and imports, increased respectively at annual rates of 13 percent and 11 percent. The performance of major items since the mid-1960's is shown in Table 3.

### Fresh and Frozen Salmon

A strong market for frozen salmon exists in Europe, and U.S. exporters have been aiming at it. The United Kingdom and other common market countries receive about 56 percent of the U.S. shipments of frozen salmon. Formerly, the U.K. alone accounted for nearly half the amount exported to Europe but in recent years the market has widened (Table 4).

**Table 4.—United States exports: fresh/frozen salmon (thousand pounds).**

Exports to	1966	1972
United Kingdom	5,163	6,232
% of total	26%	18%
European		
Economic Community <sup>1</sup>	5,611	13,042
% of total	28%	38%
All other countries	9,071	15,411
% of total	45.7%	44.4%
Total	19,845	34,685

<sup>1</sup>Exclusive of United Kingdom.

Realignment of currencies has given impetus to market expansion. Exports to France and Sweden especially jumped in 1972, an event attributable, at least in part, to the realignment in December, 1971. The value of Swedish krona increased 7.5 percent and French franc 8.6 percent in terms of U.S. dollars.

The February 1973 devaluation of the dollar appreciated the Swedish krona an additional 5.5 percent and the French franc 11.0 percent in terms of dollars, thus tending to make U.S. exports to these countries correspondingly cheaper.

It is interesting to note that France, in 1971, increased her total imports of all fresh and frozen fish by 32 percent—and that most of this increase was the result of shipments from countries outside the European Economic Community.

### Canned Salmon

U.S. exports of canned salmon (Figure 1) in 1972 increased 17 percent over the previous year. Over half of our exports of canned salmon go to the United Kingdom, but there are other significant markets elsewhere (Table 5).

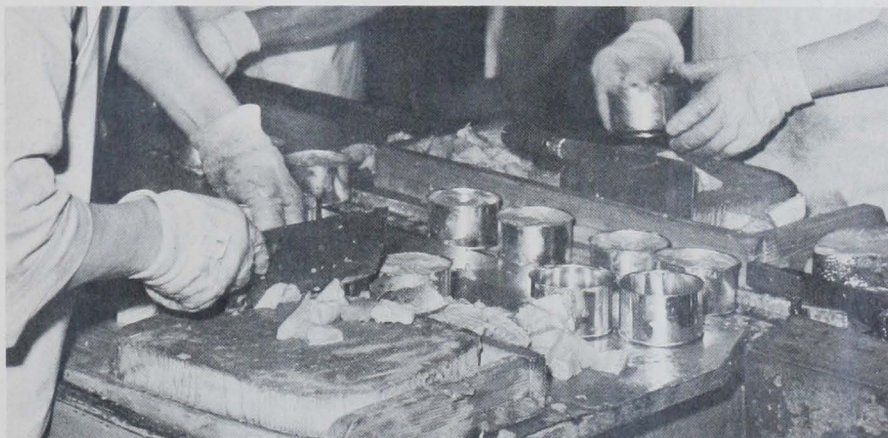
Exports of canned salmon to the U.K.

increased significantly in 1972—to 15.8 million pounds, from 10.4 million in 1971. A link between this gain and the currency realignment of 1971 is highly probable. The value of the British pound sterling appreciated 8.6 percent in December 1970, in terms of the dollar. The February devaluation of the U.S. dollar could further encourage U.K. purchases of canned salmon from the U.S., although much of the incentive will be washed out by higher import duties in the U.K. following U.K.'s entry into the common market. There

**Table 5.—United States canned salmon exports (thousand pounds).**

Exports to	1971	1972
United Kingdom	10,364.0	15,831.7
Canada	3,496.3	1,927.3
Netherlands	1,964.1	1,387.3
Australia	575.0	666.4
Japan	209.7	511.8
France	147.1	118.1
Denmark	29.4	5.3
Other	1,446.4	910.0
Total	18,232.4	21,358.1

is a plus side, however, Canada will no longer receive preferential treatment from the U.K., thus eliminating that country's former competitive advantage over the U.S. in trade with U.K. Also, the Japanese will likely take a smaller share of the United Kingdom market as a result of the recent appreciation of the yen in relation to the dollar (over 13 percent).



