

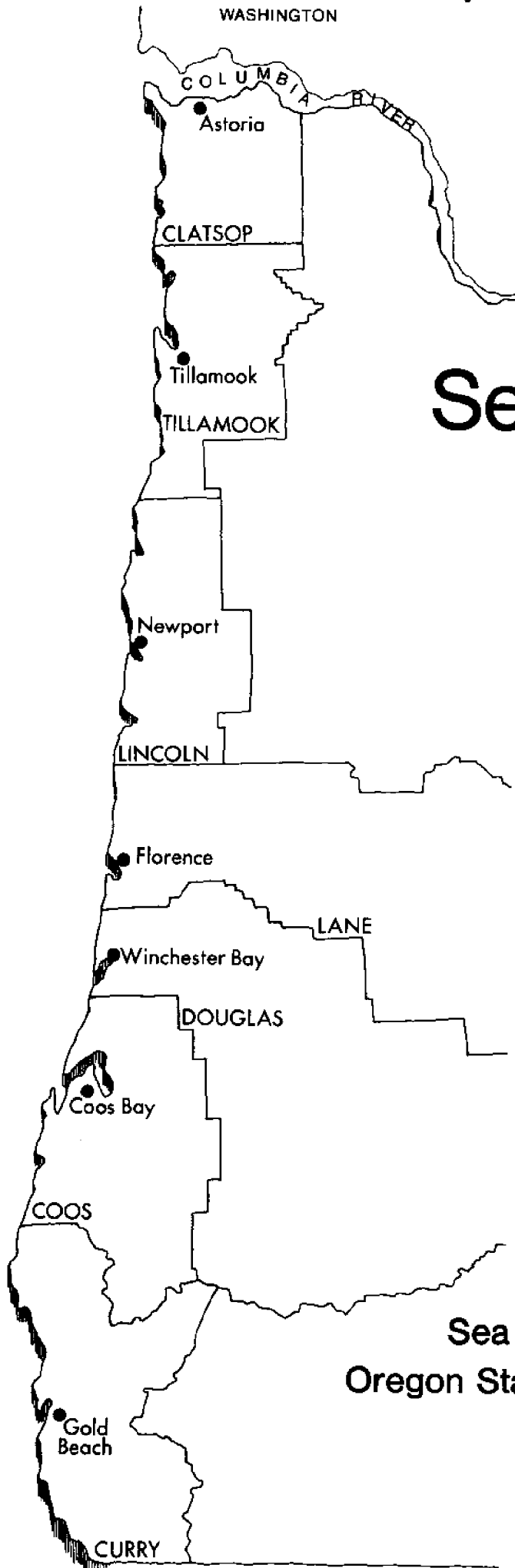
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Oregon's Seafood Industry

Its Importance to Oregon's Economy

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Earl Lang and Mark Weimar, students in the Department of Agricultural and Resource Economics at OSU, collected and assembled most of the basic data contained in this report.

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Oregon's Seafood Industry: Its Importance to Oregon's Economy

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The economic importance of Oregon's seafood industry has grown since Pacific Northwest Indians subsisted on a staple diet of sun-dried salmon. When the founding settlers came to the eastern shores of America hundreds of years ago, they were dependent upon fisheries for a staple food source. Since then demand for seafood has continued to increase. Today, many Oregon seafoods are enjoyed by consumers worldwide.

Seafood harvesting and processing methods have changed dramatically over time. Modern troll fleets, for example, now catch salmon in the ocean with lures and baited hooks. The days when horses were used to pull in beach seines loaded with salmon on the Columbia River are gone. New technology, legal battles, and an increased knowledge of and interest in Oregon's seafood industry makes it a controversial and popular topic for discussion.

Risk and uncertainty always have been important factors in Oregon's seafood industry. Because of uncontrollable natural forces, fishers and processors alike rarely can be certain of what the next harvest will bring. Individual fisheries are subject to annual catch fluctuations. Prices vary from week to week as well as season to season.

Differences in numerical information found between the narrative and graph portions of this report are due to rounding. All dollar values of seafood products presented represent prices received by the fisher at the dock.

This publication is one of the first attempts to describe Oregon's seafood industry in economic terms. It draws together information from many local, state, and federal sources. When data were not available, they were developed from basic sources.

The 1976 landed value of seafood in Oregon was estimated at \$40 million. Processing and marketing added an estimated \$60 million in value to bring the total to an estimated \$100 million. Oregon seafood processors employ more than 3,000 people on a full- or part-time basis during peak employment periods. In 1976, 5,551 Oregon commercial fishing licenses were issued to Oregon residents.



Oregon's seafood industry provides year 'round employment for many coastal residents, and seasonal employment for others.

Several other important concerns affect the Oregon seafood industry:

1. The Oregon coastal economy depends on a healthy and strong seafood industry.
2. The seafood industry yields one of the highest income multipliers in Oregon. (See discussion of multipliers, page 11.)
3. Oregon's seafood industry is based on a renewable resource, with a large reproductive capacity.

Oregon's seafood industry is complex. Besides the numerous fish species available, harvesting techniques and laws governing management of the industry pose a complicated picture.

Seafood Industry Characteristics

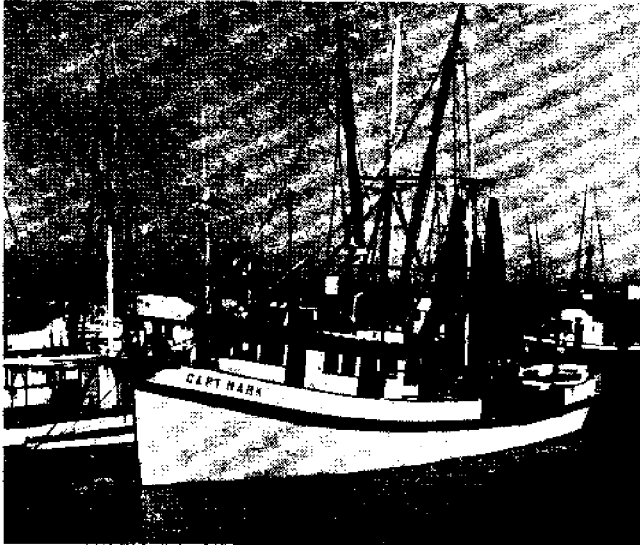
Some characteristics of Oregon's seafood industry are illustrated in Table 1. For example, the 300 miles of Oregon coast is sparsely populated.

Table 1. Demographic and General Statistics of Oregon's Seafood Industry, 1976.

