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FACTORS IN ESTABLISHING AN ALBACORE TUNA PROCESSING FACILITY IN CLATSOP COUNTY, OREGON

by

William J. Rompa

for

Sea Grant College Program

Oregon State University

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PREFACE

During the early spring of 1980 the Sea Grant College Program at Oregon State University was requested to explore the possibilities of establishing an albacore tuna processing facility in Clatsop County, Oregon. This request was primarily initiated by a local subcommittee of the Clatsop County Economic Development Committee and a subcommittee of the Oregon Economic Development Commission examining problems of the lower Columbia River economic development.

The author was requested to head such a study effort by the director of the Sea Grant College Program at OSU. Essentially, the study would attempt to assist local and state officials in their decision of whether or not to pursue the re-establishment of a local tuna processing facility after the closure of a large tuna plant owned and operated by Bumble Bee Seafoods during the winter of 1979 in Astoria.

At that time, a great local and state interest surfaced as to the devastating economic impact the closure of such a large plant would have on a rural economy such as Clatsop County which was heavily dependent on the tuna processing industry as one of its major basic economic activities.

The basic issue, whether a tuna processing facility can or cannot be economically and efficiently operated and compete within the industry, is controversial, to say the least. Two distinct camps of opinions exist as to whether re-establishing a tuna processing facility is "feasible." They are:

--If a large company, like Bumble Bee Seafoods, with all the resources available to them and their long-standing history and experience in the seafood processing industry decided not to continue their tuna operations in Clatsop County, others attempting to follow in their

tradition are sure to fail.

--Contrary to the above opinion, a large worldwide food company such as Castle and Cooke, Inc., owners and operators of the Bumble Bee tuna plant in Clatsop County, make decisions on terminations of their facilities according to the entire basis of their total activities. As a large corporation, they may have found it more advantageous to transfer their investment from Clatsop County to another location. This reasoning maintains that a large stock of albacore tuna will continue to maintain itself off the Pacific northwest coast. The resource will continue to be harvested and will need to be processed. The processing can be accomplished in Clatsop County by a processing operation smaller in scale than the previous Bumble Bee plant but accomplished on a profitable basis.

With these two diverse prevailing opinions, this study has attempted to determine which of the two opinions might be closer to the truth. It was recognized from the inception of this effort that the task at hand would not be easily accomplished.

Several factors seriously impacted the study. First, resources to accomplish the required tasks were limited. The local community had no financial resources to assist the study effort and the finances of the state through the University were also limited.

Secondly, the number of personnel committed to assisting the study was limited. As with many university efforts, students were utilized to assist in researching the tasks at hand. Students are engaged in a learning process and their work must be carefully examined. Also, the nature of the tuna processing industry makes it a difficult topic to comprehensively investigate. Economists would describe the tuna

processing industry as an "oligopoly" derived from the Greek language meaning "few sellers" or "competition among the few." (1) There are very few firms actively engaged in the processing and marketing of tuna. The nature of their business relations are complex and easy access to information concerning the activities of these firms is not readily available.

Finally, the urgency and need to make some realistic estimation of the alternative to re-establish a tuna processing facility in Clatsop County was utmost. Most workers who were unemployed by the tuna plant closure were eligible for unemployment benefits. However, these benefits are likely to begin running out within 1980. It is after this interim period when the real impact of the tuna plant closure will be realized in the local community. Any viable economic development activity such as the re-establihsment of a small tuna processing facility will help buffer the effects of the large plant closure.

INTRODUCTION TO TUNA PROCESSING IN CLATSOP COUNTY

The harvesting and processing of albacore tuna in the United States has followed an unusual pattern. Although the ancient Greeks and Romans referred to tuna as "thunnos" or "chicken of the sea," albacore tuna was considered a "trash fish" until 1885 in the United States. It was not until 1936 when salmon fishermen discovered albacore tuna off Oregon that the species was commercially harvested. (2)

About 75 percent of Oregon's albacore tuna catch is landed in Clatsop County. A number of small albacore tuna processors were operating in the county until recent times. However, a large tuna processing plant at Astoria owned and operated by Bumble Bee Seafoods

Table 1: DIRECT AND INDIRECT EMPLOYMENT LOSS - TUNA CANNERY CLOSURE, CLATSOP COUNTY, OREGON, 1979

SECTOR	INCOME (IN 1,000's)	EMPLOYMENT (JOBS)
SEAFOOD PROCESSORS	$ 40,576	348
AGRICULTURE	132	4
MANUFACTURING	792	9
CONSTRUCTION	1,184	10
AUTOMOTIVE SALES/SERVICE	3,252	17
RETAIL/WHOLESALE GOODS	8,448	69
RETAIL SERVICES	1,720	64
PROFESSIONAL SERVICES	1,828	38
TRANSPORTATION	140	2
GOVERNMENT	3,012	71
HOUSEHOLDS	14,904	N/A
TOTAL	$ 75,988	632 (JOBS)

SOURCE: OREGON STATE UNIVERSITY.

has accounted for the vast majority of tuna processed in Clatsop County for the past twenty-five years.

The Bumble Bee plant at Astoria processed not only local albacore tuna caught off the Oregon, Washington, and California coasts but also imported quantities of yellowfin and skipjack tuna to be processed. Unlike the local albacore, yellowfin and skipjack tuna are harvested on the high seas near Mexico and Central and South America. Bumble Bee also imported Japanese caught albacore to be processed at the Astoria plant.

The Astoria tuna plant became a significant economic activity in Clatsop County over the years. Although the total production at the plant varied from year to year, the Bumble Bee facility was commonly referred to as a "million can cannery." Total production on the average was about one million cans.

The economic impact of the plant closure is significant. Table 1 estimates the total business income and employment loss in Clatsop County due to the closure. (3) Although approixmately 350 jobs, for example, were lost as a direct result of the loss, these "primary" jobs will cause a ripple or multiplier effect throughout the entire local community. After unemployment benefits run out, seafood workers who lost their jobs will no longer have available income to spend in other sectors of the local economy. The total loss of jobs in the local community is 632 or almost twice those caused by the initial closure.* The estimates

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*For a more complete discussion of multipliers and their range for Clatsop County see William J. Rompa, A Working Model of the Clatsop County Economy, Special Report 540, Oregon State University Extension Service, Corvallis, Oregon, 97331, April 1979.

in Table 1 assume that local fishermen will continue to fish and derive income from albacore tuna. Their catches, however, may be landed elsewhere other than Clatsop County. Because of the Bumble Bee closure, Astoria and the surrounding ports can no longer be designated "canning ports." This voluntary designation between processors and fishermen allows for higher prices to be paid for catches of albacore landed in canning ports. The price differential can be as high as $70/ton and is significant enough to motivate fishermen with large catches of albacore to unload in designated canning ports.

In summary, the closure of the Bumble Bee facility is likely to cause permanent changes in the structure of the local economy. Most of these changes will be due in large part to the decreased household income and available for spending in the local economy. Some speculation has been given to the social as well as economic changes that can be caused by the plant closure. However those social impacts are beyond the scope of this report.

One certainty is evident. Clatsop County's economy, once dependent on three major export industries: timber and wood products, the seafood industry, and tourism, will now be more heavily dependent on two of the three.