**Figure 1.—Canned salmon accounted for about one-seventh of the U.S. fishery products exports (by value) in 1972. Over half went to the United Kingdom, but other markets in Europe and Asia are opening up. Above, cans are being packed with salmon preparatory to cooking.**





Figure 2.—Shrimp ranks second to salmon in U.S. fishery exports. There is a growing market abroad for the northern shrimp, such as those taken in New England, shown here.

## Shrimp

Shrimp ranked second to salmon in importance as a U.S. fishery export. Shipments in 1972 amounted to 29 million pounds, valued at \$32 million. Exports declined slightly in 1972 from the previous year, as greater quantities were absorbed in a growingly attractive domestic market. There are bright prospects, however, for further development of export markets for northern and Alaskan shrimp (Figures 2 and 3). These varieties closely resemble their European-originated counterparts, and are highly acceptable in European markets. At the same time, they are generally less preferred than the larger southern shrimp in U.S. markets.

Six countries accounted for nearly all the U.S. shrimp exports in 1972.

Trade between the United States and the two major foreign purchasers of U.S. shrimp, Canada and Mexico, has



Figure 3.—Pandalid shrimp such as those taken in New England and off Alaska meet a readier acceptance in foreign markets than do the big shrimp from the Gulf of Mexico preferred in the United States. These Alaskan fishermen are bringing their day's catch to the plant for processing.





Figure 4.—Exports of salmon roe to Japan declined about 28 percent in 1972, owing to an exceptionally low catch of salmon. Here salmon roe are being packed for shipment to Japan.

not been directly affected by currency realignment. Exchange rates between the Canadian dollar and the U.S. dollar have remained practically unchanged, as have the exchange rates between the U.S. dollar and the Mexican peso.

in 1972. Similarly, Japanese imports of Pacific herring roe (Figures 5 and 6) from the United States declined as a result of lighter U.S. production (Table 7).

Table 6.—Countries accounting for nearly all of the United States shrimp exports in 1972.

Country	Shipments	
	(1,000 lb.)	(1,000 dol.)
Mexico	10,072	8,329
Canada	7,748	10,137
Sweden	4,096	4,062
Japan	2,625	4,284
United Kingdom	1,977	2,378
Denmark	1,126	1,281

## Fish Roe

Japan imports sizeable quantities of fish roe. Formerly the bulk of Japan's imports of this item were from the U.S. In the wake of some U.S. supply problems, Japan has added roe supplies from North Korea and the USSR. U.S. exports of salmon roe (Figure 4) to Japan declined in 1972 to 3 million pounds from 4.2 million pounds in 1971. This was due mainly to an exceptionally low catch of salmon in the United States

Table 7.—Japanese imports of fish roe 1970-1972 (thousand pounds).

Country	1970	1971	1972
From United States	4,350.1	4,731.6	3,554.1
From other countries	3,120.0	3,937.0	11,605.6
Total	7,470.1	8,668.6	15,159.7

## POTENTIAL FOR EXPORTING NEW PRODUCTS

Untapped and relatively abundant fishery resources provide a bright spot for expanded opportunities available to U.S. fishermen. These "underutilized" species consist largely of varieties of seafoods that have not attracted a large following among U.S. consumers—for example, squid, croaker, mullet, mussels, among others. This is not to say that these would be shunned by U.S. consumers, if concerted marketing efforts were launched. Probably most would be accepted. On the other hand, there are ready markets for many of these species overseas and, therefore, these species do represent a rather high export potential, one that recently has been made even more attractive by the favorable climate for U.S. goods produced by the dollar devaluation.

