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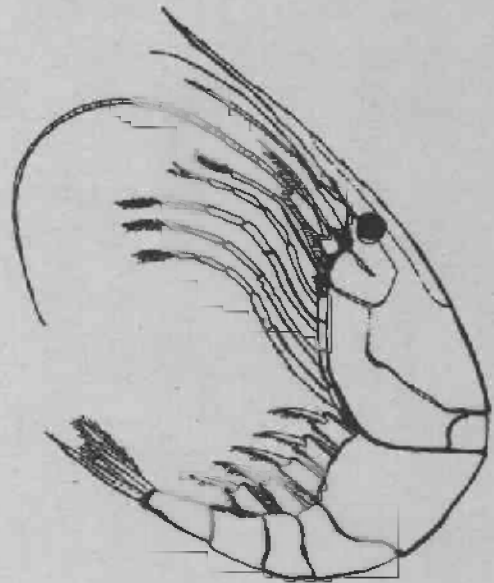
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MARKETING CHARACTERISTICS of Oregon's fresh frozen SHRIMP INDUSTRY

R. D. Langmo
C. N. Carter
R. O. Bailey



OREGON STATE UNIVERSITY
SEA GRANT COLLEGE PROGRAM
Publication no. ORESU-T-75-002

AGRICULTURAL EXPERIMENT STATION
Special Report no. 440

AUGUST 1975



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abstract

This work consolidates from many sources features of the fresh frozen shrimp industry in terms of its product volume, value, growth trends and position relative to other Oregon sea-food commodities. Market structure and functions are described as the product moves from the fisherman through the processor, broker, wholesaler and retailer to the consumer. There is brief speculation on needs for future studies of marketing.

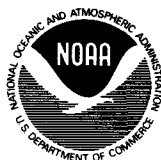
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acknowledgment



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related publications

A DEMAND ANALYSIS FOR CANNED RED (SCKEYE) SALMON AT WHOLESALB, by Richard S. Johnston and W. Robert Wood. Publication no. T-74-001. 36 pp.

This progress report briefly explores the production and consumption of Pacific Coast salmon, canned salmon market structure, and earlier work concerning demand for canned salmon. The report centers on the presentation of a new econometric model, developed to estimate the parameters of postulated demand relationships; results of the statistical analysis are also related.

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introduction

The intent of this Sea Grant report is to describe some aspects of the marketing structure for the Oregon fresh-frozen shrimp industry. An understanding of the market structure will be relevant to specific studies that may follow in areas of packaging, distribution, and retail sales.

Shrimp caught along the Pacific Coast are members of the genus *Pandalus*. The species of commercial importance in Oregon is *Pandalus jordani*. These small pink shrimp are used in such dishes as the shrimp cocktail, shrimp louis, and as a garnish in other recipes. In contrast, the larger shrimp of the genus *Penaeus*, found on the Gulf Coast and imported from the South Pacific, are used in making such things as breaded prawns.

Substantial landings of the small Pacific shrimp are made in Alaska, British Columbia, Washington, and California, as well as in Oregon. The catches have tended to increase since the late 1950s. Table 1 shows annual landings, by state and province, since 1957. Unusually large catches were made in Oregon in 1972 and 1973. Fig. 1 shows Oregon's landings for the period 1957-1973.

The catch of *P. jordani* along the Oregon-Washington-California coastline has increased substantially in 1972 and 1973, as can be seen from Table 1. It has been estimated that the potential annual catch of this species for the Oregon-Washington-California area is 33 million pounds [Cleary, 1969].

The shrimp fishing season runs from March through October, when most of the females are not carrying eggs. *P. jordani* are protandric hermaphrodites. They hatch as larvae in late March and early April. The larvae pass through a number of stages and become juveniles by autumn. Generally, they mature and function as males for much of the next two years of life, then change sex and function as females, and usually die after spawning at three to four years of age. Deviation from this pattern is

Table 1. Annual Landings of Shrimp by State, Province, and Pacific Coast

Year	Alaska	British Columbia	Washington	Oregon	California	Total
1957	2,380	1,598	2,384	404	1,423	8,189
1958	7,862	1,960	6,531	1,522	3,630	21,505
1959	13,052	1,039	2,943	2,764	2,162	21,960
1960	7,436	1,678	1,781	1,132	2,265	14,292
1961	15,981	944	1,437	1,456	2,434	22,252
1962	16,943	1,624	1,376	2,750	2,834	25,527
1963	15,127	1,788	956	3,115	2,243	23,229
1964	7,727	1,039	314	5,477	1,232	15,789
1965	16,819	1,750	23	1,748	1,436	21,776
1966	28,193	1,682	283	4,751	1,262	36,171
1967	41,813	1,696	1,089	10,374	1,488	56,460
1968	41,735	1,566	1,164	10,976	2,504	57,945
1969	47,851	2,119	1,425	10,505	3,092	64,992
1970	74,246	1,538	926	13,737	4,045	94,492
1971	94,891	735	678	9,291	3,075	108,670
1972	81,262	794	1,582	20,861	2,490	106,989
1973	116,718	na	na	24,100	na	na

SOURCE: Pacific Marine Fisheries Commission.

na = not available.