	Population	Sq. miles	Miles of coast-line	Pop./sq. mile	Value of landings to the fisher ^a & buyers ^d	Assessed values of taxable property of processors & buyers ^d		Employees ^e		Commercial fishing license holders ^b	Ports	Licensed commercial boats		Average boat size ^f (ft.)
						millions of dollars	millions of dollars	Normal	Peak			No. ^c	Values ^f (\$000,000)	
Clatsop Co.	29,350	805	30	36	\$10.7	\$ 6.9	1,254	1,592	710	1	399	\$ 22.0	33 ft.	
Coos Co.	59,700	1,604	50	37	8.9	1.1	396	615	759	3	408	25.3	35 ft.	
Curry Co.	14,100	1,627	70	9	4.2	0.3	50	140	485	3	261	14.6	33 ft.	
Douglas Co.	80,400	5,063	15	16	1.4	0.4	60	145	314	1	164	5.6	28 ft.	
Lane Co.	241,800	4,552	25	53	0.2	0.1	2	5	483	1	248	7.4	27 ft.	
Lincoln Co.	27,650	986	60	28	7.0	2.3	218	262	676	3	356	21.4	34 ft.	
Tillamook Co.	18,500	1,115	50	17	3.4	0.6	85	146	319	3	172	6.6	29 ft.	
Subtotal Coastal Counties	471,500	15,752	300	28	\$35.8	\$11.7	2,065	2,905	3,746	15	2,008	\$102.9	31 ft.	
Other Oregon counties	1,870,250	81,229	N/A	23	\$ 4.7	\$ 7.3	186	191	1,805	8	939	\$ 28.2	27 ft.	
State Total	2,341,750	96,981	300	24	\$40.5	\$19.0	2,251	3,096	5,551	23	2,947	\$131.1	31 ft.	

Source:

^a Oregon Department of Fish and Wildlife.^b *Ibid.* (obtained from commercial license application addresses.)^c *Ibid.* (obtained from commercial license applications.)^d County Assessors' estimates.^e Oregon State Employment Service (includes processing plant employees only.)^f OSU Extension (Data obtained through computerized regression analysis of commercial license application information and Marine Advisory Program Marine Data Sheets).^g *Ibid.* (Overall length.)



The value of Oregon's fishing fleet is estimated to be more than \$130 million. Many other boats bolster Oregon's marine industries.

This is especially true in Curry and Tillamook counties which have population densities of only 9 and 17 persons per square mile. While Lane County's population seems large, most people live inland in the Willamette Valley.

Many Oregon commercial fishing license holders are not permanent residents of the coast. Nearly half of the 2,602 license holders in 1976 listed home addresses in noncoastal communities.

Clatsop, Coos, and Lincoln counties continue to be the centers of Oregon's seafood industry. These three counties contribute about 65 percent of the \$40 million dollar 1976 landed seafood value. The 2,145 license holders that reside in these three coastal counties represent 39 percent of the 5,551 total.

The average boat size for noncoastal community commercial license holders is smaller than the overall average. Many operate small fishing boats that are stored inland and towed to the coast for use during fishing seasons. Coos County has the largest average boat size, 35 feet. The average boat length reported for Oregon noncoastal counties is 27 feet.

The value of Oregon fishing boats can vary for each fishery, and the type and quality of fishing gear accounts for large differences in boat values. It is not uncommon, however, to find a 28- to 35-foot Columbia River gillnet boat valued at \$15,000 to \$30,000. A 30- to 50-foot troller equipped to fish for salmon, tuna, and crab could range from \$30,000 to \$90,000 in value. Some of the large 60- to 75-foot dragners and shrimpers are valued at \$200,000 to \$500,000.

A total of 721 boat licenses and 1,263 individual commercial fishing licenses were issued to non-

Oregon residents during 1976. More than 95 percent of these requests came from Washington and California. They represented 25 percent of the total registered boats and 23 percent of the individual commercial fishing licenses issued that year.

Clatsop County hosts the largest seafood processing facilities in Oregon. Coos and Lincoln counties follow in second and third places. Other counties have limited seafood processing facilities.

A total of 185 wholesale fish buyer licenses were issued in 1976. Fifteen major companies processed seafood in Oregon during 1976 at 62 plant locations.

Estimated Values and Landings, 1971 through 1975

To examine Oregon's seafood industry in more detail, information is presented in two forms: *total values* and *total pounds*. These figures indicate the landed value (the amount of money received by fishers at the dock) and the weight of the catch when unloaded in port. Table 2 presents 5-year average values of Oregon seafood landings from 1971 through 1975 and indicates that five seafoods dominate the industry. Salmon captures the largest share with 34 percent; tuna, 31 percent; shrimp, 13 percent; crab, 11 percent; and groundfish, 9 percent. Other seafood products, such as oysters, clams, sturgeon, shad, and smelt, account for the remaining 2 percent.

Clatsop County leads in the average value of landings during the 1971 through 1975 study period with 35 percent. This is due in part to the large numbers of tuna landed and processed in Astoria.

Coos and Lincoln counties follow Clatsop's lead with 18 percent and 17 percent, respectively, of the 5-year average value for all seafoods. Columbia River landings, primarily gillnetted salmon, account for 13 percent. Even though fishers catch a large share of these salmon near Astoria, they are not counted in Clatsop County's total, due to the data collection methods used by the Oregon Department of Fish and Wildlife. The remaining total landings are Curry County, 7 percent; Tillamook County, 6 percent; and Douglas County, 4 percent. Landed values in Lane County account for less than 1 percent of total value.

Table 3 lists the 5-year average (1971 through 1975) pounds of seafood landed. During this period, a yearly average of 88.6 million pounds of seafood valued at just over \$27 million dollars was landed. Pounds *roundweight* represents the weight of the fish with head and gut still intact except for salmon, which trollers gut at sea.

Table 2. Five-Year Average Values (in thousand dollars), 1971 through 1975.