PROCESSING TUNA - AN OVERVIEW OF THE INDUSTRY

Before examining the tuna processing industry in great detail, some general review of seafood trends are necessary. This will provide some perspective from which the tuna industry can be examined.

Figure 1 indicates that since about 1969 world seafood catches have stabilized at about 65 million metric tons. Figure 2 shows that the United States share of this world catch has remained fairly stable at about 2.5 million metric tons and is about equal to the catch for the country of Norway for most years. At least four major countries far surpass catches of the U.S. These include Japan, USSR, China and Peru.

Figure 3 indicates that the per capita consumption of seafood has remained stable at about 12 pounds since 1965. Figure 4 shows the increasing value and amount of seafood imports as compared with U.S. exports which have remained stable since 1960.

From examination of these four figures it is not difficult to describe a general seafood supply and demand scenario for the U.S. simply stated, while world-wide supplied of seafood have not increased (along with stable U.S. supplies), a consistent demand by a growing national U.S. population has caused a large increase in the value of U.S. imports of seafood. Some of this value increase is due strictly to inflation but as we will discover in a later discussion, the increase in value has risen faster than the inflation rate.

The tuna industry, in general, follows a trend similiar to the previous scenario. While a number of different tunas are harvested in the temperate and tropical waters of all major oceans, about two-thirds of the world catch is harvested from the Pacific Ocean. The United States, Japan, and western Europe, with about 20 percent of the world's population, consume approximately 95 percent of the world tuna catch. In more recent years the United States has consumed about 50 percent of the world catch. (4)

The principal product of the tuna industry is canned tuna in 1/4 lb.

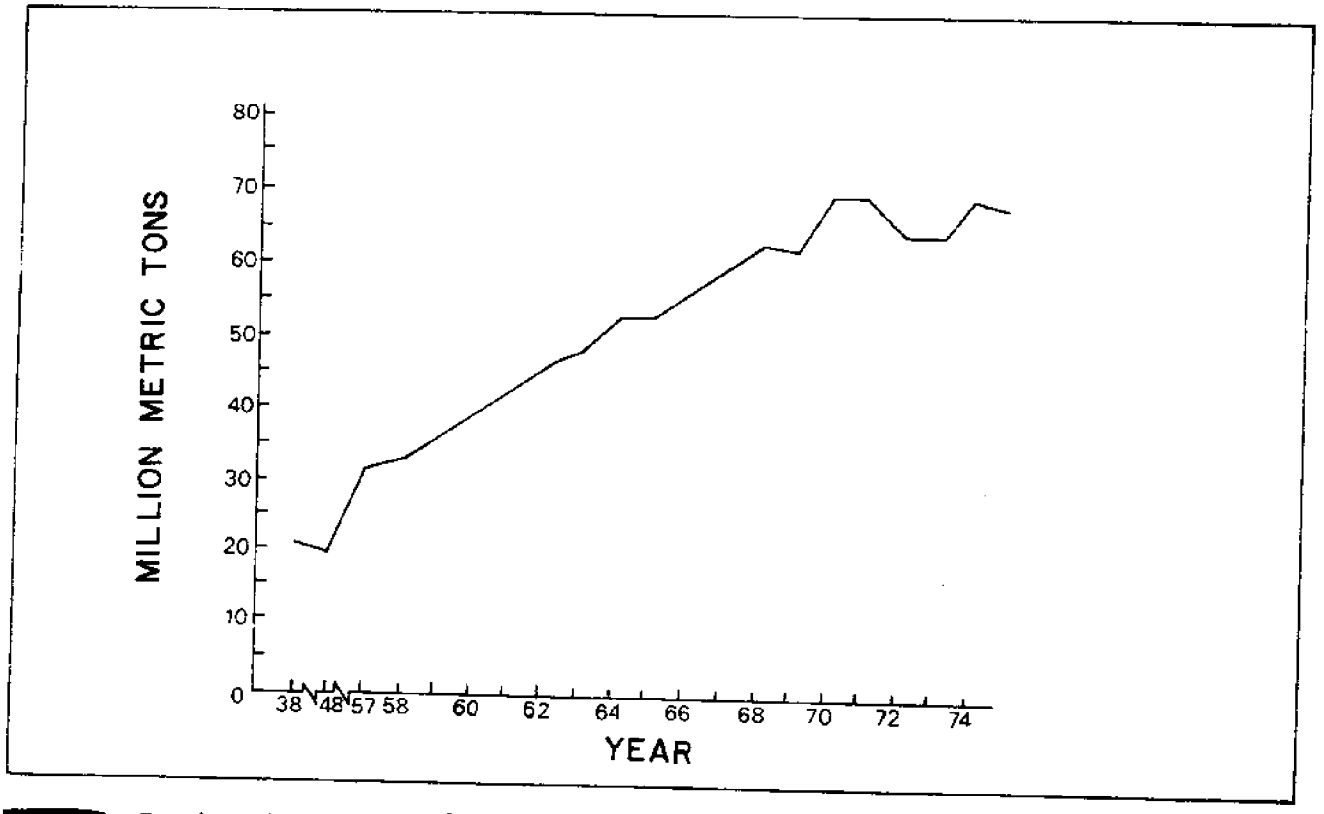


FIGURE 1: Total world catch, 1938-1975. From Yearbook of Fishery Statistics: Catches and Landings 1938-1975. Rome; FAO, United Nations.