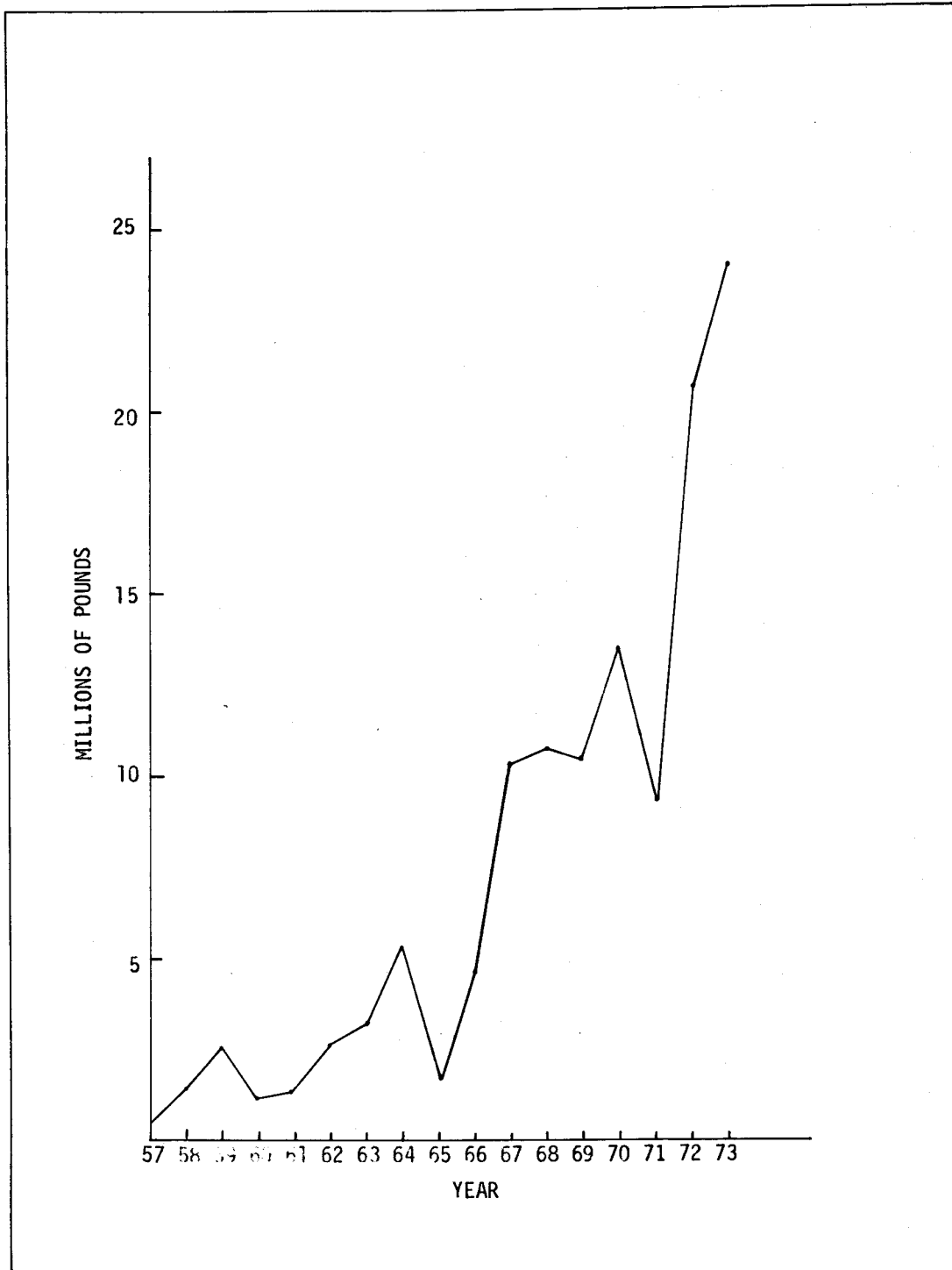


Fig. 1. Annual landings of shrimp in Oregon, 1957-73.

(Pacific Marine Fisheries Commission; Fish Commission of Oregon.)

not rare. During some periods large numbers of the shrimp function exclusively as females after the first year of life [Dahlstrom, 1973, pp. 55-59].

Variations in the length of life and growth rate have been noted along the coast. Oregon and Washington shrimp appear to grow more slowly than California shrimp but, in turn, they often live a year or more longer [Dahlstrom, 1973, p. 58].

These ocean creatures live near sandy, muddy areas of the Continental Shelf, and congregate in schools. Fishermen are able to make good catches, with very few other fish species intermingled, by daytime trawling. The shrimp caught range in age from six months to four years; however, those of marketable size are generally more than one year old. There are still many unknowns with respect to the shrimp life cycle, natural and fishing mortality factors, and the conditions necessary for a sustainable production of large quantities of this resource.

The shrimp produced in Alaska, *Pandalus borealis*, and those from Maine are of similar size to the Oregon shrimp and, hence, meet like consumption uses. The Alaskan catch has increased substantially, beginning about 1967, as can be seen from Table 1. In 1967, a treaty, creating a 9-mile contiguous fishery zone seaward of territorial waters, protected most of the Alaskan sea beds from Soviet and Japanese fleets which had been quite active in the area since 1961. This, plus improved processing techniques and increased domestic demand, was the main factor in the growth of the Alaskan catch. Quotas were set for several Alaskan areas in 1971 because of concern over possible depletion of the resource. A fishermen's strike, a shortened season, and fresh water shortages in the Kodiak area, prevented continued growth of the catch in 1972. However, 1973 was the best year to date.

The New England fishery, concentrated primarily in Maine, produced more than 24 million pounds of shrimp in 1972. The bulk of this catch is frozen and exported to Europe, particularly to the Scandinavian countries. Maine's shrimp season runs from late fall until spring. The interested reader may refer to a study, "Market Structure Analysis of the Maine Shrimp Industry", by Dunham and Stinson of the University of Maine at Orono [Dunham and Stinson, 1973].

The record catch of 24.1 million pounds for Oregon's 1973 season reflects the growing economic importance of the Oregon shrimp

resource. Fig. 2 shows the catch and the "ex-vessel" value of shrimp landings for the 5-year period, 1969-1973. The "ex-vessel" value is the gross amount of money paid to fishermen by processors for the freshly caught shrimp. Prices paid to fishermen have nearly doubled since 1969, indicative of a strong surge in foreign and domestic demand.

As shown by Fig. 3, the ex-vessel value of shrimp increased in 1973 to about 16 percent of the total ex-vessel value of Oregon commercial food fish landings. If yields on the order of the 1972-73 catch are sustainable, and if the demand for shrimp continues to be strong, shrimp will continue to hold an important place in the Oregon fishing industry.

Obviously, the ex-vessel value of Oregon shrimp is not a full measure of the value of this resource. Also included should be the returns to employees and entrepreneurs in the total marketing structure. The remainder of this paper provides insight into that portion of the marketing structure which leads from the docks to the delivery of Oregon shrimp in a fresh-frozen state for its final consumers. Note that the concern here is with cleaned shrimp packed in 5-pound cans and frozen which, for Oregon in 1974, made up nearly 54 percent of the total processed product. Of the remaining 46 percent of processed shrimp, about one-half is cooked, cleaned, packed in 5-pound cans, but not frozen, and is intended for immediate use. Another half is pressure-cooked in small cans and distributed with other canned grocery items.^{1/}

^{1/} SOURCE: National Marine Fisheries Services, U.S. Department of Commerce, Seattle, Washington.