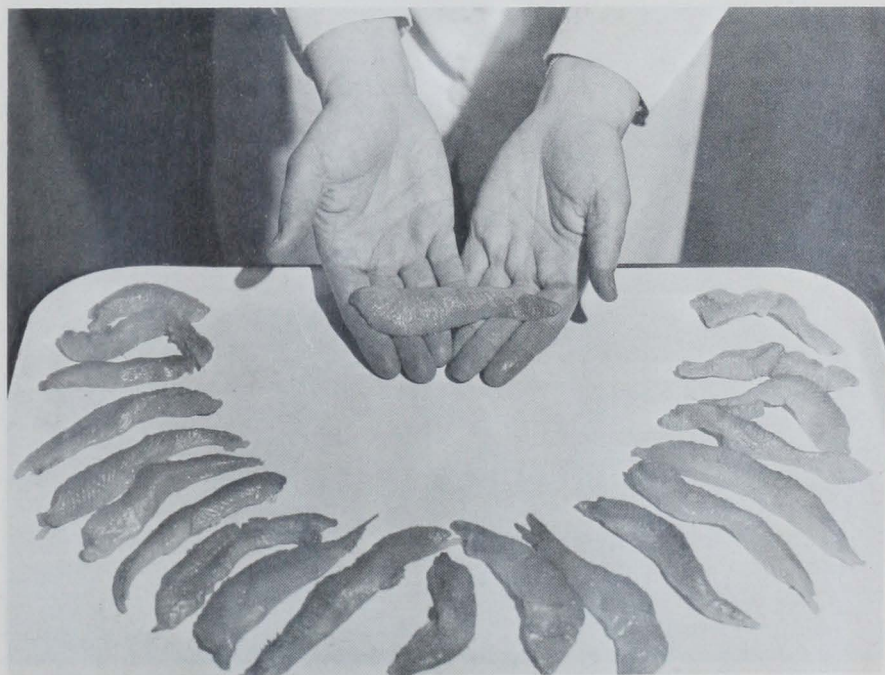


Figure 5.—Alaska's herring roe is a prized delicacy in Japan, bringing several dollars a pound.



Examination of Japanese fish consumption data, for example, reveals that some of the major species are on the list of U.S. underutilized species (Table 8).

Table 8.—Average consumption per household in Japan, in value (yen) of fresh and frozen fishery products, 1970.

Fish products	Household	
	Urban	Farm
All fresh and frozen	27,485	23,289
Squid, cuttlefish	2,530	2,878
Jack mackerel	1,439	1,478
Sea bream	1,079	742
Saury	555	576
Cod, Alaska pollock	375	599

### Squid, Fresh and Frozen

Squid are found in most areas of U.S. fishery activity, but a sizeable fishery exists only off southern Cali-

fornia. The U.S. squid catch in 1970 amounted to about 27 million pounds (live weight), and over 90 percent of this total was landed in California. The potential catch, in California and other areas, is many times the present catch level. Squid has been classified as "much underutilized" among principal resources of the California fishermen (Ahlstrom, 1968). The State of California Department of Fish and Game also states that "the squid resource is underharvested," and that "the fishery is being conducted in only a small segment of this species range. Because these animals are short lived, there can be a more intensive harvesting of standing crop than in the case of long lived animals" (Frey, 1971).

The estimated potential of squid off the U.S. East Coast is above 200 million pounds, as compared with ac-

tual landings of only about 2 million pounds (Gulland, 1971).

The technology used in other food processing operations is adaptable to processing most types of squid. However, a potential drawback for production exists with one of the squid available to U.S. fishermen on the Atlantic coast (*Loligo pealii*). This variety has a "quill" which must be removed—presently through a manual operation.

There is only a limited market for squid in the U.S. as a food item. Principal consumers are among certain ethnic groups and gourmets. A substantial portion of the U.S. catch is sold as bait.