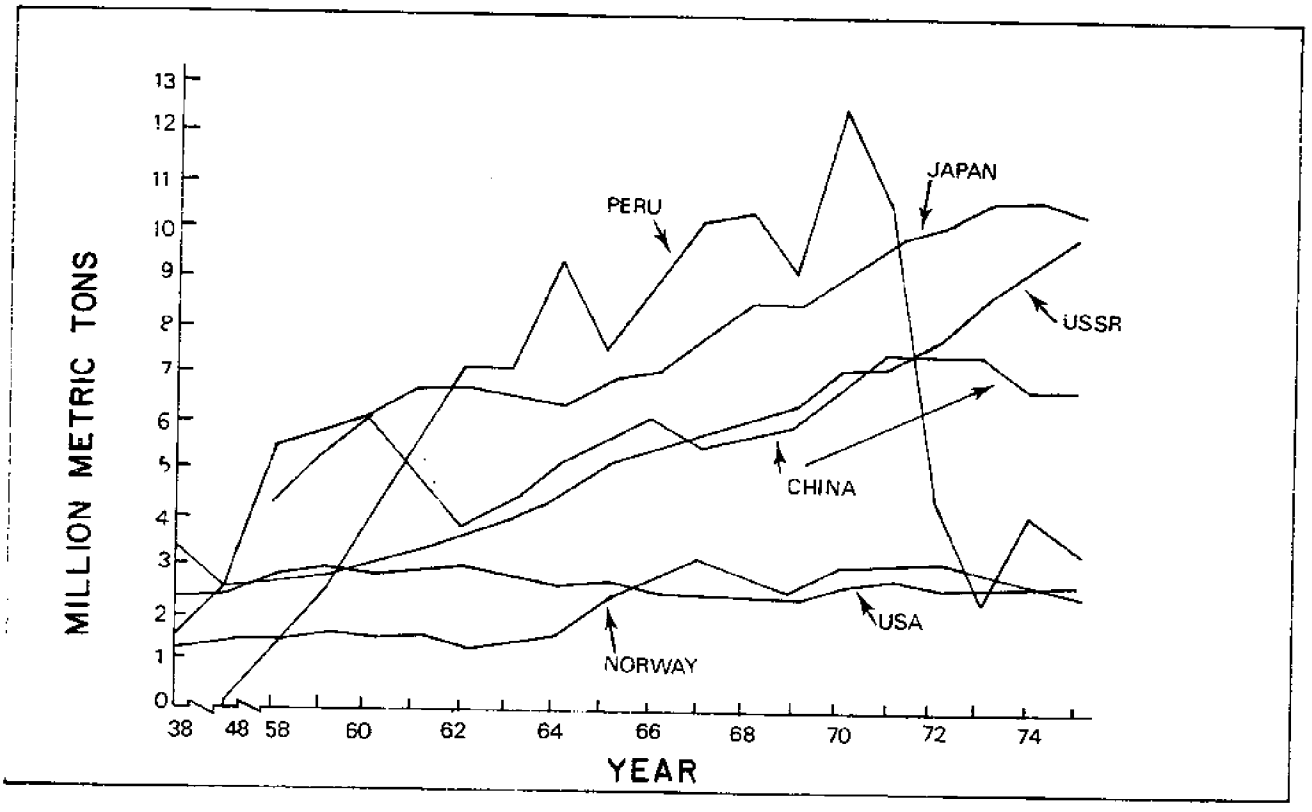


FIGURE 2: World catch by leading nations, 1938-1975. From Atlas of the Living Resources of the Seas. FAO Department of Fisheries, Rome. 1972.

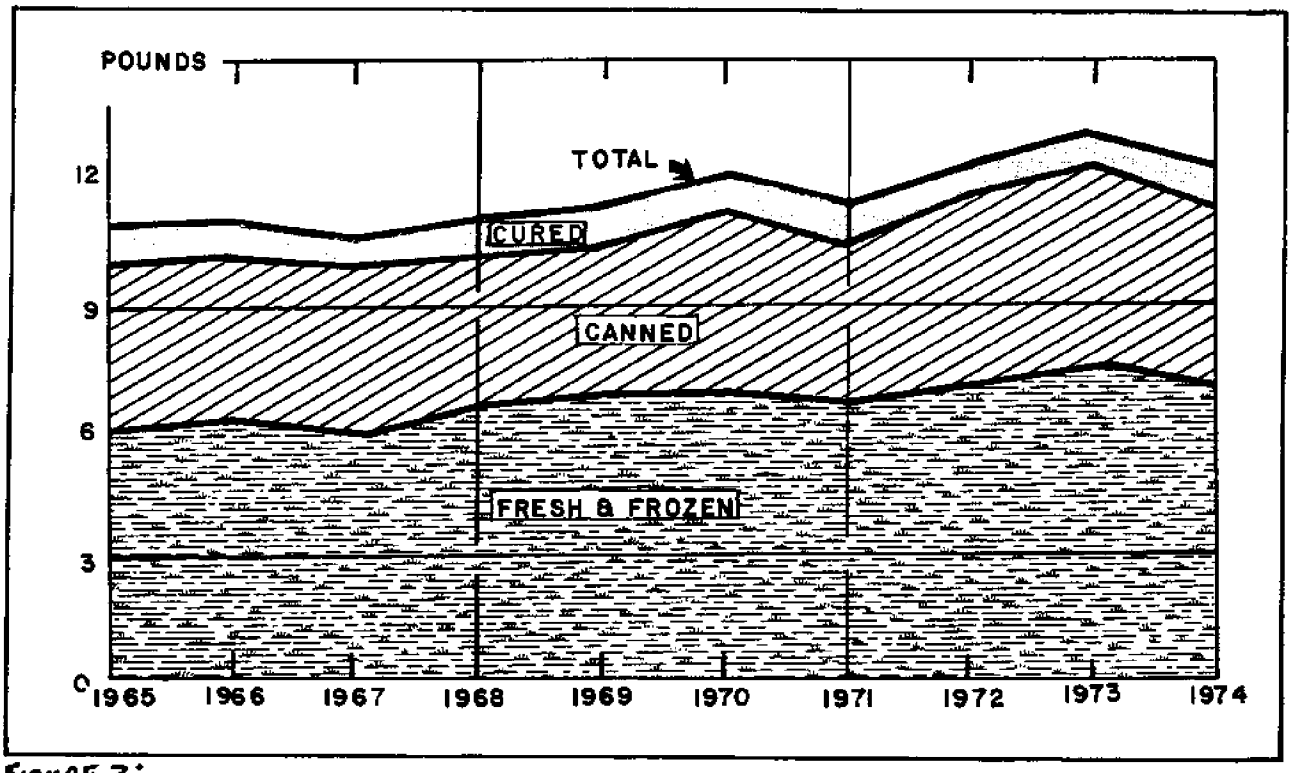


FIGURE 3: Per capita consumption of commercial fish and shellfish, 1965-74 (Edible Meat)