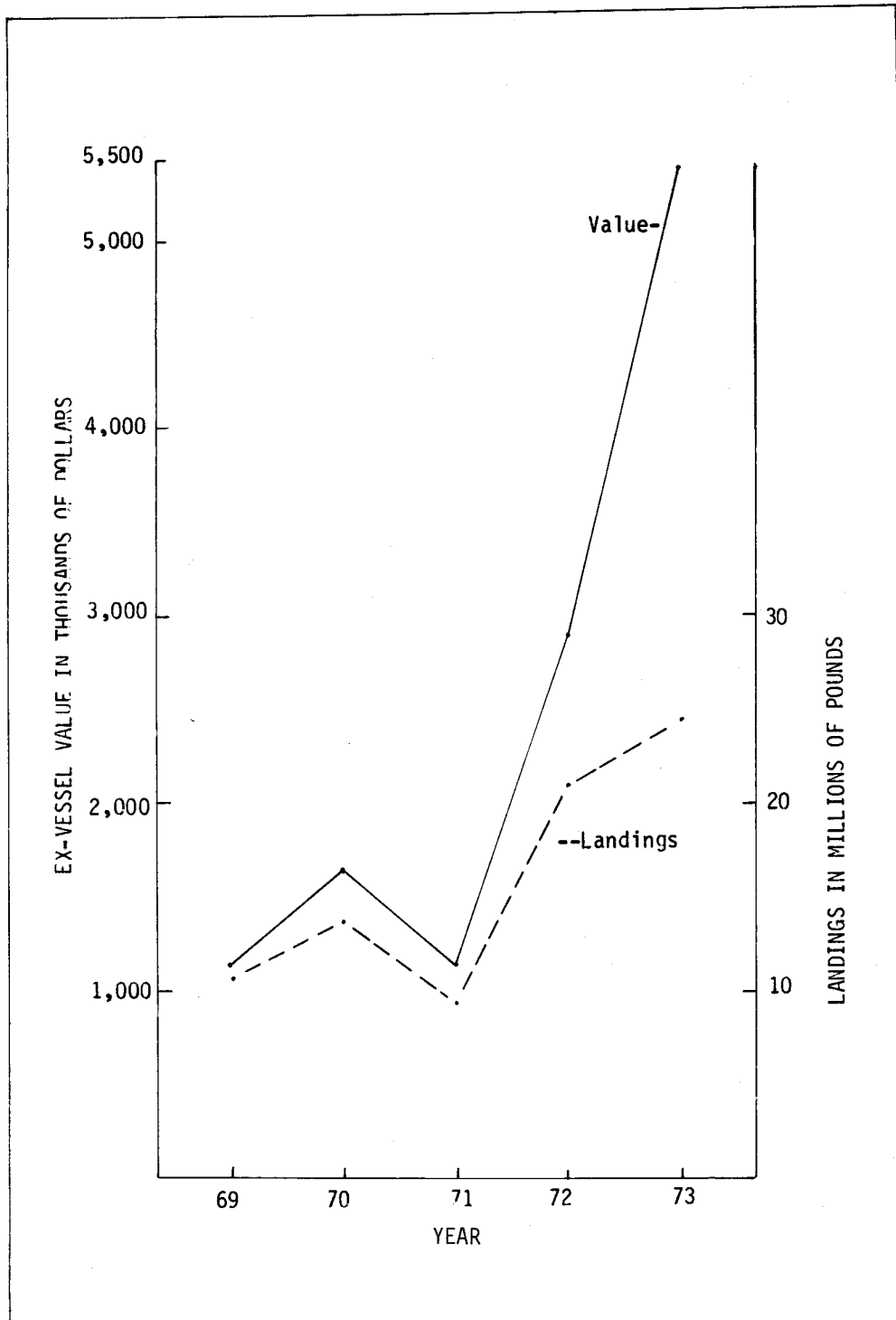


Fig. 2. Landings and ex-vessel value of Oregon shrimp, 1969-73.

(Fish Commission of Oregon.)

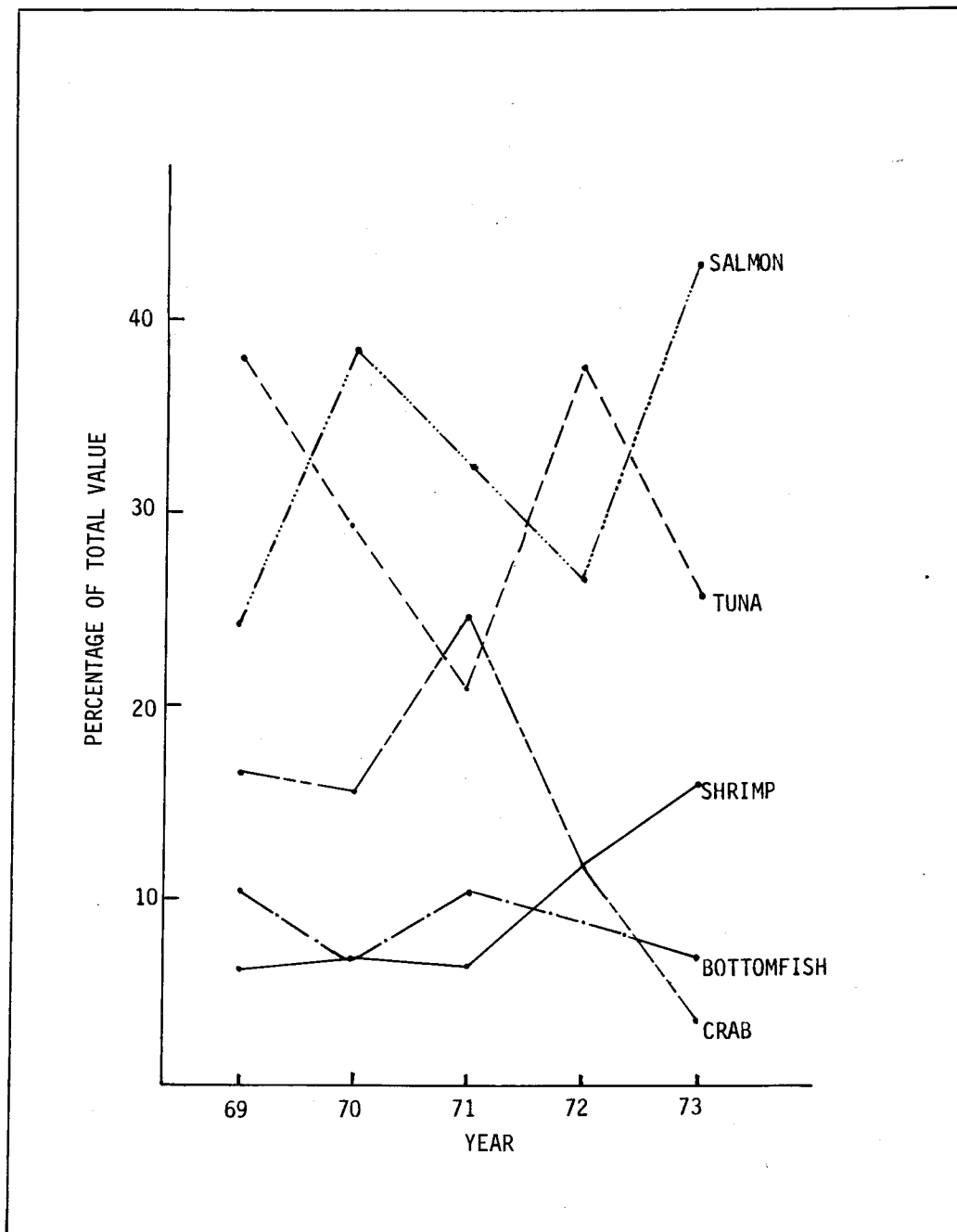


Fig. 3. Ex- vessel value of Oregon food fish products as a percentage of total ex-vessel value, 1969-73. (Fish Commission of Oregon.)

market structure

GENERAL CHARACTERISTICS

Numerous functions must be performed by any market structure. Functions for the distribution of Oregon shrimp, from the fishing enterprise to the final consumer, are similar to those for many other fishery products. It is not surprising, then, that Oregon shrimp is marketed by enterprises and through channels that are common to the total fresh and frozen fish industry on the Pacific Coast. For a good general study of this industry, see O'Rourke and DeLoach [1971].

The marketing structure can be viewed as having six divisions of activity: (1) fisherman; (2) processor; (3) broker; (4) wholesaler; (5) institutional user or retailer; and (6) consumer. The trade channels may be structured as in Fig. 4.