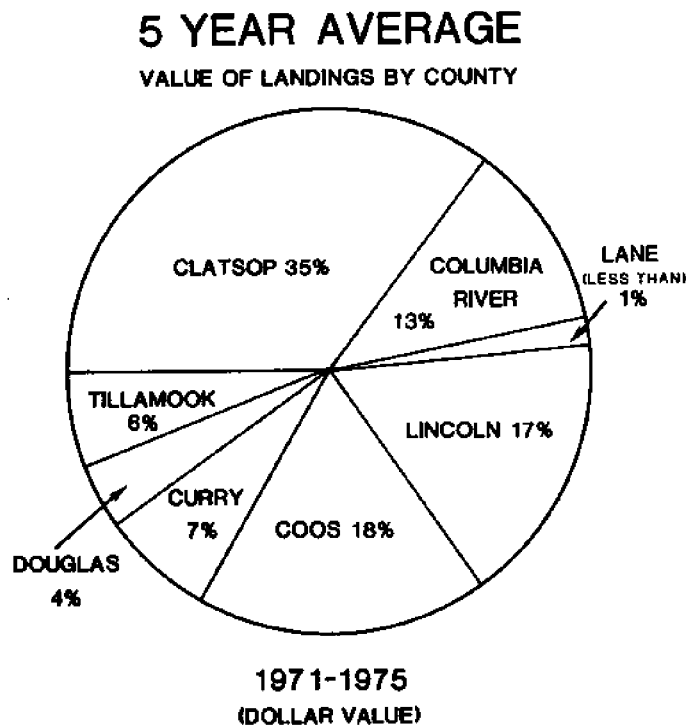
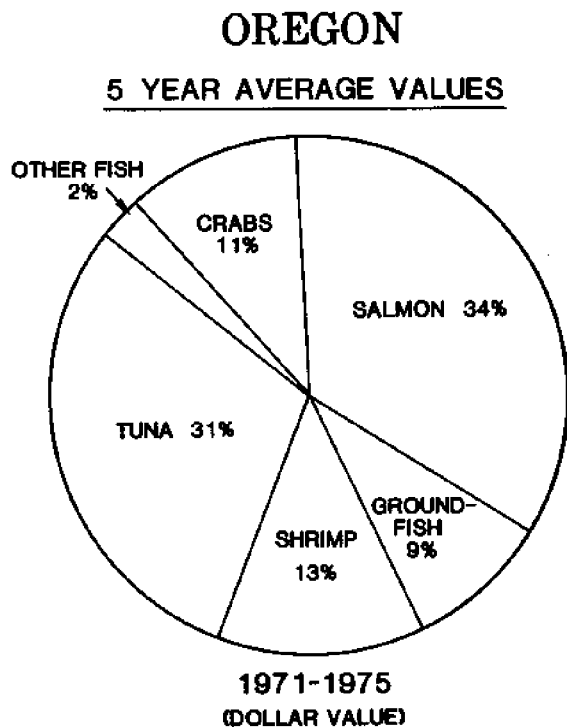
Landing location	Salmon	Tuna	Groundfish	Crab	Shrimp	All others	Total
Columbia R.	3,379	.....	5	.....	.....	126	3,510
Clatsop Co.	291	6,299	1,159	1,063	598	14	9,424
Tillamook Co.	1,055	117	120	219	350	303	1,519
Lincoln Co.	1,619	925	371	619	895	137	4,566
Lane Co.	82	22	.....	22	.....	2	128
Douglas Co.	406	86	335	170	149	40	1,186
Coos Co.	2,979	2,371	4,062	449	1,043	28	4,898
Curry Co.	942	55	200	402	349	1	1,949
Total	\$9,337	\$8,308	\$2,556	\$2,944	\$3,384	\$651	\$27,180

Source: Oregon Department of Fish and Wildlife.

Table 3. Five-Year Average Landings (in thousand pounds roundweight), 1971 through 1975.

Landing location	Salmon	Tuna	Groundfish	Crab	Shrimp	All others	Total
Columbia R.	5,225	.....	79	.....	.....	604	5,908
Clatsop Co.	527	19,219	9,975	2,501	3,744	24	35,990
Tillamook Co.	1,055	117	120	478	2,230	175	4,175
Lincoln Co.	2,518	2,525	3,046	1,486	5,368	68	15,011
Lane Co.	125	58	2	51	.....	15	251
Douglas Co.	667	230	2,975	332	830	269	5,303
Coos Co.	2,979	2,371	4,062	843	5,670	95	16,020
Curry Co.	1,498	156	1,723	697	1,903	2	5,979
Total	14,594	24,676	21,982	6,388	19,745	1,252	88,637

Source: Oregon Department of Fish and Wildlife.



Estimated Values and Landings, 1976

The 1976 season could be considered a good year for the Oregon fishing industry compared with the previous 5-year average. Table 4 shows that more than \$40 million dollars in seafood was landed in Oregon, which is 48 percent higher than the \$27 million dollar average for the 5 previous years. This increase was due in part to increased landings of every major seafood except tuna and salmon. Higher prices paid for most products, particularly salmon, also account for the increased total values in 1976.

Table 5 shows that total landings increased in

1976 to 93.8 million pounds, slightly more than the 88.6 million pounds average for 1971 through 1975. Pounds of salmon landed in 1976 equaled the previous 5-year average, while tuna declined by 16 percent. Increased landings were noted in all other fisheries for 1976.

In 1976, salmon contributed half the total product value of Oregon's commercial seafood landings. This is a 16-percent increase from the 5-year average value. The drop in tuna landings partially explains why the value of Clatsop County's landings declined to 27 percent of Oregon's total in 1976 from its previous 5-year average of 35 percent.

Table 4. Estimated Average Values (in thousand dollars), 1976.

Landing location	Salmon	Tuna	Groundfish	Crab	Shrimp	All others	Total
Columbia R.	4,453	.....	8	.....	3	256	4,720
Clatsop Co.	1,508	5,378	1,755	812	1,138	89	10,680
Tillamook Co.	2,090	4	15	225	759	281	3,374
Lincoln Co.	3,736	179	727	671	1,556	128	6,997
Lane Co.	180	.....	1	29	.....	1	211
Douglas Co.	865	33	168	192	115	12	1,385
Coos Co.	5,618	228	881	866	1,246	78	8,917
Curry Co.	1,620	65	197	2,086	276	.....	4,244
Total	\$20,070	\$5,887	\$3,752	\$4,881	\$5,093	\$845	\$40,528

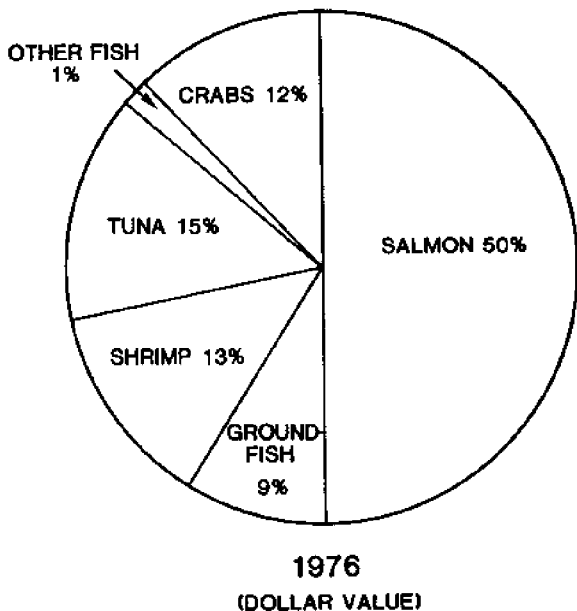
Source: Oregon Department of Fish and Wildlife.

Table 5. Estimated Average Landings (in thousand pounds roundweight), 1976.

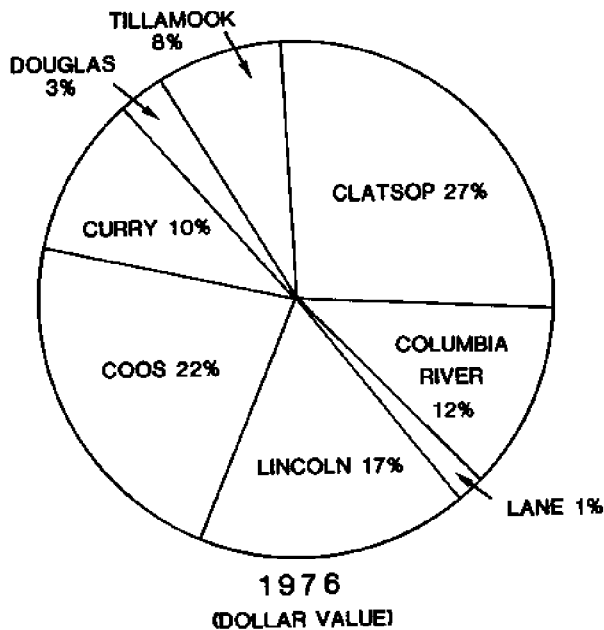
Landing location	Salmon	Tuna	Groundfish	Crab	Shrimp	All others	Total
Columbia R.	3,614	.....	56	.....	13	793	4,476
Clatsop Co.	1,024	16,166	12,533	1,353	5,687	247	37,010
Tillamook Co.	1,540	8	109	376	3,795	128	5,956
Lincoln Co.	2,669	415	5,191	1,118	7,779	64	17,236
Lane Co.	125	.....	5	48	.....	3	181
Douglas Co.	624	76	1,203	320	575	82	2,880
Coos Co.	3,968	531	6,293	1,443	6,228	164	18,627
Curry Co.	1,040	152	1,409	3,476	1,378	2	7,457
Total	14,604	17,348	26,799	8,134	25,455	1,483	93,823

Source: Oregon Department of Fish and Wildlife.