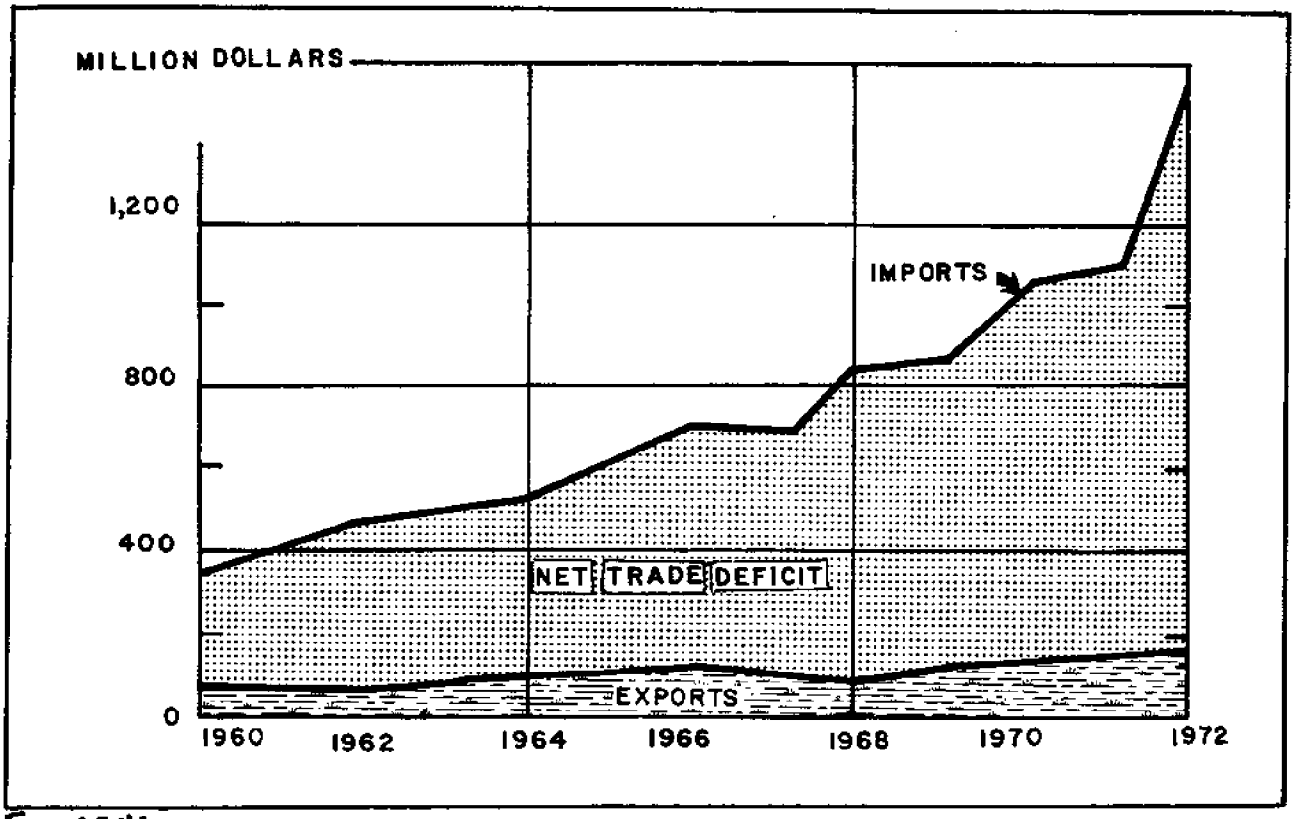


FIGURE 4: Value of U.S. Imports and exports of fishery products, 1960-72.

cans (3 1/2 oz.), 1/2 lb. cans (5 1/2 oz.), 1 lb cans (11 1/2 oz.) and 4 lb. cans (46 oz.). The canned tuna can represent a wide variety of "light meat" species including yellowfin, skipjack, bluefin or bigeye tuna. Albacore tuna is considered a premium product and is the only tuna that can legally be canned and labeled "white meat." In addition to producing canned tuna for human consumption, the tuna industry also uses scrap dark meat and waste products to produce pet food, fish meal, oil for paint and other solubles. Tuna canneries are most efficient in the use of the entire tuna resource.

About 40 percent of the total U.S. tuna pack comes from domestic landings. The remainder for U.S. consumption is imported tuna which comes from a wide variety of foreign fishing nations. Figure 5 indicates the relationship between U.S. domestic and imported supplies of all species of tuna.

The U.S. tuna canning industry is spread over a wide geographic area. Five commercial canneries exist in southern California (San Pedro and San Diego areas). One plant operates in Hawaii, five in Puerto Rico and two in American Samoa.

Canneries in southern California employed an average of 6,215 people during 1978 while Puerto Rican canneries employed and average of 6,834 people. While these canneries process other fish such as bonito, anchovies and mackerel, tuna is the main product produced. (5)

Albacore tuna represents 10-15 percent of the total U.S. tuna supply. Figure 6 shows that U.S. domestic supplies of albacore have decreased since 1960 while imported raw and canned supplies have generally increased.