Abroad, there are potentially large markets for squid, particularly in Mediterranean countries. The U.S. now exports about 10 million pounds of squid annually, principally to Greece and the Philippines. The item is relatively inexpensive, worth about 13.4 cents per pound (f.a.s.). Total shipments were valued at \$1.4 million in 1972.

At present, Japanese fishermen take squid off New England for sale in Italy, where it brings as much as 50 cents per pound for frozen squid at wholesale.<sup>1</sup> Greece is also a good potential market for U.S. squid. Imports of frozen squid in Greece went from 762 tons in 1967 to 1,206 tons in 1970. Greece also imports canned squid—2,680 tons in 1970. Devaluation should improve our trading position in this product.

### Atlantic Herring

Within the last 5 years U.S. exporters have built a modest trade in herring fillets in European markets, mainly West Germany. Herring products are in high demand throughout Europe. Herring landings in Gloucester, Massachusetts, have jumped to 40 million pounds to supply the export market. The export potential for herring fillets, however, has been only partially realized. Herring imported by West Ger-



Figure 6.—Japan is the sole buyer of U.S. herring roe. Exports declined in 1972, as a result of lighter U.S. production.

<sup>1</sup>Japanese activity was centered on Georges Bank (about 150 miles offshore) in late 1972.



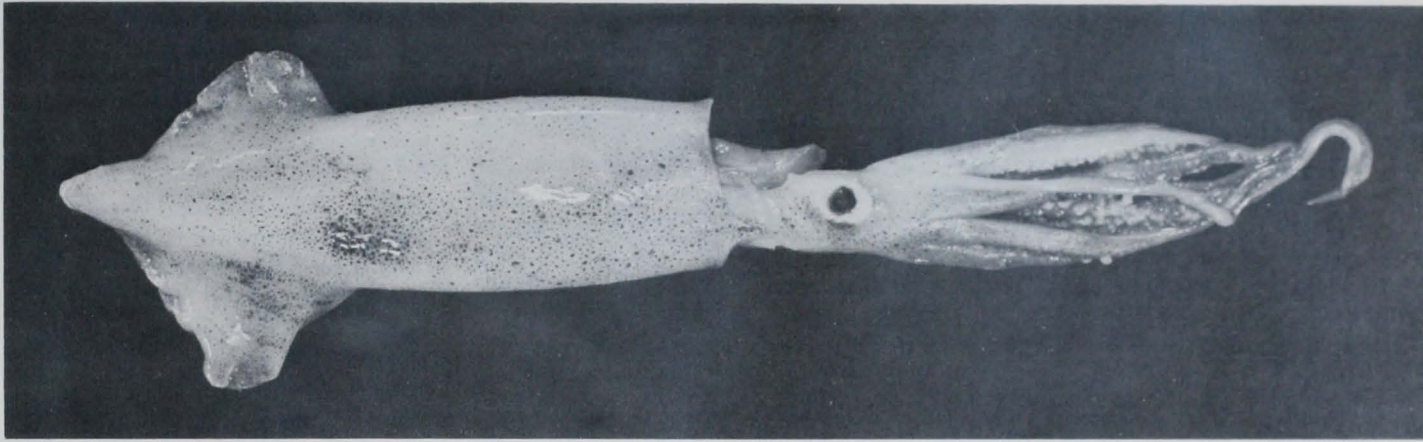


Figure 7.—Largely unappreciated in the U.S., squid is in substantial demand both in Europe and Asia. The only substantial U.S. fishery is in California. It is believed that the catch could be greatly increased. The estimated potential off the East Coast is more than 100 times present catches.

many and Belgium in 1971 from all sources is shown in Table 9.

There is heavy fishing for herring in the Northwest Atlantic, and stocks are probably fully exploited. A measure of control on stocks has been established by international agreement through a quota system which allots the United States about 25,000 metric tons (55 million pounds) for the Gulf of Maine and Georges Bank areas. It is in the U.S. interest to continue to pursue this quota.