OREGON ESTIMATED VALUES



ESTIMATED VALUE OF LANDINGS BY COUNTY



Production and Values, 1969 through 1976

The total estimated value of Oregon's seafood landings have steadily increased over the past 8 years. The two lowest years, 1969 and 1971, when just over \$17 million in seafood was harvested, were more than doubled in 1976, when \$40 million was received by fishers. The average value for the 8-year period is more than \$26 million.

Total pounds landed has remained fairly stable over the same 8-year period with the exception of 1971 when harvests dipped to 77 million pounds. The 8-year average of total landings was 89 million pounds.

Salmon

Salmon continues to dominate Oregon's seafood industry. Although the salmon harvest has dipped far below the record 44 million pounds taken at Columbia River processing plants and buying stations in 1915, the fishery retains an important position in the industry.

Oregon's salmon fishers catch mostly coho (silvers) and chinook (kings). They also take small numbers of chum, pink, and sockeye salmon. Landed values in 1976 rose to a record \$20 million while pounds harvested have changed only slightly during the past 8 years.

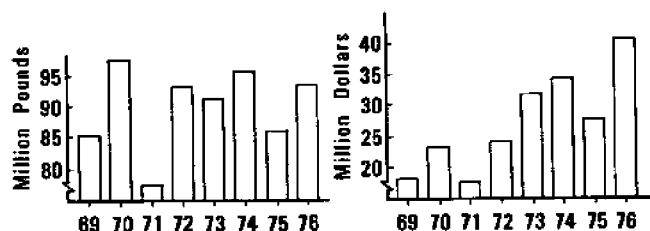
The chinook or king is the largest of all salmon, often reaching 15 to 30 pounds or more. Chinook are harvested both on the ocean by trollers and in the Columbia River by gillnetters. Predominant catches take place on the Columbia, however, where more than half the value of chinook landings have occurred in the past 8 years.

Troll-caught salmon generally bring a higher price than gillnetted salmon. This is particularly true for chinook, and is attributed to the stage of the life cycle when the fish is caught.

While in the ocean, chinook, like all salmon, feed actively. When the urge to spawn drives the salmon into fresh water, the fish stops eating and consumes its own body fats for energy. Consequently, the meat of the fish gradually loses both flavor and texture while in fresh water. When the chinook reaches this condition, it is more suitable

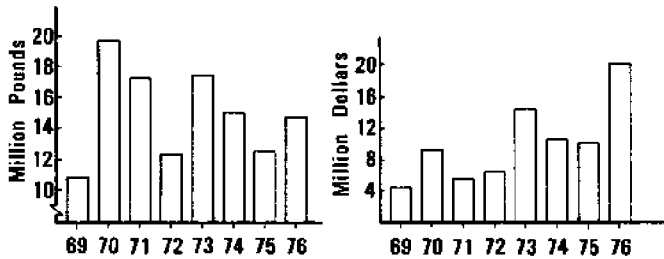
TOTAL OREGON FISHERIES

YEAR	POUNDS ROUNDWEIGHT	ESTIMATED VALUE
1976	93,823,000	\$40,528,000
1975	86,259,000	\$27,969,000
1974	95,838,000	\$34,296,000
1973	91,737,000	\$32,849,000
1972	83,054,000	\$24,001,000
1971	77,666,000	\$17,097,000
1970	97,965,000	\$23,545,000
1969	85,546,000	\$17,588,000



SALMON

YEAR	POUNDS ROUNDWEIGHT	ESTIMATED VALUE
1976	14,604,000	\$20,070,000
1975	12,391,000	\$10,385,000
1974	15,099,000	\$10,531,000
1973	17,402,000	\$14,162,000
1972	12,189,000	\$6,412,000
1971	17,278,000	\$5,748,000
1970	19,629,000	\$9,144,000
1969	10,932,000	\$4,357,000



for canning than for the fresh or fresh-frozen market.

Oregon chinook landings in 1976 earned fishers \$7 million. The 1971 through 1975 5-year average was more than \$5 million, but in 1973 totaled almost \$9 million.

The coho or silver, a smaller salmon than the chinook, usually weighs in at 4 to 16 pounds. Less than 25 percent of the total value of coho landings since 1969 has come from coho caught in the Columbia. In most years, the value percentage was considerably less. During 1976, for example, Columbia coho landings were only 8 percent of the total value of coho landings in Oregon. The ocean troll fleet lands most coho salmon in Lincoln and Coos counties, nearly half of the total value of coho landings.

Total value of coho landings in 1976 approached \$13,000,000. Compared to the 5-year average of \$4,633,000 during 1971 through 1975, the 1976 value shows a dramatic increase due to more pounds landed at higher prices.

Fishers catch a substantially larger number of coho each year than chinook. Trollers, on the average, usually catch two coho for every chinook. Due to a lower price for coho and the smaller size, however, total landed values between the two salmon usually are not much different.

Other salmon species contribute small amounts of landed values in Oregon. Sockeye, usually a 6- to 7-pound fish sometimes referred to as a "blue-back," dwindled from an approximate landed value of \$60,000 in 1971 to a mere \$231 in 1976. Five-

year values during 1971 through 1975 reflect extremes with a \$28,000 average.

Fishers also catch some chum and pink salmon in Oregon. Chums do not normally "bite" or take lures easily and are usually harvested by gillnet. Oregon law prohibits seining for salmon. At present, gillnetting for salmon is legal only in the lower Columbia.

Pinks, the smallest salmon, usually weigh 3 to 6 pounds at harvest. They, too, have a peculiar trait of being harvested in varying quantities every other year. The 1976 value for an "off" year was \$2,200. "On" years in areas south of Puget Sound have been the odd years: 1973, 1975, 1977, etc.