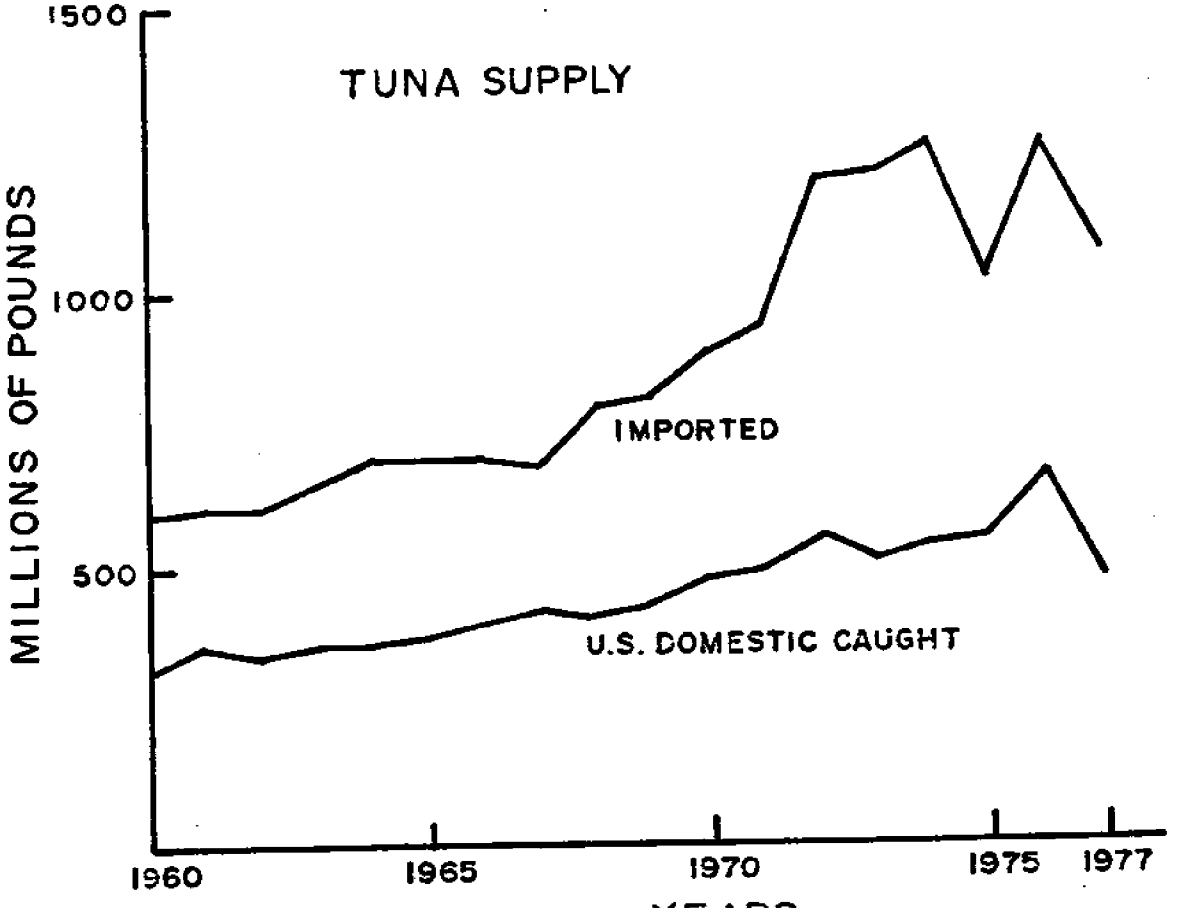


FIGURE 5: SOURCE: NATIONAL MARINE FISHERIES SERVICE

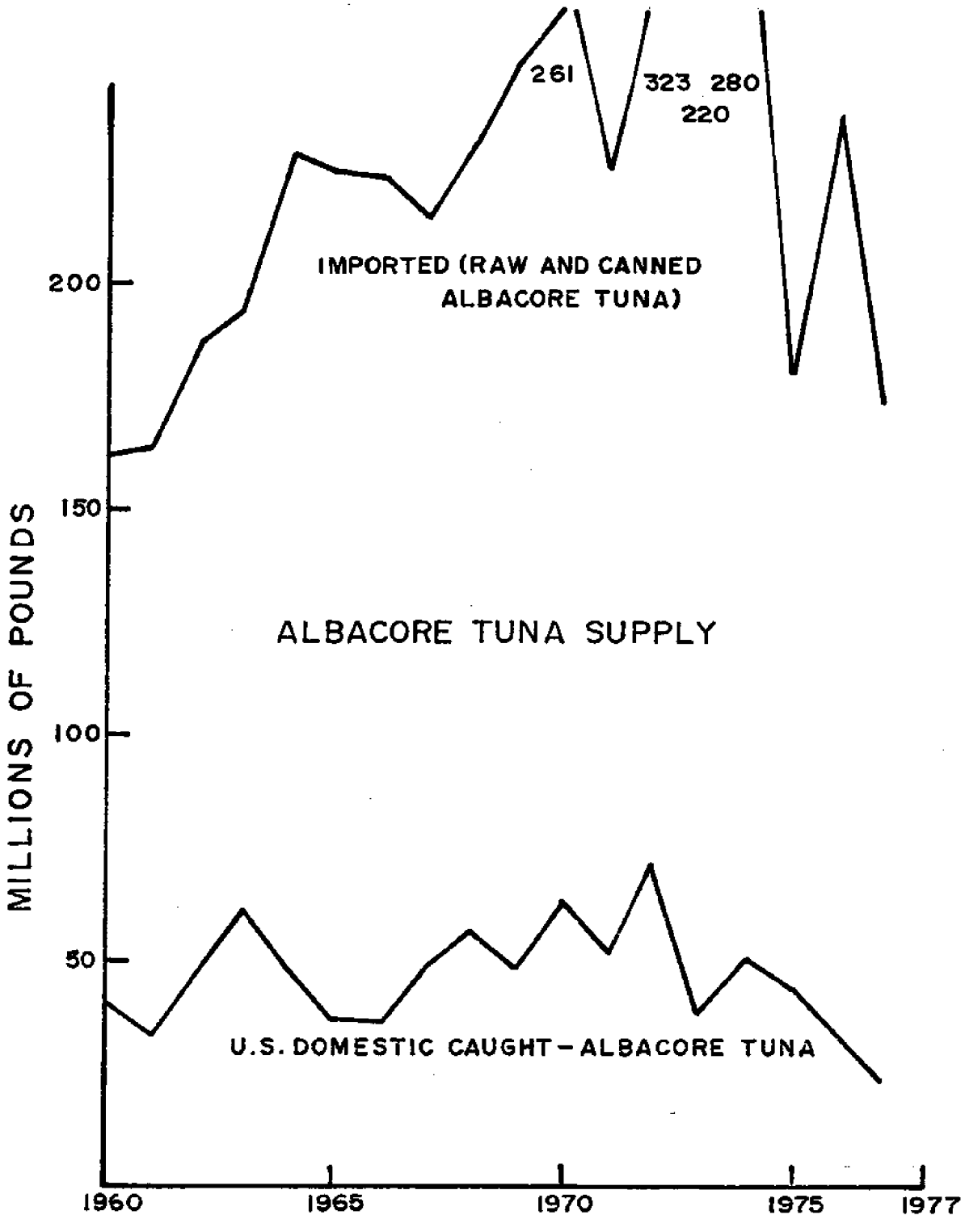


FIGURE 6: NATIONAL MARINE FISHERIES SERVICE

TABLE 2. WORLD ALBACORE TUNA CATCH BY OCEAN AND YEAR (TONS)

YEAR	ATLANTIC	PACIFIC	INDIAN	TOTAL
1967	74,900	119,700 (55%)	21,000	215,600
1968	72,100	95,400 (52%)	16,000	183,500
1969	76,200	101,300 (47%)	37,800	215,300
1970	70,500	101,600 (54%)	16,500	188,600
1971	85,300	122,500 (56%)	11,000	218,800
1972	85,200	119,000 (57%)	5,300	209,500
1973	74,500	147,500 (60%)	22,800	244,800
1974	72,400	140,700 (60%)	22,800	235,900
1975	61,900	112,100 (60%)	15,400	189,400
1976	76,800	148,800 (61%)	15,600	241,200

Table 2 indicates the world albacore tuna catch by ocean and year from 1967-1976. The percent of total catch for the Pacific has grown steadily from 55% in 1967 to 61% in 1976. The "maximum sustainable yield for North Pacific albacore is estimated at 125,000 metric tons. (6)

Domestic albacore tuna landings provide approximately 10-20 percent of U.S. consumption. Annually the U.S. imports 80-90 percent of its albacore consumption. (7)

Table 3 indicates the wide range of countries that import albacore tuna to the U.S. Major importers include Japan, Taiwan, South Korea, New Hebrides and South Africa.

At a more regional level, Figure 7 indicates the growth in albacore landings for Oregon and Washington since the early 1960's. Oregon landings far exceed those of Washington and large catch fluctuations are present.

Figure 8 indicates the proportion of annual catch harvested off various locations of the U.S. Pacific coast. For most years the catches off Oregon and Washington exceed more than 50 percent of the total west coast catch. An additional 20 to 30 percent is harvested off Vancouver Island. In total 80 to 90 percent of the U.S. domestic west coast catch is harvested between Vancouver Island and the southern tip of Oregon.

Oregon albacore tuna landings from 1936-1979 are included in Table 4. The landings are characterized by large catch fluctuations and at first glance seem to present a cyclical pattern.

In an attempt to discover a more exact relationship among the landings data, several statistical analyses were performed. The entire analysis of the Table 4 landings data are presented in Appendix A. A summary of conclusions is presented in Table 5.

Table 4 shows an unusually low landing total for 1979; the lowest since 1961. This occurrence caused considerable alarm in Clatsop County since low landings happened to coincide with the closing of the Bumble Bee tuna plant at Astoria. However, the summary information presented in

TABLE 3:

Proportions of United States albacore imports by country or location, 1974-1977

Country or Location	Year 1974	1975	1976	1977
Greece				*
Ecuador				1%
Canada	*	*	*	
Mexico	*	*	*	
Costa Rica			*	
Panama	*	*	2%	4%
Jamaica			*	
Trinidad	*	2%	*	*
Netherland Antilles	3%	6%	3%	
Chile			5%	
Uruguay	*		2%	*
Spain	1%		1%	1%
Laos			*	
Malaya	5%	4%	1%	2%
Singapore	*	*	*	
Philippines	*	*	*	
China			1%	*
South Korea	*	2%	8%	11%
Taiwan	8%	20%	18%	19%
Japan	40%	37%	34%	37%
New Guinea			*	
New Hebrides			3%	10%
French Polynesia			2%	2%
Fiji			3%	1%
Canary Islands	4%	10%	2%	*
Ivory Coast	3%	8%	3%	
Mauritania	4%	2%	2%	3%
South Africa	6%	3%	7%	3%
New Zealand	*	*		*
British Pacific Island Possessions	5%	3%		
Sierra Leone	*	*		2%
Ghana		*		*
Kenya	2%	*		
Malagasy	4%	3%		
Argentina	*			
France	2%			
Portugal	*			*
Australia	*			
Ethiopia	*			
Venezuela			*	