Approximately 10 to 15 percent of Oregon's fresh-frozen shrimp is consumed within the state. Research indicates that the single most important wholesaling center for this product is San Francisco. Lesser amounts of the product are wholesaled in Portland, Seattle, and Los Angeles. Sales to U.S. exporters and foreign importers take place through brokers and wholesalers in San Francisco and Seattle, or directly from larger primary producers whose sales staff may accomplish the broker's function.

The competitiveness of the market depends on the strength of consumer demand. During the 1972-73 and 1974 seasons, the market for Oregon fresh-frozen shrimp favored the seller because of a consistently strong demand for the product. There was conflicting opinion expressed by producers, brokers, wholesalers, and independent retailers as to whether the Oregon frozen shrimp was superior to frozen shrimp from Alaska and Maine. Each producer packs shrimp under at least five different labels. It is in this sense that product differentiation may be made. However, since the final consumer buys repacked trays of several ounces, and rarely sees the 5-pound institutional pack,

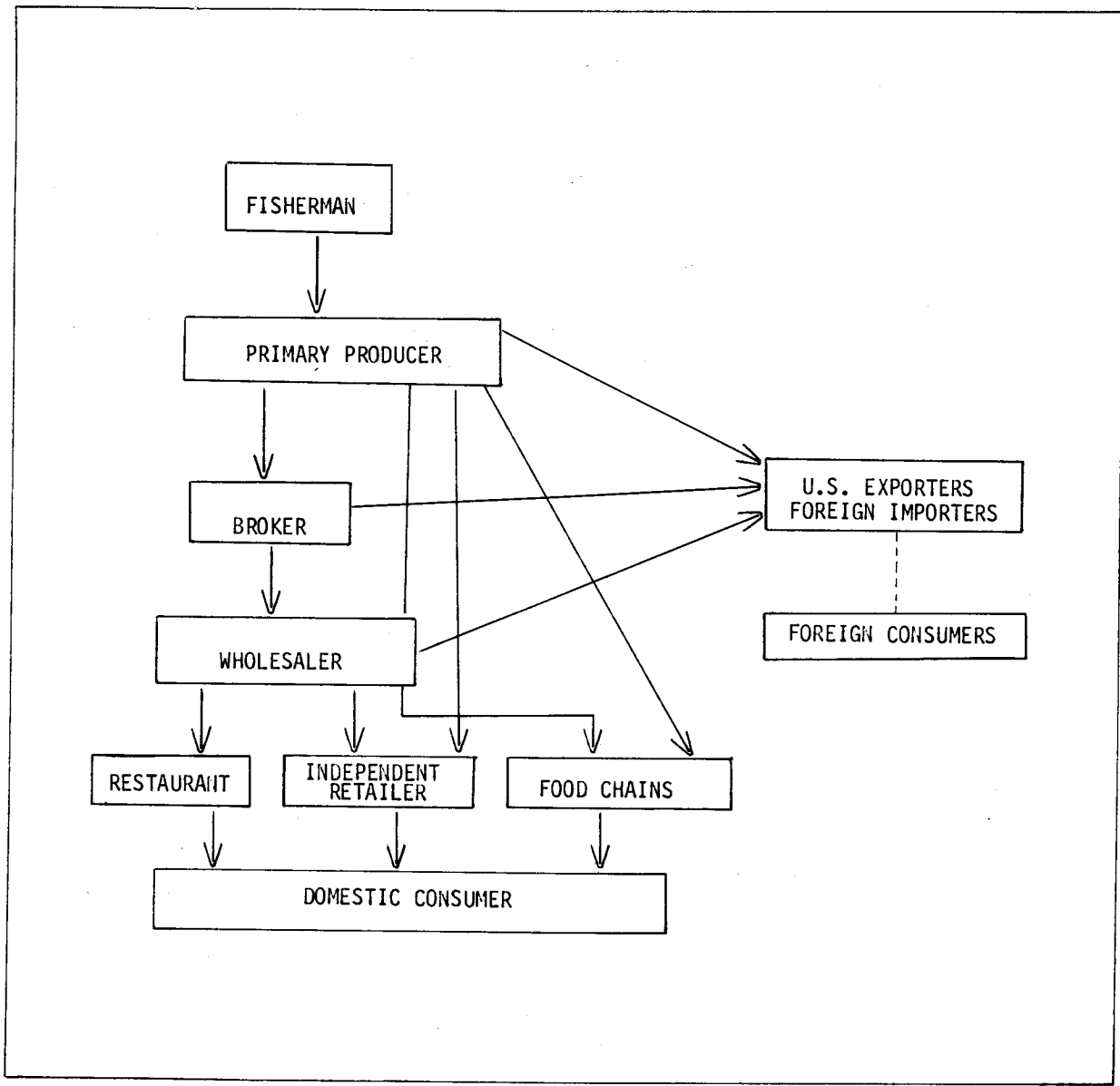


Fig. 4. Alternative marketing routes of fresh-frozen Oregon shrimp from fisherman to the consumer.

this differentiation is made at the retailing level, if it is made at all.

Tradition, family relationships, and close personal ties play a large role in the marketing system for fresh-frozen Oregon shrimp. These factors supplement the price structure in effecting coordination and control of the marketing of the product, serving as additional rationing devices, particularly when there is a seller's market. Details of these situations will be discussed in the following sections.

There is not enough information available at this time to estimate how much of the frozen product goes to the various urban centers or to export markets. A general consensus is that 40 to 60 percent (54 percent in 1974) of Oregon's annual shrimp landings are fresh-frozen in the 5-pound institutional can. What follows is a description of the characteristics of the enterprises and market channels associated with this product.

DESCRIPTION OF THE INSTITUTIONAL FORMS IN THE MARKETING STRUCTURE

The Fisherman

The Oregon shrimp fisherman, with his crew, operates his modestly sized trawler from one of seven ports in shrimp season, which generally runs from March until October. Many of the fishermen catch shrimp during the season, then utilize their vessels for other types of fishing during the winter. Some are content to work only during shrimp season. There is evidence of a marked decrease in the number of vessels operating during the fall beginnings of deer and elk hunting seasons.

The Fish Commission of Oregon is empowered to set the length of the shrimp fishing season and to issue licenses to those fishing in Oregon waters. In recent years this control was extended to fishermen from California operating within a three-mile limit off the Oregon coast. The Commission levies a tax on landed shrimp at the rate of 0.3 cents per pound.

According to state records, 72 vessels licensed in Oregon reported landings from the shrimp fishery in 1971. Landings of shrimp are made all along the Oregon coastline. On the map in Fig. 5, the ports for shrimp vessels are shown, followed by landings reported at those ports for the 1972 season in millions of pounds.

After landing the fishermen transfer their catch to one of approximately ten processors. The ex-vessel price which they receive for their catch has usually been determined beforehand. Interviews led to the conclusion that fishermen tend to remain suppliers for a particular firm over considerable periods of time. Tradition and personal ties seem to play an important role in determining which processor the fisherman supplies. There is no indication that this phenomenon is caused exclusively by processor ownership or financing of the fishing enterprise, although such arrangements may occur.