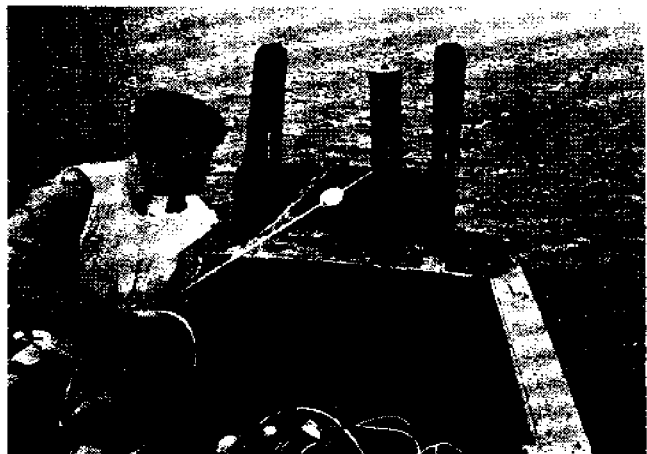
Chums usually weigh 8 to 12 pounds at harvest. The average landed value during 1971 through 1975 was \$3,000 and rose to a high of \$13,500 in 1976.

Chums may become more important to the Oregon economy, particularly as salmon ranching is established. For example, an experimental chum hatchery at Netarts Bay in Tillamook County has been in operation for several years under the guidance of researchers from Oregon State University's Sea Grant College Program. Sea ranchers have built similar commercial hatcheries on some other Oregon streams and are currently raising and releasing other salmon species such as coho and chinook.

Tuna

Significant amounts and values of tuna have been landed and processed in Oregon in the past 8 years. To understand the fishery, a distinction must be made among the varieties of tuna landed and processed in the state and those actually caught off the Oregon coast.

Fishers land three different types of tuna: yellowfin, skipjack, and albacore. Although Oregon fishers bring limited amounts of yellowfin to port in Oregon, it is the highest-volume tuna for the United



Gillnets are used on the lower Columbia River to harvest salmon.

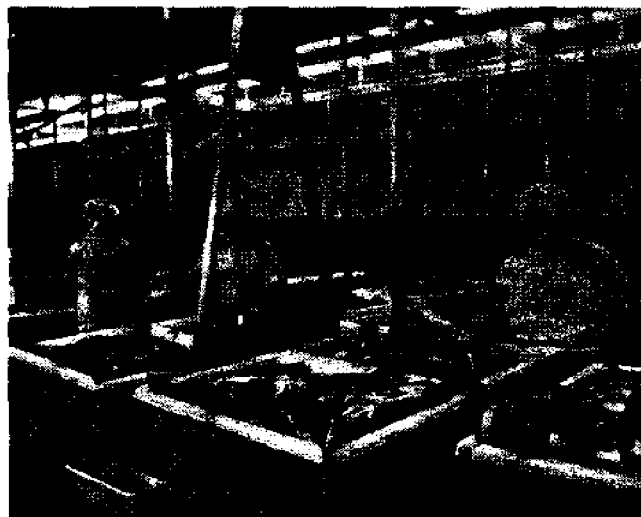
States, and the kind most consumers purchase. Yellowfin can weigh up to 300 pounds, but the average fish is 60 to 100 pounds.

Fishers harvest yellowfin and skipjack in large nets called "purse seines" on the high seas near Mexico and Central and South America and elsewhere. Yellowfin and skipjack prefer these tropical waters, and fishing crews with large boats (up to 250 feet in length) must spend weeks at sea pursuing these fish. These may be sold to Oregon processors.

During the summer, Oregon fishers catch albacore tuna from 30 to 200 or more miles off the Oregon coast. When the usually cool 50° F (10° C) surface water temperature off Oregon warms to 58° F (14.4° C) or higher, the albacore tuna begin to appear.

Unlike yellowfin and skipjack, fishers troll for albacore with lures or "tuna jigs," which are bounced along the surface water. Until 1885 albacore were considered a "trash fish" by the United States seafood industry and consumers. In 1936 salmon fishers discovered albacore off Oregon, and the species were commercially harvested. Albacore landed in Oregon usually weigh 12 to 14 pounds each but can reach 30 to 40 pounds or more. Consumers highly value this fish for its tasty meat. Albacore is the only tuna seafood processors can label "white meat."

Seafood processors in Clatsop County process nearly all yellowfin and skipjack tuna landed in Oregon. About 75 percent of Oregon's albacore catch is also landed there. Fishers land the remain-

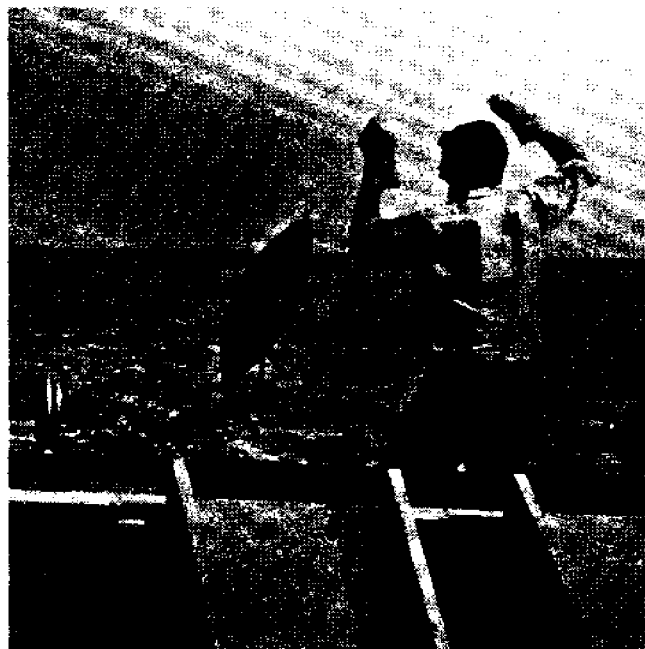


Seafood workers hand-fillet groundfish caught off the Oregon coast.

ing 25 percent in other Oregon ports such as Coos Bay and Newport. Fish buyers ship most of these albacore landings either to Astoria or California for processing.

The albacore fishery has experienced large catch fluctuations, with a harvest of 22 million pounds in 1944 dropping to 450,000 pounds in 1954. A record high 38 million pounds were landed in 1968, but the total slipped again to 8 million pounds only 3 years later in 1971.

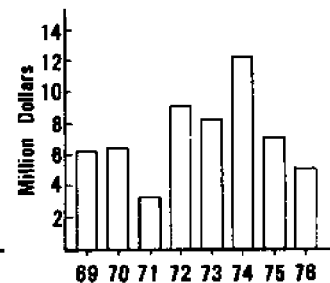
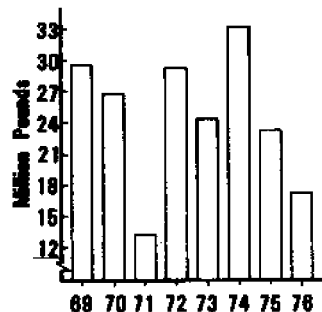
Five-year average tuna landed values were slightly more than \$8 million and almost 25 million



During the summer large numbers of albacore tuna are caught off Oregon's coast, and many more are processed by Oregon canneries.