*Less than 1%

SOURCE: National Marine Fisheries Service

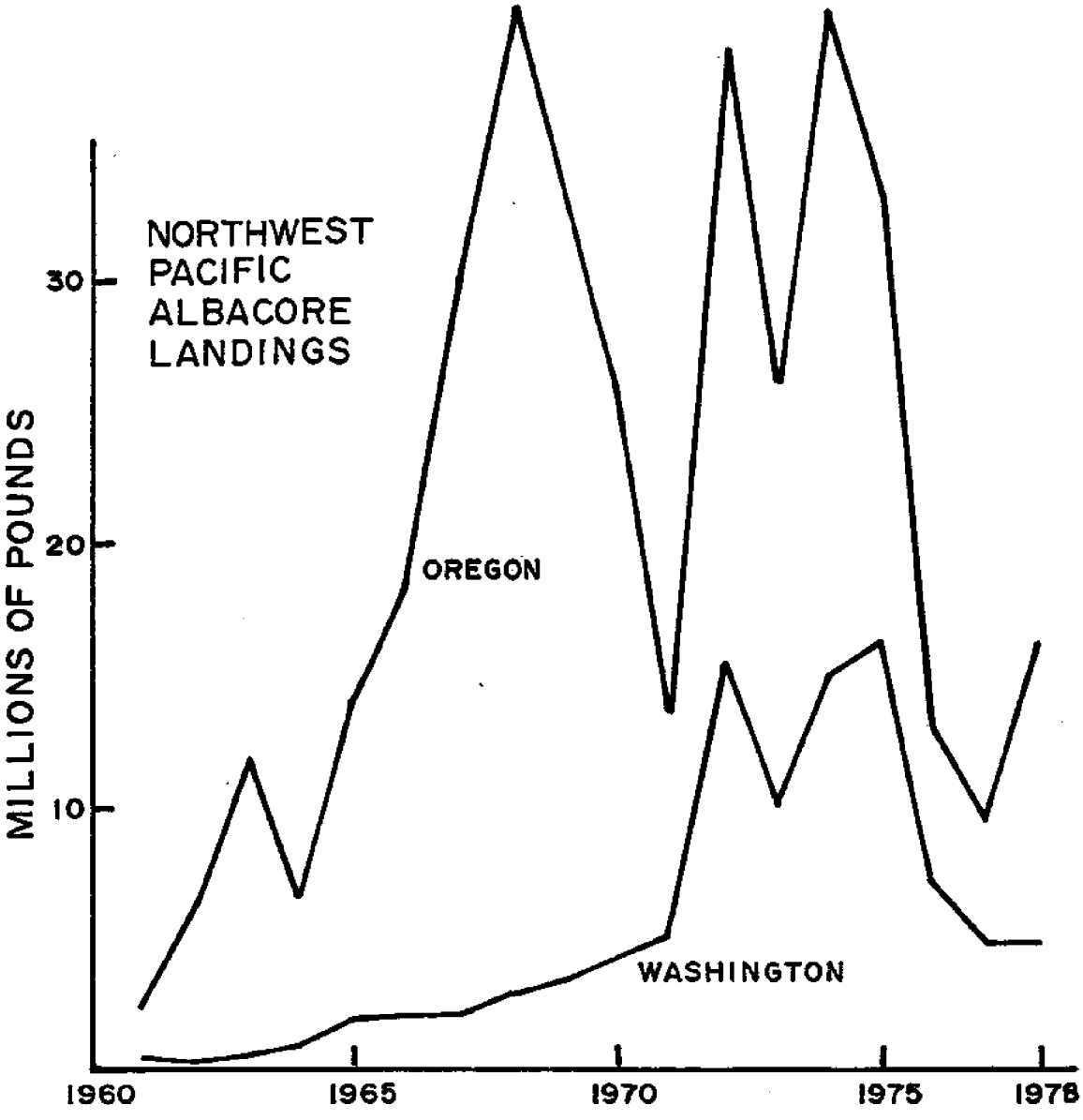
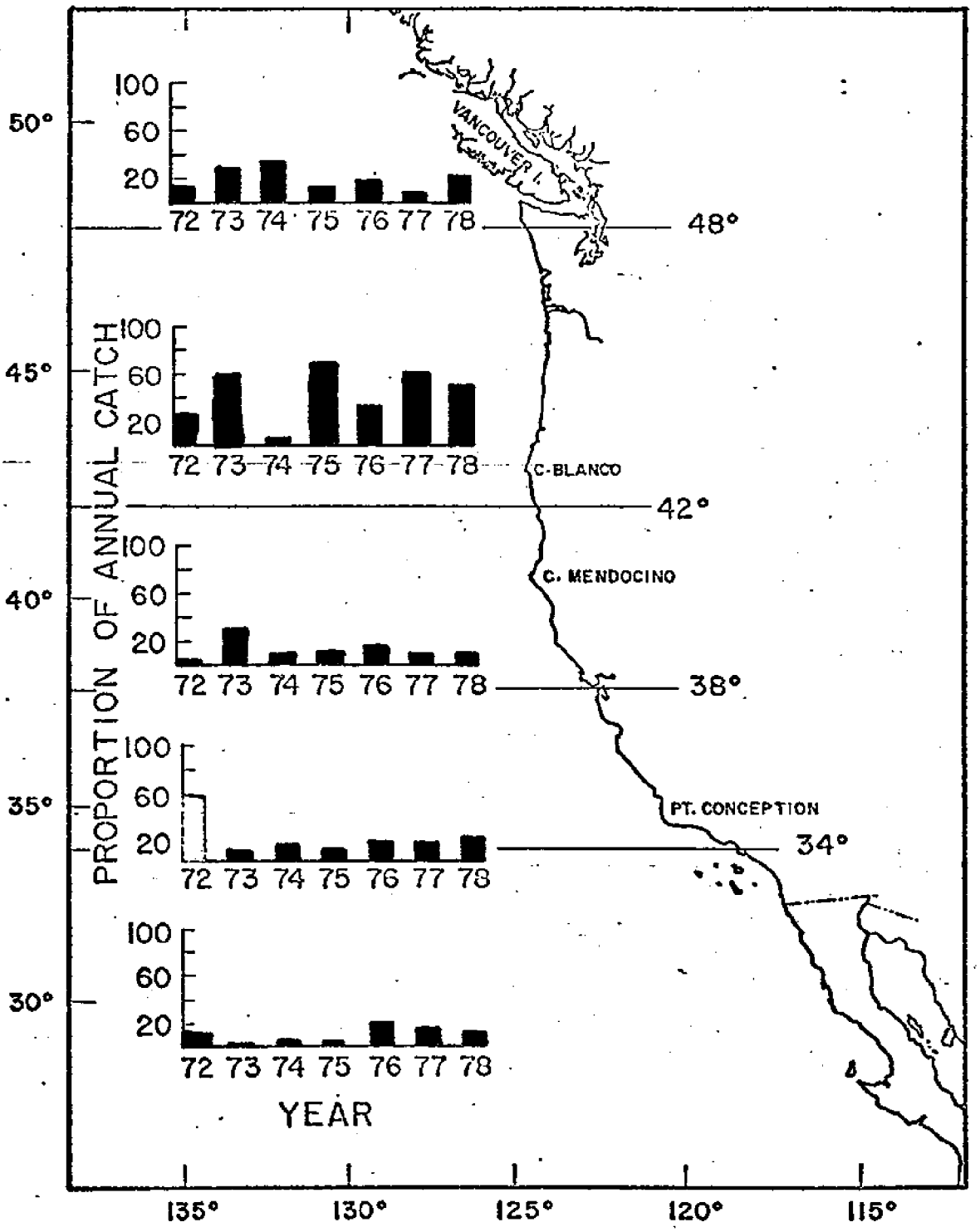