Table 9.—Herring imported by West Germany and Belgium from all sources in 1971.

Country	(1,000 lb.)	(1,000 dol.)
Belgium	31,442	6,642
West Germany	287,977	50,734

In the European fisheries of the Northeast Atlantic, herring stocks have shown great fluctuations over the several centuries they have been fished. Apparently, exploitation rates on these stocks are presently heavy, which reduces the likelihood of increased catches from these areas to satisfy increasing demand on the Continent for herring products (Gulland, 1971).

### Mullet and Other Roes

In recent months, the Japanese have been purchasing trial shipments of roe from suppliers in the U.S. Gulf area.

Fish roe from a large number of species are a highly desired item in Japan. As a specialty product, they command high prices. Japanese consumption of roe is increasing steadily. Japan presently takes all herring roe produced in Alaska and the majority of salmon roe from Alaska and the Pacific Northwest.

Recently, whole Florida mullet has been sold to Japan. In Japan the mullet roe was to be removed and processed. Although the Japanese use exacting methods for the processing and preservation of fish roes, there is no reason to believe that our Gulf of Mexico industry could not implement these techniques. Export values could triple if the finished product was manufactured in the United States rather than selling the raw material to Japan and letting the value be added there.

A realistic figure for potential mullet roe sales in Japan, by U.S. suppliers would be in the order of about 100 tons per year. At current prices in Japan, this would be worth about \$360,000 per year in U.S. sales. This would be a boon to the domestic mullet fishery, because it would represent considerable upgrading in the utilization of the mullet catch. About 1 million pounds of raw whole mullet would be converted into a product worth the equivalent of about 36 cents per raw, whole pound. Presently, mullet processed for the U.S. market has an average value of 17

cents per pound in terms of raw, whole fish.

There are some important technological considerations that must be taken into account in development work in the mullet fishery. Extraction of mullet roe, for example, requires a special knife and a certain amount of dexterity which is being adapted from existing Japanese production methods. Product specifications adhering to Japanese market requirements are being examined by an NMFS team from the Southeast Region.

The marketability of mullet flesh has been impeded by the occurrence of rancidity which develops during storage. Sea Grant in conjunction with the University of Florida is currently trying to develop a rancidity retardant.

### Croaker Surimi

Surimi is ground or minced fish flesh from which the Japanese make a variety of specialty products such as fish sausages and fish pastes. Demand has been increasing sharply for surimi in Japan and this has put a strain on production. The texture of croaker flesh is preferred over all other species in surimi, but Japanese croaker production has reached a peak. In order to satisfy demand, the Japanese have turned to Alaska pollock as a source of surimi,



and to retain some of the croaker texture, surimi has been mixed in a ratio of 80 percent pollock and 20 percent croaker. However, this blending has not satisfied the delicate seafood taste of many Japanese consumers. The difference in demand is illustrated by the fact that pollock surimi sells for 25 cents per pound while croaker surimi goes for 48-50 cents per pound. The size of the Japanese market for surimi and similar products is huge. In 1970 the Japanese consumed over 2 billion pounds of processed "kneaded" products—which include fish sausage, etc. For this, consumers paid an average of 32 cents per pound—for an aggregate value of over \$640 million.

Croakers are concentrated in the Gulf of Mexico, which provides about 90 percent of the U.S. catch of this species. United States croaker landings in 1971 were about 12 million pounds for human food, and 58 million pounds for industrial use—mostly pet foods.

Moves are being made to divert more of this production into higher valued products for human consumption in domestic markets. For example, croaker has been used in the development of a fish-cake product; this has not quite hurdled all the technological barriers that stand in the way of marketing success, however. Surimi development, for the Japanese market, appears to be a more promising activity at this time. In any case, the resource is so abundant that serious recommendations have been made to develop this as a high-volume, low-priced, industrial fishery. A large amount—probably 400 million pounds or more—is now being demonstrably wasted through being discarded by shrimp fishermen from their trawler operations.