The exact determination of remuneration is subject to regional variation. From the port of Newport and northward, the price per pound is agreed upon orally by fishermen and processors. In this region, the total payment to the fisherman is determined most often by the processor on the basis of the weight of the processed product. By experience and agreement between fishermen and processors, the processed product is 25 percent, by weight, of the raw product. Hence, the fisherman receives payment, following processing, for four times the weight of the finished product at the previously agreed upon price. Interviews showed several variations on this practice. One was to spot check the weight of one out of ten of the large boxes which are used for transferral of the raw product to the processor. Another was to estimate the amount delivered by both the percentage recovery and spot check methods, and pay the fisherman based on the highest estimate.

In the Coos Bay area, fishermen are organized into an association. The association collectively bargains with local processors annually to determine an ex-vessel price. Moreover, the quantity transferred to the processor is determined by weighing the total delivered catch, rather than by estimating the weight from a small sample of containers.

The same weighing arrangements apply in Port Orford and Brookings. However, the ex-vessel price is tied closely to those established in Northern California around Eureka and Crescent City. This occurs because a substantial part of the catch from the southernmost two ports in Oregon is transshipped to California in a raw, iced form, for processing in that state.

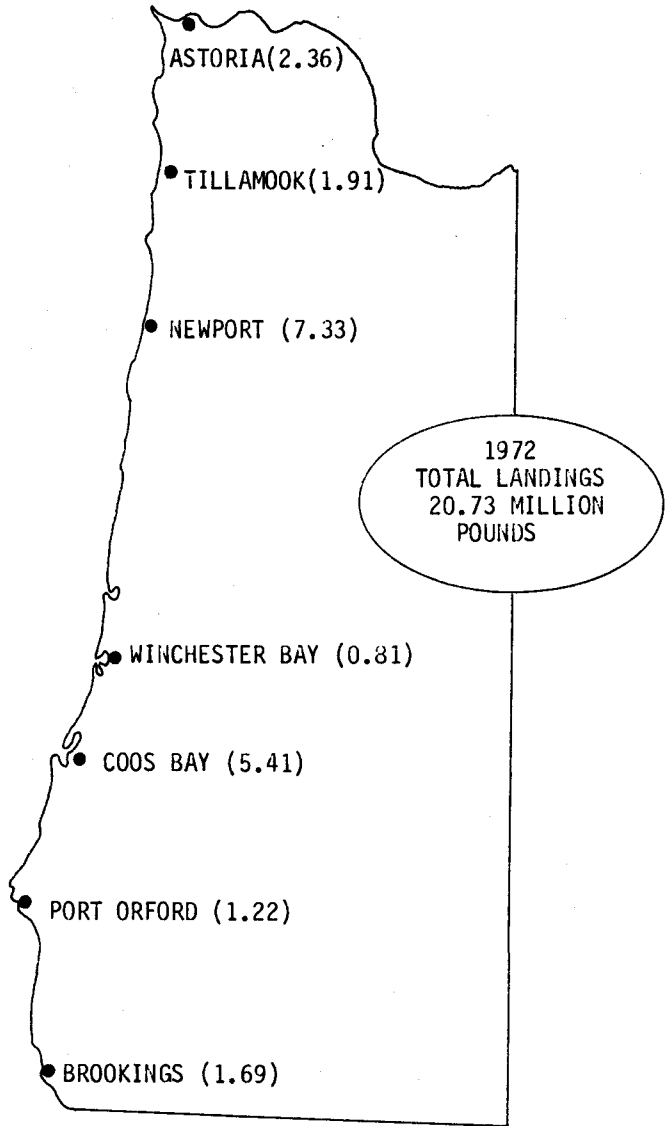


Fig. 5. Landings of shrimp in Oregon, by port, 1972.
(Fish Commission of Oregon.)

In spite of these variations, the ex-vessel prices up and down the coast seem to be very nearly the same at any given time. In the past, when the prices have not been in line, disputes between fishermen and processors have arisen. These disputes seem to serve the function of removing price differentials.

The Processor

The major function of the processor is to convert the fisherman's catch into a finished product to be marketed by the wholesaling and, eventually, retailing sectors. The seasonal nature of the shrimp landings, and variations within the season, can lead to a six- to seven-month gap between processing and consumption. Because of the three- to four-month period when there are no shrimp landings, the product must have a minimum storage life of four months, and a desired average storage life of six to seven months. Experience indicates that the frozen, vacuum-packed shrimp produced by Oregon processors has an expected storage life of eight to nine months under proper preparation, handling, and storage conditions.

A need for maintenance of the quality of the canned frozen product during transit and storage was cited by processors and wholesalers. If a wholesaler receives a shipment of shrimp that is damaged, or even partially spoiled, he may reject the whole lot. Excellent ability of the 5-pound capacity steel can to protect the frozen shrimp from physical damage contributes, in part, to the continued use of that container by Oregon processors.

A substantial proportion of the Alaskan shrimp is loose-frozen in belt tunnels and then packed in plastic bags. Container sizes for home consumers range through 8, 10, 12, and 16 ounces. Institutional packs are 2 1/2, 5, and 15 pounds. One handler of Alaskan shrimp distributes about 90 percent of the product for institutional use and 10 percent for retail consumers. Much of the capital equipment used by Alaskan processors probably was introduced during the last seven years. In contrast, most of the vacuum packing equipment in Oregon is older. Conversion to the newer Alaskan packing processes might require a large capital expenditure or additional expense for leasing machinery. The reluctance of Oregon producers to incur this additional expense, and strong demand for the current product, provides further support for the continued use of the 5-pound can.

When the raw product is received from the fisherman, it must pass through a multi-step process. The major steps are (1) cooking; (2) picking - separating the meat from the exoskeleton; (3) inspection; (4) rinsing in chilled brine; (5) final inspection and placement into cans; (6) evacuation and sealing of the cans; and (7) transfer to cold storage for freezing.

For many years the cooked shrimp was picked by hand. In about 1968 a mechanical picking machine became commercially feasible, and most processors began to lease the equipment. It is believed that all Oregon shrimp is machine-picked now. Moreover, since 1971 there has been an increase in the number of machines used by interviewed processors, in response to the increased consumer demand and landings of shrimp by Oregon fishermen.

Studies of 1972 cost data for several processors employing mechanical picking led to an estimate of the proportion of their total costs attributable to a few general categories:

- (1) Raw product..... 50.0 - 56.0%
- (2) Direct costs:
 - (a) Equipment..... 5.0 - 7.5%
 - (b) Packaging material... 4.2 - 5.0%
 - (c) Labor..... 15.0 - 16.3%
 - (d) Taxes..... 2.1 - 3.3%
- (3) Overhead..... 16.3 - 21.8%

The processing firms are distributed geographically along the Oregon coast in a fairly even fashion. Several firms have buying or receiving stations at ports removed from their plant facility. Raw product is purchased from fishermen at these stations, then transported to the processing plant by truck. It is estimated that 10 to 15 percent of Oregon landings are transshipped in raw form from the more southern ports to Northern California packers. This estimate is rather rough; a detailed survey would be required for a precise determination.

Processing plants can also be divided into two categories, based upon the size and financial strength of the corporations to which they belong or by which they are controlled. One category will be referred to as the "large-company operation" and the other as the "small," or family-owned and operated firm. There is good reason to

hypothesize that the marketing methods and characteristics for these types of plants differ from one another.