TUNA

YEAR	POUNDS ROUNDWEIGHT	ESTIMATED VALUE
1976	17,348,000	\$5,887,000
1975	23,584,000	\$7,505,000
1974	33,040,000	\$12,571,000
1973	24,425,000	\$8,698,000
1972	29,234,000	\$9,136,000
1971	13,092,000	\$3,628,000
1970	26,937,000	\$8,924,000
1969	29,828,000	\$6,712,000



pounds during the period 1971 through 1975. The 1976 landings included more than 17 million pounds, valued at just under \$6 million.

The future of the tuna industry, particularly for yellowfin and skipjack, remains uncertain. With the advent of the federal Marine Mammal Protection Act of 1972, quotas have been placed on the number of porpoises that may be taken in the nets of tuna seiners incidental to the tuna catch. These restrictions pose very real harvest problems until new reliable techniques can be created to significantly reduce or eliminate the capture of porpoises usually found with schools of yellowfin and skipjack.

Groundfish

Groundfish or "bottomfish" landings have been the most stable over the past 8 years. Landings averaged between 21 and 23 million pounds each year except 1976. The estimate for 1976 landings is almost 27 million pounds.

Fishers harvest groundfish using 50- to 90-foot boats called trawlers. They fish from 3 to 40 miles or more off the coast. At least 23 varieties of bottomfish are landed. These include Pacific cod and ocean perch, rockfish, turbot, flounder, red snapper, ling cod, and several types of sole, including petrale, sand, lemon, English, and dover sole. Each fish differs in value according to individual characteristics of the meat and development of respective markets.

Lack of domestic markets has been a major problem for growth in the groundfish industry. Consumers, accustomed to eating beef and poultry, are reluctant to try new products, especially

when they know little about them. The United States per capita seafood consumption is lower than most seafood-producing countries.

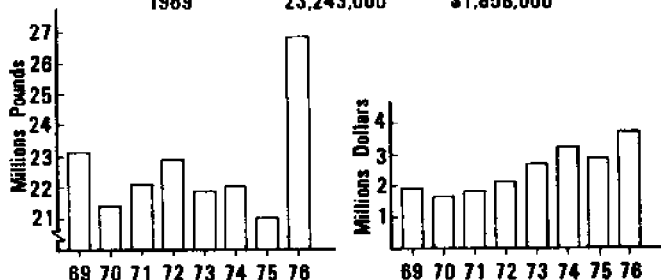
In Oregon, the groundfish industry has the lowest landed values of the five major fisheries with a \$2.5 million average during the 5-year period 1971 through 1975. Total value of landings increased to slightly more than \$3.7 million in 1976.



The groundfish industry has been Oregon's most stable fishery, though landed value is relatively low.

GROUND FISH

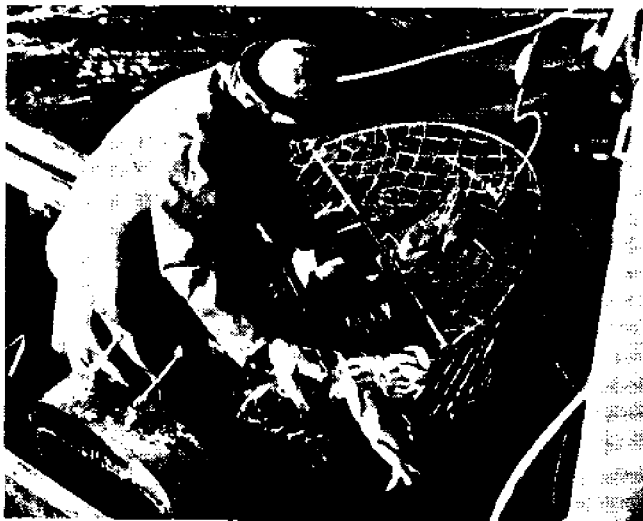
YEAR	POUNDS ROUNDWEIGHT	ESTIMATED VALUE
1976	26,799,000	\$3,752,000
1975	21,024,000	\$2,843,000
1974	22,098,000	\$3,234,000
1973	21,944,000	\$2,623,000
1972	22,801,000	\$2,166,000
1971	22,040,000	\$1,812,000
1970	21,392,000	\$1,605,000
1969	23,243,000	\$1,858,000



Crab

The Dungeness dominates Oregon's crab fishery. Large circular wire traps called "crab pots," baited with dead fish (usually squid or clams) are used to capture the Dungeness crab.

Crab fishers can harvest only mature male crabs 6¼ inches wide across the back or larger. Under current Oregon law, trapped females must be returned to the water unharmed. The Fish and Wildlife Department estimates that up to 90 percent of the offshore legal-sized males are harvested each year and average just over 2 pounds each. This large percentage of male harvest appears to have little effect on the whole population since the 2-year-old crabs are sexually mature but not legal size. By the time a male crab reaches 6¼ inches, it will have had the opportunity to mate for two seasons. Also, each male can mate with more than one female.



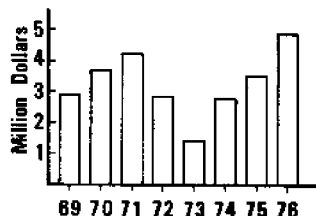
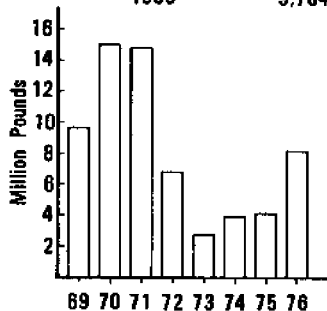
Dungeness crab are taken in large wire traps called pots. Average landed value has been about \$3 million annually.

The cyclical nature of the available harvest has created market problems for the Dungeness crab. During each of the last peak cycle years of 1970 and 1971, almost 15 million pounds were landed. However, the cycle bottomed out in 1973, when only 2.3 million pounds were caught.

Average landed values for the 5-year period, 1971 through 1975, were nearly \$3 million. A record year in 1976 produced nearly \$5 million. Landings are evenly distributed along Oregon coastal counties, with the exception of Lane County. In 1976, however, almost half the landed value of crabs was attributed to Curry County.

CRAB

YEAR	POUNDS ROUNDWEIGHT	ESTIMATED VALUE
1976	8,134,000	\$4,881,000
1975	4,027,000	\$3,503,000
1974	3,918,000	\$2,761,000
1973	2,350,000	\$1,340,000
1972	6,762,000	\$2,866,000
1971	14,876,000	\$4,245,000
1970	14,929,000	\$3,732,000
1969	9,784,000	\$2,934,000

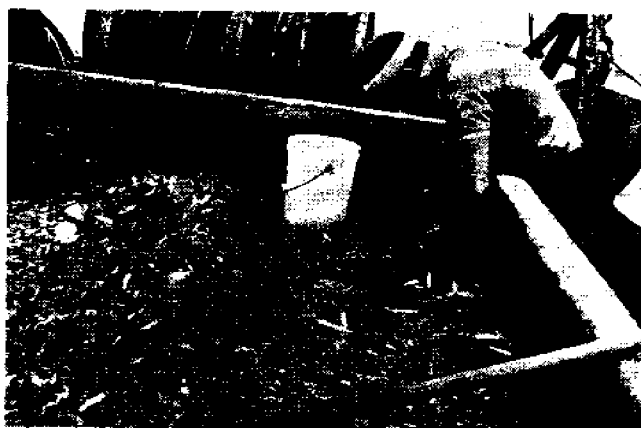


Shrimp

Oregon's Pacific coast shrimp landings began to grow in the late 1950's. In 1976 fishers landed more than 25 million pounds.