FIGURE: 7

SOURCE: PACIFIC PACKERS REPORT 1980



albacore Tuna

FIGURE 8: U.S. Domestic West Coast Catch

SOURCE:
National Marine Fisheries Service

TABLE 4: Oregon albacore tuna landings, in thousands pounds, by month of landing, 1936-77, Oregon Department of Fish and Wildlife

Year	July	August	September	October	November	December	Total
1936	0	0	0	0	0	0	28
1937	0	66	944	288	49	6	1,354
1938	0	0	0	0	0	0	8,000
1939	6	2,836	2,913	730	0	0	6,485
1940	2,590	5,233	1,320	144	0	0	9,286
1941	789	5,653	1,064	44	5	0	7,545
1942	2,062	5,048	2,876	957	0	0	10,943
1943	1,753	4,083	3,446	1,214	0	0	10,495
1944	1,588	8,979	8,778	3,143	4	0	22,492
1945	1,454	7,903	2,590	232	0	0	12,178
1946	394	2,371	1,186	0	0	0	3,951
1947	1,029	2,651	4,815	1,063	0	0	9,558
1948	2,620	3,707	1,372	175	129	0	8,004
1949	632	2,108	2,189	1,426	30	0	6,457
1950	1,535	1,902	496	1,242	211	0	5,386
1951	41	217	1,303	1,254	102	0	2,917
1952	14	123	1,299	840	256	53	2,585
1953	0	21	566	187	1	0	776
1954	0	0	99	360	10	0	469
1955	0	0	27	318	158	0	503
1956	0	477	2,615	425	157	9	3,653
1957	83	896	626	1,064	32	0	2,702
1958	393	5,373	3,043	945	1	0	9,754
1959	1,444	4,082	4,362	574	112	1	10,574
1960	19	900	2,605	933	105	0	4,563
1961	23	1,188	1,496	539	4	0	3,250
1962	28	4,663	2,727	1,414	104	13	8,949
1963	76	5,446	3,990	1,835	45	7	11,400
1964	39	1,067	2,096	1,229	21	0	4,452
1965	6	3,059	6,550	2,261	244	2	12,122
1966	635	11,363	3,376	2,630	37	0	18,041
1967	432	15,297	10,465	3,046	3	0	29,243
1968	8,083	18,018	8,650	2,987	14	1	37,752
1969 1/	2,913	18,265	6,906	1,526	151	66	29,828
1970	7,590	7,169	5,749	962	296	16	21,782
1971	2,799	4,887	165	530	38	0	8,420
1972	4,815	13,634	4,464	122	21	0	23,056
1973 2/	96	10,084	5,500	657	4	0	16,350
1974	2,759	12,433	8,882	1,126	25	0	25,225
1975	1,326	12,256	2,745	762	77	0	17,166
1976 3/	1,445	3,641	638	315	149	30	5,934
1977 4/	181	3,527	530	131	56	0	4,425
1978 5/	812	7,038	3,035	301	0	0	11,248
1979 6/	17	1,303	455	1,284	42	0	3,102

1/ June - 494 lb.
2/ June - 8,811 lb.
3/ February - 6,648 lb.; June - 9,948 lb.
4/ May - 69 lb.; June - 71 lb.
5/ February - 1753 lb.; June 5
6/ Preliminary Data

TABLE 5: OREGON ALBACORE TUNA LANDINGS (1936 - 1976)

SUMMARY CONCLUSIONS FOR STATISTICAL ANALYSIS

1. LANDINGS CHARACTERIZED BY HIGH DEGREE OF VARIABILITY

AVERAGE	-	10.6 MILLION POUNDS
LOW	-	27,600 POUNDS (1936) AND 469,440 POUNDS (1954)
HIGH	-	37.8 MILLION POUNDS
STANDARD DEVIATION	-	8.8 MILLION POUNDS (86% AVERAGE POUNDS)

2. LANDINGS HAVE GENERALLY INCREASED BY 250,000 POUNDS/YEAR

3. STRONG RELATIONSHIP EXISTS BETWEEN PREVIOUS YEARS LANDINGS AND CURRENT LANDINGS (CAUTION: LARGE PREDICTIVE ERRORS CAN RESULT -- SEE 1978 - 1979 LANDINGS).

4. AUGUST LANDINGS PROVIDE BEST PREDICTOR OF CURRENT YEAR'S TOTAL LANDINGS -- (IF AUGUST LANDINGS ARE HIGH (LOW) TOTAL LANDINGS ARE LIKELY TO BE HIGH (LOW).

SOURCE: STATISTICAL ANALYSIS OF OREGON DEPARTMENT OF FISH AND WILDLIFE LANDINGS DATA BY SHEPARD BUCHANAN, OREGON STATE UNIVERSITY.

Table 6 will account for the major reasons why 1979 albacore landings were lower than usual. (8)

MARKETING TUNA - AN OVERVIEW

As previously stated, tuna is exclusively marketed as a canned product in the United States. Figure 9 indicates that since 1946 the U.S. per capita consumption of canned tuna has continued to increase from just under one pound to almost three pounds in 1970. At the same time consumption of canned salmon has decreased and fresh/frozen seafood has remained stable.

Table 7 provides some general trends in U.S. per capita consumption of major food commodities from 1960-1979. It is interesting to note the shift away from beef and veal products to an increase in consumption of fish, pork, chicken and turkey as major "meat" commodities.

Table 7: Geographic Distribution of Tuna Consumption

	Northeast	North Central	South	West
Per capita consumption (in pounds)	3.5	2.0	1.9	2.6

Source: National Marine Fisheries Service

Households are the largest consumers of canned tuna accounting for 89 percent of total consumption. Institutions (cafeterias, schools, military installations, hospitals, etc.) command the remaining 11 percent.

TABLE 6: WEST COAST U.S. ALBACORE FISHERY -- 1979

SUMMARY

1) ONE OF POOREST SEASONS ON RECORD (5,500 SHORT TONS)

2) 1978 SEASONAL TOTAL (18,500 SHORT TONS)

3) 10-YEAR AVERAGE (23,000 SHORT TONS)

FACTORS INFLUENCING 1979 FISHERY:

1) LATE ARRIVAL OF BOTH "SOUTHERN" AND "NORTHERN" GROUPS OF FISH.