For one thing, the large-company operation may have its own sales staff, or may be tied directly to a brokerage operation which is owned by its larger parent corporation. The smaller firms rely on independent brokers.

A second difference is that the large-company operation has more financial strength. Smaller firms may have to rely on their brokers for financial support, a situation which could affect profitability when demand for the product is not strong.

The Broker

The National Food Brokers Association has defined a broker (hereafter referred to as a "pure broker") as "an independent sales agent who performs the services of negotiating the sale of food and/or grocery products for, and on account of, the seller as principal, and who is not employed or established by, nor an affiliate or subsidiary of, any trade buyer, and whose compensation is a commission or brokerage paid by the seller" [O'Rourke and DeLoach, 1971, p. 26]. A pure broker does not speculate, nor does he buy or sell for his own account; that is, he does not take title to, or possession of, the products in which he deals.

Much of the following description relating to the distribution of Oregon's shrimp by out-of-state brokers was obtained from interviews in the San Francisco area.

Means of marketing that fraction of Oregon's shrimp consumed within the state is more accurately described in the section following this, concerning the wholesaler.

Brokers may occur at any level in a market structure to facilitate the meeting of buyer and seller of a product. For fresh-frozen Oregon shrimp, brokers enter the market structure primarily as intermediaries between the processing and wholesaling levels. Brokers may also serve to facilitate export sales. As mentioned earlier, larger firms maintain their own sales staffs to accomplish the functions of the broker.

In general, the broker is involved in the following operations: (1) If the sale arranged is F.O.B. to the wholesaler's location, then the processor ships to a public warehouse at that location. Cost of transportation is included in the price to the

wholesaler. The broker then contacts wholesalers, who pick up the product at the warehouse. This is economical, because the bulk shipment of the processor costs less to transport than if each wholesaler arranged his own smaller shipment via a common carrier. (2) If the sale is F.O.B. at the processor's location, the broker will arrange a collective shipment for the wholesalers he serves. Which of these alternatives occurs is influenced by the financial strength of the processor. Among processors, the smaller firms usually follow the first alternative, while at least one large firm indicated that it used the second alternative exclusively.

Few of the brokers in the fresh and frozen fish industry are "pure brokers." Research of this project substantiates that of O'Rourke and DeLoach in that most of the brokers in the industry act as "jobbers" or "trading companies." This means that they may also speculate, buy and sell shrimp with their own resources, and extend financial aid to processors. Factors which encourage these practices are several: (1) small processors may have financial problems or need to have guarantees of working capital with which to operate between the seasonal income periods; (2) because of the seasonal nature and short supply of shrimp, coupled with strong demand, the broker is encouraged to provide these services in order to secure a stable supply from the processor.

One of the ways in which the broker develops a continuing clientele is through a permanence in the financial relationships that are established. Once a broker confirms such a financial relationship, the processor may become unwilling to disrupt the agreement because the overall demand of the California (or Seattle) market is much greater and steadier than alternative markets. O'Rourke and DeLoach noted that Southern and Northern California brokers do not seem to bid aggressively for business in each other's territory. The Northern Pacific producers have traditionally been served by Northern California brokers.

Interviews with California brokers tended to confirm observations of the O'Rourke and DeLoach study concerning the determination of wholesale prices. The main factors in determining the price Oregon processors receive are the current demand of the major market areas and supply from other fishing areas. The price is also determined, in part, by the capacity of the broker and the needs of the processor. If the broker is dealing with a small processor, he may be

able to exert considerable influence on the price he pays.

The broker and larger vertically-integrated processors seem to play a large role in the actual operation of the price structure. O'Rourke and DeLoach note [1971, p. 28] that "if supplies are plentiful, the broker may take a smaller gross margin; if supplies are drying, he may raise his margin." For another example, quantity discounts can be raised and lowered as the demand and supply of the product change. It appears that this type of personalized marketing decision and some of the additional services performed by the broker, supplement the free interplay of market forces. Because of these factors, there is never a single industrywide price for the product.

The basic price range, though established in the large urban centers, seems to influence the price of shrimp which remains in Oregon. Evidence of this relationship was confirmed after examining the retail price of shrimp in Portland and San Francisco for one week in 1972. The retail price range in Portland was nearly identical to that in San Francisco.

The Wholesaler

The wholesaler is the segment of the market structure that buys shrimp in quantity, stores it, and handles the distribution of the product to retailers and restaurants. Although some brokers buy shrimp on their own account, the wholesaler incurs most of the cost of having this seasonal product available to the consumer on a year-round basis.

The two major operations of wholesalers are those of storage and delivery. Elements of these operations will be considered in terms of how they affect different wholesalers. In general, wholesalers can be divided into two categories: (1) the wholesaler who is vertically integrated with a processor, or who is in fact or contractually integrated by virtue of established ties along the market structure; (as indicated earlier, close personal ties or a tradition of close business relationships may place a wholesaler in this category); and (2) the smaller or independent wholesaler who buys from whomever has the product to sell.

These two categories of wholesalers seem to have different buying and inventory build-up patterns. The smaller or independent wholesaler who lacks reserve "buying

power" has to gradually purchase extra shrimp as it becomes available, to build up inventory to be sold during the off-season. The larger wholesaler with established ties along the marketing structure has more flexibility in building up his inventory. Supply permitting, this type of wholesaler will buy a large portion of the shrimp toward the end of the fishing season, to be carried over into the off-season. A graph of these two different buying patterns, based on figures from 1967-68, is shown in Fig. 6.

The inability of the less powerful wholesaler to rely on "buying power," forcing him to maintain larger inventories, is strongly reflected in the difference in storage costs between the two types of wholesalers. Given the rates for public warehouse storage of shrimp, storage cost schedules for the two types can be developed. For example, in 1967 one less powerful wholesaler had an average cost of \$1.18 per pound for storage. In contrast, a more powerful wholesaler had an average cost of \$0.64 per pound.

Two qualifications must be made. First, the optimal buying pattern yielding the minimum cost per pound of storage requires that a large capital outlay be made to purchase a large quantity of shrimp in one month. Any benefit obtained by the wholesaler as a result of an efficient inventory holding pattern must be measured against the cost of financing this inventory schedule. Second, seasonal fluctuations in landings may cause the counted-on supply of late season shrimp to be unavailable, even to the wholesaler with direct ties to a processor.

Transfer cost is the second major problem confronting the wholesaler. During an interview, one Portland wholesaler remarked that his firm could "... hardly afford to stop the truck for the small accounts any more." An interview with a Public Utilities Commission executive led to the conclusion that it is prohibitively expensive for an Oregon wholesaler to use a common carrier for intrastate transfer and delivery of the product. Two major Portland wholesalers use their own trucks to make overnight trips stretching from Vancouver, Washington, to Ashland, Oregon. The wholesaler's trucks are not classified as common carriers and, therefore, are not subject to the intrastate tariff schedules.