In contrast to the large shrimp of the gulf coast, Oregon's shrimp are the small pink variety used to garnish cocktails, salads, and other dishes. Large trawlers tow socklike nets just off the ocean's floor to harvest the shrimp.

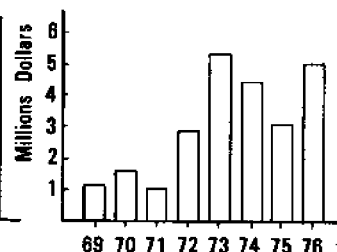
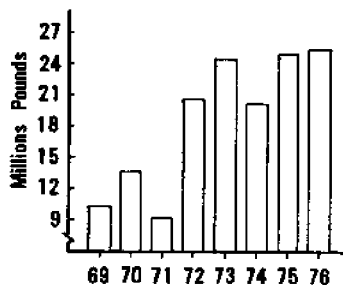
The marked increases in shrimp landings are due to a combination of factors. First, fishers' knowledge of the shrimp ground locations has increased. Second, new technology has increased processing capacity and efficiency. Shrimp are now peeled by machine, for example, rather than



Shrimp harvests off the Oregon coast have increased dramatically in recent years.

SHRIMP

YEAR	POUNDS ROUNDWEIGHT	ESTIMATED VALUE
1976	25,455,000	\$5,093,000
1975	24,084,000	\$3,131,000
1974	20,314,000	\$4,420,000
1973	24,517,000	\$5,394,000
1972	20,731,000	\$2,870,000
1971	9,095,000	\$1,110,000
1970	13,572,000	\$1,629,000
1969	10,268,000	\$1,130,000



hand-picked. Increased demands for Oregon's shrimp have opened new markets for the product and larger, dual-rigged boats are now being used to increase harvests.

Landing values in 1976 were estimated at slightly more than \$5 million, which is more than the 5-year average of \$3.4 million from 1971 through 1975. However, a record \$5.4 million in landings were recorded in 1973.

Fishers land most shrimp at Astoria, Newport, and Coos Bay, where larger numbers of processing facilities exist. The shrimp boats, generally larger than other Oregon fishing vessels, need the improved harbors for unloading and moorage that these ports offer.

Other seafood

Several kinds of products other than the five major categories previously discussed also contribute to the Oregon seafood industry. They include oysters from Tillamook, Yaquina, and Coos Bay; sturgeon and smelt from the Columbia River; clams from Clatsop County beaches and Coos Bay; and shad from the Columbia River and Winchester Bay in Douglas County.

Over the years these assorted products have contributed between 1 and 2 percent of the total value of Oregon's seafood industry. For example, Oregon oysters were valued at \$417,000 in 1976.



Oysters are raised in the bays at Tillamook, Yaquina, and Coos Bay. While not a major fishery, they contribute regularly to our economy.

Average Prices Paid to Fishers, 1969 through 1976

Average prices paid to Oregon fishers for seafood products can be determined by dividing the total estimated value by the total number of pounds landed. Table 7 provides rough estimates of the average prices fishers have received for their catches annually since 1969.

Table 7. Prices Received by Fishers, 1969 through 1976.

Year	Salmon	Tuna	Groundfish	Crab	Shrimp
1969	\$.40	\$.23	\$.08	\$.30	\$.11
1970	.47	.26	.08	.25	.12
1971	.33	.28	.08	.29	.12
1972	.53	.31	.10	.42	.14
1973	.81	.36	.12	.57	.22
1974	.70	.38	.15	.70	.22
1975	.84	.31	.14	.87	.13
1976	1.37	.34	.14	.60	.20

Economic Concepts

The value-added concept

Economic values generally illustrate the relative importance of each seafood. Value is added to products at each step of the production and marketing process.

A mature salmon swimming in the ocean, for example, has no value in economic terms. Only after the salmon is caught by a fisher does the value-added process begin.

This value-added process will continue from the *fisher* to *processor* to *wholesaler* to *retailer* and ultimately ends when a *consumer* purchases the seafood product. The value-added amounts differ according to each step of processing and also among seafood products. The value of Oregon's seafood products after they are processed and marketed is estimated to be more than twice the value received at the dock by fishers. This is an important point to remember since the estimates presented here represent only the landed value of the seafood product. It does not include estimates of value-added at the *processor*, *wholesaler*, or *retailer* stages of production. These estimates are not currently available.

Fisheries also have social and aesthetic values. However, it is difficult to measure such values. Dollar values do represent an estimate of worth that people understand.

Multipliers

Multipliers are a measure of economic impact from money spent in an economy. Consider the following example:

Suppose a Clatsop County fisher receives \$1,000 for the catch. Some of this money *will be spent locally* on fuel, loan payments, and fishing supplies. A portion of the \$1,000 will go for home mortgage and auto loan payments, groceries, clothing, taxes, and so forth. Hired labor will be paid wages.

Some of the original \$1,000 *will not be spent locally*. Taxes paid to the federal government or certain equipment and supplies purchased in another county or state are examples of payments made *outside* the local economy and represent

"leakages." These leakages have little impact on the local community.

Money spent in the local economy will have a *direct impact*. The hired labor, for example, will spend wages for such living needs as housing, food, entertainment, etc.

What about the *indirect impacts* of spending patterns? These are also important. For example, the hired labor who received wages (direct impact) caused by the fisher's original \$1,000 will make local payments (indirect impacts) for loans, groceries, and taxes. Some of this money will also leak from the community in the form of outside payments. This process of *local* and *outside* payments will continue until all of the original \$1,000 has leaked from the community.

Through a process of determining the *direct* and *indirect* impacts and *leakages* for any business activity the multipliers can be determined.*

Table 6 shows the multipliers obtained for the seafood industry in several Oregon coastal counties.

Table 6. Multipliers for Selected Oregon Coastal Counties.

County	Year obtained	Fishers	Seafood processors
Clatsop	1968	2.7	1.8
Tillamook	1973	2.7	3.0
Douglas	1970	2.7	N/A

Multipliers for the fishers in the three counties show a remarkable similarity. The 2.7 multiplier indicates that for every \$1.00 received by the fisher, another \$1.70 of local business activity will be generated, for a total local impact of \$2.70:

$$\begin{array}{r}
 \$1.00 \quad + \quad \$1.70 \quad = \quad \$2.70 \quad = \quad 2.7 \\
 \text{(initial} \quad \text{(additional} \quad \text{(total impact} \quad \quad \\
 \text{payment)} \quad \text{local} \quad \text{on local} \quad \quad \text{(multi-} \\
 \quad \quad \text{business)} \quad \text{community)} \quad \quad \text{plier)}
 \end{array}$$

Clatsop and Tillamook county multipliers for seafood processors differ. The business patterns seafood processors generate in these two communities explain the differences.