Basic technology for producing croaker surimi in the U.S. is available, although exacting Japanese product specifications (flavor, color, texture,

etc.) may be difficult to meet. NMFS personnel in the Southeast Region are examining these problems.

## Eels

Small shipments of eels from the U.S. are going to Europe. In Italy eels bring 30 cents per pound at wholesale. Eels are little used in the United States, although the resources are substantial. There are export possibilities for both live eels and frozen products. United States landings of eels amount to about 2 million pounds per year—with a landed value of about \$400,000. The potential catch is not known, but it is undoubtedly considerably greater than at present.

Technological problems with this product are mostly present in developing an acceptable product for Japanese markets. Cultured eels, sold alive, are preferred in Japan and U.S. eel culture does not yet exist. European product standards are less rigorous but lack of knowledge on eels is a major obstacle. NMFS and the states of North Carolina and Florida are examining approaches to European and Japanese markets.

## Silver Hake and Pacific Hake

The silver hake (called whiting in New England) resource off New England is being utilized heavily by foreign fleets, U.S. effort is also substantial, with probable room for expansion. The silver hake fishery in ICNAF subarea 5 (New England and Georges Bank) may be able to sustain an annual catch in the order of 660-880 million pounds. The average annual quantity extracted from this fishery over a recent 5-year period (1965-1969) was about 332 million pounds (Gulland, 1971).

The Pacific hake resource extends along the Canadian/U.S. coast between Queen Charlotte Sound in Canada and Baja California. Only the Soviets operate in this fishery in earnest, although its maximum sustainable



Figure 8.—Pacific hake caught by U.S. fishermen is primarily used for the production of pet food. There is a sizable traditional market for hake as a food fish in most Mediterranean countries, where it is known as a choice fish.



yield is estimated at 210,000 metric tons per year (FAO, 1972).

U.S. fishing for Pacific hake is currently limited to a Puget Sound fishery that is geared to pet food production. The species has characteristically soft flesh but, unlike silver hake, an organism frequently occurs in Pacific hake which causes a protein breakdown and consequent further softening of the flesh during storage. Pacific hake, nonetheless, is highly edible, although there are technological problems with regard to processing hake for human food. There is a sizeable traditional market for hake in most Mediterranean countries where it is known as a choice fish.

The two currency devaluations may provide the price advantage needed for the United States to compete in European markets. Frozen h. & g. (headed and gutted) silver hake, for example, produced in New England, sells (wholesale) in the range of 25 cents to 35 cents per pound, depending on package size, f.o.b. Boston area. This item has been bringing about 22 cents to 29 cents per pound in Italy, and the U.S. product has not been competitive. The "devalued" price, however, will be more attractive. Also, in Italy, there is a strong demand for fresh hake, at prices up to \$1.09 per pound, which appears high enough to warrant absorbing air transportation costs. In addition to Italy, silver hake are regularly sold in markets in the U.K. and West Germany. Spanish interests now appear eager to find new sources of supplies to satisfy growing demand in their country, and have been looking into the possibilities for establishing connections with suppliers of Pacific hake.

### Atlantic Mackerel

Mackerel stocks in the Northwest Atlantic are being regulated through a quota system, under ICNAF. The potential yield for mackerel in this area is estimated at above 600 million pounds annually. ICNAF data indicate a sharp upturn in effort in this fishery over the last few years, and



Figure 9.—Worker cracks California sea urchins so that the valuable roe can be extracted. There are large foreign markets for sea urchin roe.

high catches have approached (some say, have gone over) the limit of the estimated potential, although catches have fluctuated. The U.S. participation in this fishery is practically nil. Mackerel was formerly one of the leading species landed by New England fishermen. The peak years were during 1820-1880 when yearly landings were in the order of 90 to 170 million pounds, and again in the 1940's when landings ranged from 50 to 60 million pounds. Subsequently, the schools of mackerel disappeared from known areas and the U.S. catch dwindled to about 2 to 3 million pounds. Apparently, the mackerel are now available, but the years of absence practically destroyed their marketability in the U.S. Present U.S. catches average about 8 million pounds per year. The U.S. quota for 1973 is 26,000 tons (57 million pounds).