Even under this scheme, it is quite costly to make deliveries. In 1972, Portland wholesalers were paying \$7.28 per hour to teamster drivers. Projecting to an hourly wage of

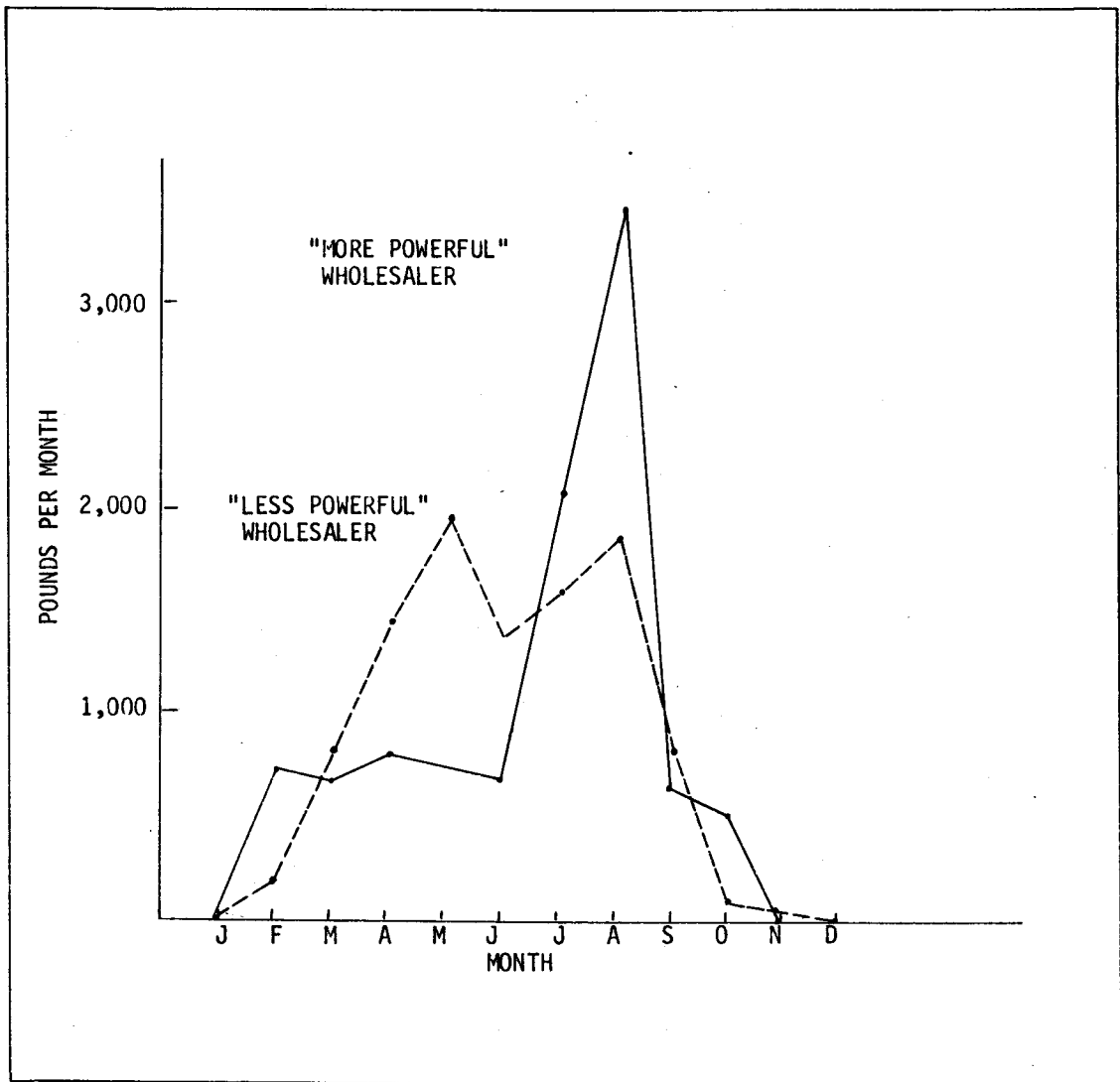


Fig. 6. Characteristics of inventory purchase patterns in 1967 for two types of wholesaler.

\$8 for drivers, the following graphs, Fig. 7, show the rapidly rising cost per pound when small quantities of the product are delivered. For example, a delivery of five pounds, requiring a five-minute stop, will have a driver-labor transfer cost of \$0.13 per pound. If driving time between deliveries is considered, the cost of a 20-pound delivery, taking one hour total time, is \$0.40 per pound. Fig. 8 shows how these distribution costs vary with amount of product delivered and total delivery time.

The Retailer

O'Rourke and DeLoach estimated the disposition of fresh and frozen fishery products by integrated primary producer-wholesalers in California as follows: "In dollar terms, 46 percent of total sales in 1968 were made to other wholesalers and almost 10 percent to brokers. Twenty-three percent of sales were made to retailers and 16 percent to restaurants, leaving 5 percent to miscellaneous outlets... The proportion of sales going to retailers and restaurants was significantly higher among firms in San Francisco and Oakland" [O'Rourke and DeLoach, 1971, p. 23].

Local research in this portion of the market structure has been concentrated in food chain outlets, where there are several major problems connected with the handling of the 5-pound institutional can. One large chain outlet reported purchasing an average of 350 pounds of seafood per week, of which 4 pounds per week were the small Pacific shrimp. With an estimated 4,000 pounds per week of fresh meat of all kinds being re-tailed, the shrimp amounts to about 0.1 percent of the butchers' product. For the re-packaging costs of shrimp to be proportional to those of beef, no more than three minutes out of a 40-hour butcher-week should be spent on in-store preparation of shrimp for the consumer.

Proportionately, the actual time for preparation of shrimp is much greater than that allocated to fresh meat. The butcher must thaw the product, clean his hands and the work area, place the shrimp in small consumer-size trays, weigh the product, mark the package, and place it in the meat counter. According to an inspector of the Oregon Department of Agriculture, work areas which have been used previously to package red meats or poultry must be thoroughly cleaned before seafood can be handled. The regulation is intended to prevent exposure of the pre-cooked shrimp to salmonella

bacteria often found on raw meat and poultry products. Since the consumer often does not re-cook the shrimp, if sanitary precautions were inadequate he could consume the bacteria. Reduced potential contamination provides one justification for having small consumer packs of shrimp meat in the frozen food section. As noted earlier, some Alaskan shrimp is packed this way. The fact that no Oregon processors have entered this market is a reflection of the continued profitability of the 5-pound institutional can.

The Consumer

Consumer reaction within the shrimp market structure is discussed in a brief summary of a National Marine Fisheries Service study of shellfish consumption [Miller and Nash, 1973, pp. 3-5]. The study was based on a sample of 1,500 households enlisted to log the details of seafood purchases for a one-year period. The survey has been criticized on statistical grounds, but since no other information is available, it will be cited for some general impressions.

Shrimp of all kinds emerged as the most popular shellfish in the United States. Consumption of shrimp by those surveyed was greater than consumption of all other shellfish combined. On the whole, higher-income households ate more shellfish per capita. Older consumers seemed to be more disposed toward consumption of all fishery products; however, shrimp had an even distribution with respect to age.