The 3.0 multiplier in Tillamook County indicates that seafood processors, when considered as a whole unit, do more local business than those in Clatsop County.

These multipliers, in general, *can not* be added

* Economic studies to discover the multipliers for a number of Oregon counties have been completed by researchers in the Department of Agricultural and Resource Economics at Oregon State University. More detail on these studies can be obtained by contacting the Department at OSU or obtaining copies of the publications listed under Suggested Reading.

together. They should each be considered separately.

Caution about multipliers

The size of the multiplier is obviously not the only tool available for evaluating economic activity. The total volume of sales, for example, is also important.

In 1968, the total sales of seafood processors in Clatsop County was about \$40 million. The total sales for seafood processors in Tillamook County were slightly more than \$1 million in 1973.

These figures are not directly comparable, but they do provide some idea of how economic information can be used in evaluating the roles of various industries or business activities. The seafood-processing multiplier in Clatsop County may be smaller than Tillamook County, but the volume of sales in Clatsop County is much larger.

The concepts *value-added* and *multiplier* can be useful tools when analyzing economic activities. The concepts have been used improperly in some instances, and the myths and misunderstandings created have been unfortunate.

Again, it is important to recognize that the information presented in this report does not include complete estimates of value-added or the multiplying effect of business activities in the seafood industry. (Refer to the list of suggested readings on these concepts.)

Processing and Marketing

Large firms that market several seafood products, as well as small firms specializing in a few products, characterize Oregon's seafood industry. Most larger firms find it necessary to maintain branch processing plants or buying stations, especially in the smaller ports, while the main plant or office may be in Sacramento or Seattle.

Europe has become a major market for Oregon salmon, with Southern California the second most important.

California is Oregon's major customer for various groundfish species. However, processors send some quantities to Portland and Seattle for local consumption or to other U.S. metropolitan areas.

California is also Oregon's major shrimp customer. Some shrimp goes to Europe and other markets in the United States such as Honolulu, Detroit, and Seattle. Oregon consumers buy only about 10 to 15 percent of the catch.

More than 60 percent of Oregon-produced Dungeness crab is marketed in California, primarily in San Francisco and Los Angeles. Some crab finds its way to markets in Seattle, and some remains in Oregon.

Southern California tuna canneries buy most of Oregon's albacore tuna. Oregon processed tuna is marketed throughout the United States.

Table 8. Processing and Marketing of Oregon Seafood Products.

Product	Largest share of processing	Major market
Salmon	Fresh/frozen (whole)	Europe
Tuna	Canned	United States
Groundfish	Fresh/frozen fillets	California
Crab	Canned fresh/frozen	California
Shrimp	Canned fresh/frozen	California

Future of Oregon's Seafood Industry

The future of Oregon's seafood industry depends on several important factors: management of fishery resources, economic and social needs of the industry, and the impact of salmon ranching.

Management of fishery resources presents a large problem to regulatory authorities. Governments working together at the state and federal levels must determine the length of fishing seasons, size and poundage quotas, and perhaps limit entry to particular fisheries.

The seafood industry, in turn, desires a reliable source of income to meet its economic needs. It wants the same sense of economic security others demand. Managers must balance the industry's welfare and fishery conservation with plans agreeable to both sides.

The Fisheries Conservation and Management Act of 1976, or "200-mile limit," provides protection from foreign fishers encroaching on United States fisheries. Although the act does not eliminate foreign fishing, it does give the United States seafood industry first opportunity at any fishery within waters 200 miles or closer to native shores. Foreign fishers may harvest any additional fisheries on a "maximum sustainable yield" basis, and they pay a fee for this privilege.

The act is expected to stimulate the United States seafood industry to explore new fisheries such as Pacific hake. It also protects native salmon on the high seas beyond the 200-mile zone, except where the fish enter a foreign nation's fisheries zone.

Salmon ranching may return some of the lost numbers of fish once known in Oregon. However, early estimates indicate that any large economic impact from salmon ranching is still 10 to 15 years away.

Several large corporations have plans for building salmon-ranching hatcheries in Oregon, and a limited number already exist. Those in current operation raise chum, chinook, and coho salmon, and plans to include pinks are underway.

The range of return for aquaculture-reared salmon currently shows that a limited number (1 or 2 percent) of the juveniles released eventually will return to the hatchery. Some hatcheries also hope to speed up the growth rate of their young salmon by using warmed water, cutting down the normal hatchery rearing period from 16 months to only 6 months.

The U.S. seafood industry shows uncertainty towards new management plans and developments such as the 200-mile limit and salmon ranching. Concern with new government regulations intervening in its affairs and over the intrusion of large corporations into the fish-harvesting arena confront the industry. Some fishers fear that large numbers of fish produced by salmon ranchers could drive the price of catches down.

Before harvests can be increased, markets for the new seafood products must be developed. Processing facilities need to be updated and enlarged to sustain a larger seafood industry. Whatever the future brings, change is just around the corner for Oregon's seafood industry.

Suggested Readings

Several helpful publications on economics of Oregon's seafood industry can be obtained from the Department of Agricultural and Resource Economics, Oregon State University, Corvallis, Oregon 97331.

1. *Income Multipliers in Economic Impact Analysis—Myths and Truths*, Coppedge, Robert O. and Russell C. Youmans, Oregon State University Extension Service, Special Report 294. Describes multipliers, value-added and turnover rates and noted differences among concepts.
2. *The Tillamook County Economy: A Working Model for Evaluating Economic Change*, Youmans, Russell C., William Rompa, and Edward Ives, Oregon State University Extension Service, Special Report 478, March, 1977. Explains input-output study conducted with explanation for further use.
3. *Douglas County, Oregon: Structure of a Timber County Economy*, Youmans, Russell C., David R. Darr, Roger Fight, and Dennis L. Schwitzer, Oregon State University Agricultural Experiment Station, Circular of Information 645, December, 1973. Describes input-output study. Includes technical coefficients.
4. *Marine Economics Data Sheets*. A large number of one-page descriptions on fishing vessels; includes information on market value, construction characteristics, tonnage, equipment, variable, and fixed costs of operation, etc.

Copies of the following OSU Sea Grant publications contain economic information on Oregon's seafood industry and are available from: Sea Grant

Communications, Oregon State University, Corvallis, Oregon 97331.

5. *Fish or Cut Bait*, Smith, Courtland L., Oregon State University Sea Grant College Program, Publication No. ORESU-77-006. A brief history of Oregon's seafood industry.

6. *The Salmon Processing Industry*, Jensen, William S., Oregon State University Sea Grant College Program, Publication No. ORESU-T-76-003. Recounts the history and development of Pacific salmon processing.

7. *Oregon's Commercial Fishermen*, Liao, David S. and Joe B. Stevens, Oregon State University Sea Grant College Program, Publication No. ORESU-T1-75-001. Describes characteristics of Oregon's fishers in 1972.

8. *Oregon Fish Fights*, Smith, Courtland L., Oregon State University Sea Grant College Program, Publication No. ORESU-T-74-004. A history and analysis of conflicts between fishing groups in Oregon.



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