Atlantic mackerel represent an export opportunity, although the benefits of devaluation in this case are not so clear. There are established markets for mackerel in major European countries at relatively low prices. Whole, frozen mackerel brings in the range of

10 cents to 20 cents per pound in European markets. This would be a difficult range to compete with for U.S. producers, but the disadvantage could be overcome by marketing the species in a different product form.

### Mussels

Mussels are excellent food and are consumed in large quantities in Europe and other parts of the world. The U.S. is an exception, however. Despite the existence of sizeable resources, the U.S. harvest is extremely modest. In meat weight, the U.S. catch runs about 1 million pounds, with an average value of about 10 cents per pound. This low price reflects the relatively weak demand in the U.S. for mussels, compared with other shellfish.

Spain and France, in Europe, are heavy importers of mussels—several millions of dollars worth yearly. The price per pound is not overly attractive, at present, in terms of probable U.S. production costs and considering transportation costs from the U.S. A different product form, canned or frozen, for example, might be introduced into



these European markets and receive a favorable reception wherever mussels in some form are a traditional food.

## Sea Urchin

Sea urchins constitute one of the brighter prospects for underutilized fisheries development. There is a large, although undetermined, population of sea urchins off California and on the Atlantic coast. The development of a sea urchin fishery in southern California is particularly logical. The harmful effects of sea urchins to the marine communities call for a reduction in their numbers. Further, a large market is available in Japan, and possibly in Europe and the U.S. as well. Small-scale fisheries for sea urchins have sprung up sporadically in California and have existed for many years in Maine. However, no attempt had been made to initiate a large-scale fishery for the domestic markets or to develop an export trade.

Recently NMFS has taken a leading role in helping to develop a fishery. NMFS personnel taught potential suppliers how to process the roe, helped obtain preliminary data on processing

costs, supplied samples of the product to potential buyers, and brought sellers and buyers (predominantly Japanese) together. Since October, 1972, approximately 25,000 pounds of sea urchin roe have been shipped by airfreight to Japan from California. Two new roe processing plants are planned in California.

Japan now consumes about 2.6 million pounds of sea urchin roe per year. Given the growing Japanese demand for roe, they would be highly receptive to a new source of supply of sea urchin roe. Prices in the Japanese market are attractive. Sea urchin roe now brings about \$2.25 per pound and up. A modest harvest in the U.S.—in the order of 4 to 5 million pounds of sea urchin—could develop into a million dollars plus in export sales.

Canada is now exporting sea urchin roe to Japan, and since October, 1972, Canada has shipped 20,000 pounds of roe and 36,000 pounds of live sea urchins to Japan. Other suppliers include Mexico, Chile, and possibly, in the near future, the Peoples Republic of China.

Harvesting and extracting sea urchin roe is a manual operation. No other technological restraints appear to exist and product requirements for Japanese market have been developed.

## Alaska Pollock

Alaska pollock represent one of the most abundant of the world's commercial fishery resources. Much of this resource is in waters adjacent to Alaska. U.S. fishermen, however, have not sought Alaska pollock in any great degree, and almost the entire catch throughout the northern perimeter of the Pacific Ocean has been taken chiefly by the Japanese, the Soviets and Koreans.

The non-U.S. fishing pressure on the pollock resource is heavy, although scientists believe that the pollock resource in the Gulf of Alaska is virtually untapped (Alton and Nicholl, 1973). It is estimated that the Gulf of Alaska would sustain a catch of about 25,000 metric tons yearly (55 million pounds).

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