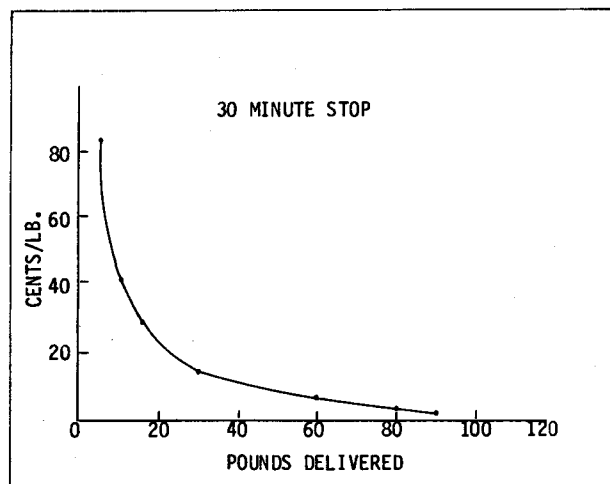
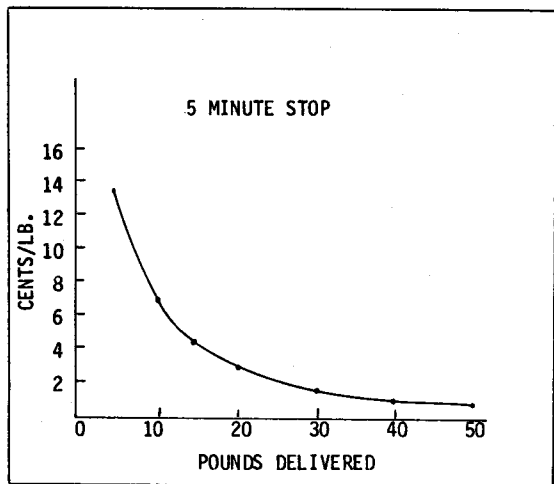


Fig. 7. Wholesale delivery costs as a function of pounds product delivered.

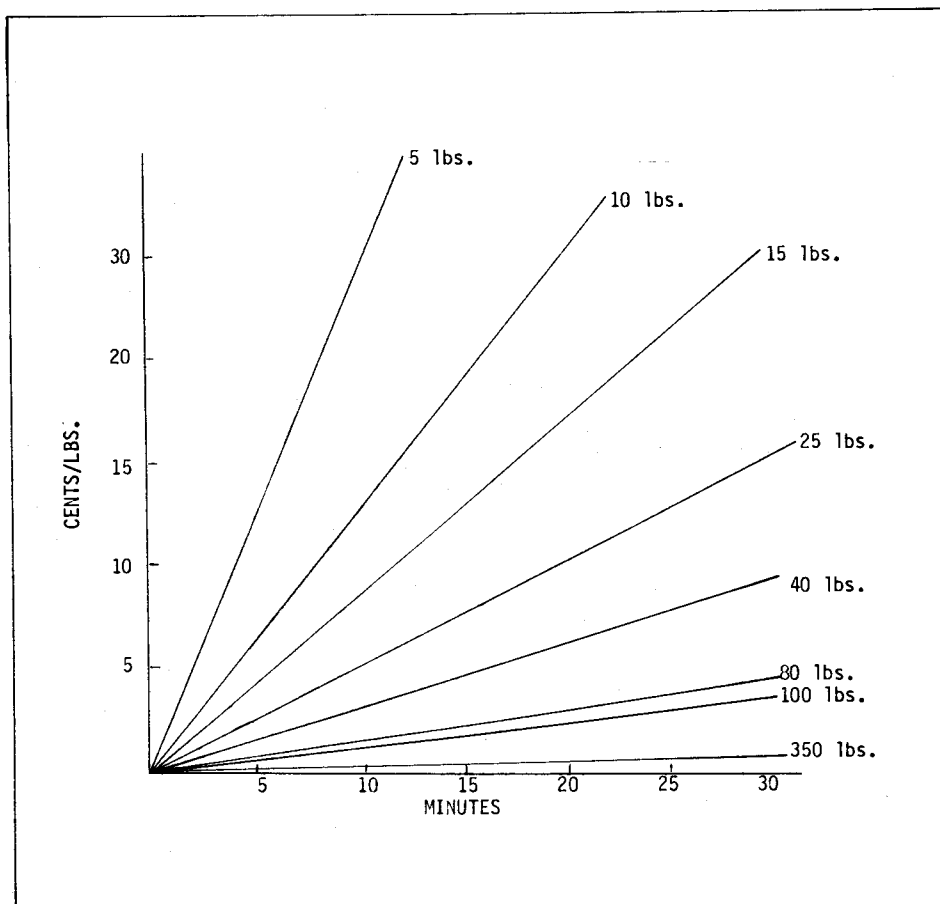


Fig. 8 Wholesale delivery costs as a function of quantity and delivery time.

observations and items for future study

GROWTH IN THE EXPORT MARKET

More than 90 percent of Maine's landings of the small pink shrimp for 1970-71 was sold in overseas markets [Dunham and Stinson, 1973, p. 6]. Since Oregon shrimp is similar in size and quality to Maine shrimp, it is not surprising that export sales have increased recently for the local product. Interviews with brokers and wholesalers disclosed evidence of several large sales of frozen shrimp to Japan and Sweden.

Increasing affluence and demand for protein in foreign countries are possible reasons for increased exports. Also, devaluation of the U.S. dollar lowered the price of shrimp to these countries. More interestingly, the recent price controls in this country applied to domestic, but not foreign, sales. Thus, export sales often were more profitable to producers, brokers, and wholesalers than were domestic sales.

ITEMS FOR FURTHER STUDY

This study has primarily been an effort to describe the marketing characteristics of Oregon's fresh-frozen shrimp industry. Its pursuit has revealed some data that need to be determined more precisely, and several topics for further research that would help identify advantages for Oregon shrimp become apparent. For example, estimates of the following items could be refined: (1) distribution of annual landings by type of processing - fresh-frozen versus canned consumer pack; and (2) geographical distribution of the frozen product between in-state, out-of-state, and export markets.

To make studies of the demand for the product, ex-vessel, wholesale, or retail price series might be developed. At this time, the only price series available for shrimp are figures based on national or regional data broken down into shrimp size categories.

A study of the relationships between shrimp and crab might be useful. If shrimp and crab are substitutes in consumption, perhaps one of the reasons for the surge in demand for shrimp is the recent low harvests of the Dungeness crab. The precise effect is unknown at present.

Concerning management of the Oregon shrimp fishery, an analysis of the economic effects of a harvest quota system or limited licensing of fishermen might be in order, in case either scheme seems warranted for conservation. The analysis would include, for example, an estimate of the effects of a sustainable level of production on the revenue for fishermen and processors.

A study of alternative packaging options for Oregon processors could be made. Items to be considered are (1) possible markets for new shrimp packs; and (2) costs associated with changing from the existing to new types of packaging, and comparative costs to processors of several packaging options.

Finally, since the fishing and processing season lasts for no more than eight months of the year, processors might want to investigate ways to use their facilities during the off season. For example, is it economically feasible to import raw shrimp for processing with existing equipment?

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