2) WEAK TEMPERATURE FRONTS ALONG WEST COAST

3) HIGH WINDS AND ROUGH SEAS HAMPERED FISHING EFFORTS

4) FISH NOT BITING

5) LOW AVAILABILITY OF 12-15 POUND FISH OFF CALIFORNIA WHICH NORMALLY CONTRIBUTE SIGNIFICANT PORTION OF U.S. DOMESTIC CATCH

6) CLOSURE OF CANADIAN WATERS TO U.S. FISHERMEN

SOURCE: NATIONAL MARINE FISHERIES SERVICE.

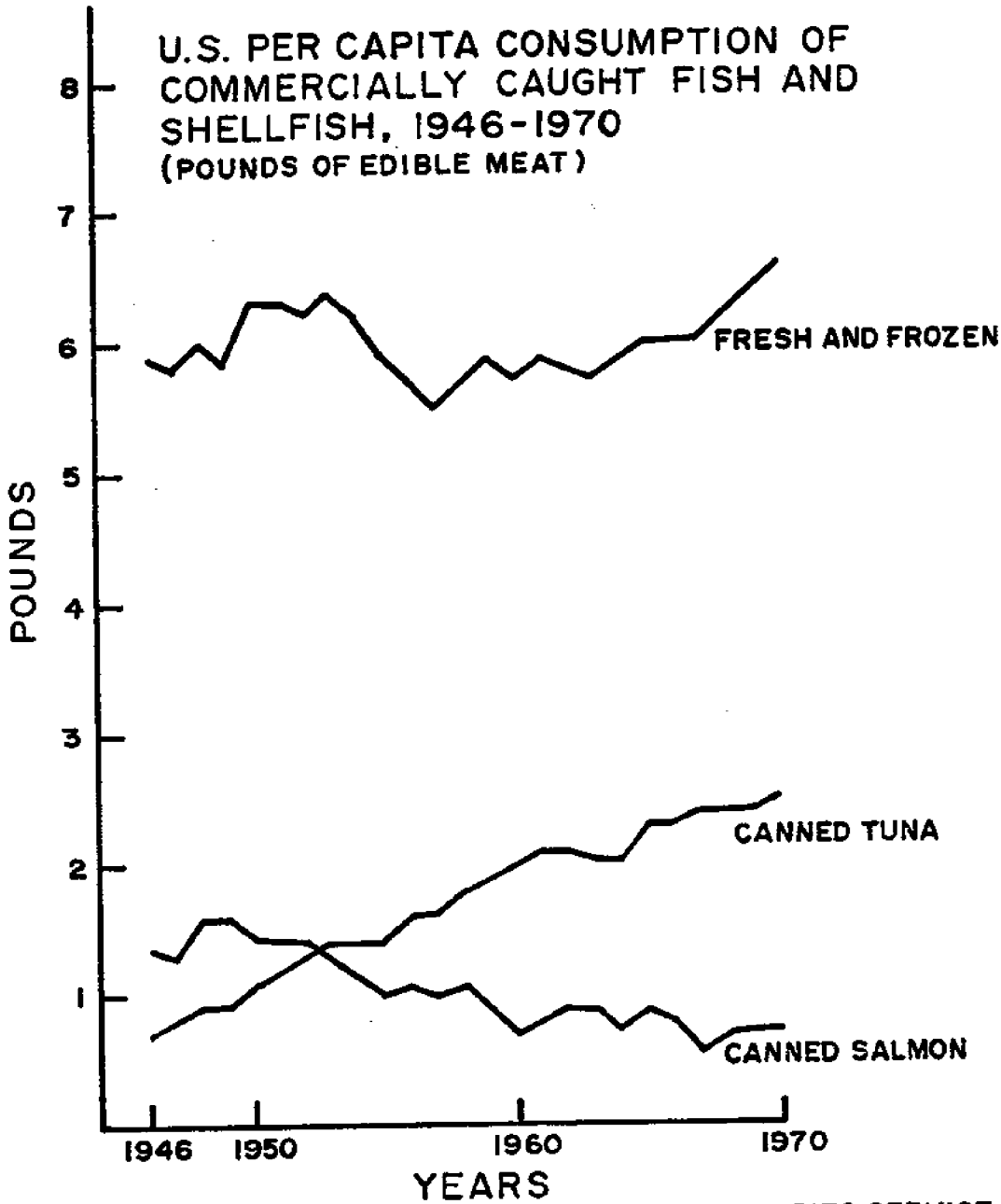

U.S. PER CAPITA CONSUMPTION OF COMMERCIALLY CAUGHT FISH AND SHELLFISH, 1946-1970
(POUNDS OF EDIBLE MEAT)
POUNDS
8
7
6
5
4
3
2
1
FRESH AND FROZEN
CANNED TUNA
CANNED SALMON
1946
1950
1960
1970
YEARS
NATIONAL MARINE FISHERIES SERVICE

FIGURE 9:

Table 8 indicates that some geographic distribution exists as to the per capita consumption of tuna in the United States. Highest consumption of 3.5 pounds per person exists in the northeastern states and the lowest, 1.9 pounds per person, in the southern U.S.

U.S. institutional demand has a strong preference for "white meat" tuna packed in water. Albacore tuna represents 55 percent of canned tuna sold to institutions. Some 60 to 65 percent of this consumption is imported in one and four pound cans. (9)

Figure 10 indicates a general increase in the United States pack of light meat tuna while the albacore pack has fluctuated with not much overall increase in output.

Figure 11 shows that the ex-vessel price for albacore tuna, when adjusted for inflation, has increased at a steady rate since 1965. Figure 12 indicates that wholesale prices for both solid white and chunk light tuna have increased dramatically since the mid-1960's. Although much of this increase is due to inflation, it is estimated that these prices, when adjusted, represent an approximate 15 percent flat increase in the price received for canned tuna.

In summarizing this section of the report on marketing it is proper to note that researchers at the National Marine Fisheries Service Southwest Fisheries have concluded that if it were possible to increase the supply of white meat tuna, consumption would also increase. This is an important consideration since it does not hold true for all seafood products.

Approximately 10 percent of U.S. albacore imports are in canned form. About 80 percent of these canned imports are supplied by Japan.

TABLE 8: TRENDS IN U.S. CIVILIAN PER CAPITA CONSUMPTION OF MAJOR FOOD COMMODITIES (1960-1979)

Commodity			Trend
Meats	-	beef	down
	-	veal	down
	-	lamb	down
	-	pork	up
	-	fish	up
Poultry	-	eggs	stable
	-	chicken	up
	-	turkey	up
Dairy	-	cheese	up
	-	condensed milk	down
	-	fluid milk	down
	-	ice cream	stable
Fruits	-	fresh	stable
	-	canned	stable
	-	canned juice	up
	-	dried	down
Vegetables	-	fresh	up
	-	canned	stable
	-	frozen	stable
Grains	-	wheat flour	stable
	-	rice	up
Other	-	coffee	down
	-	tea	stable
	-	dry beans	stable
	-	cocoa	down
	-	sugar	down
	-	peanuts (shelled)	up

Summary

Up	-	9
Down	-	9
Stable	-	9
Total		27

Source: National Food Review, Spring 1980

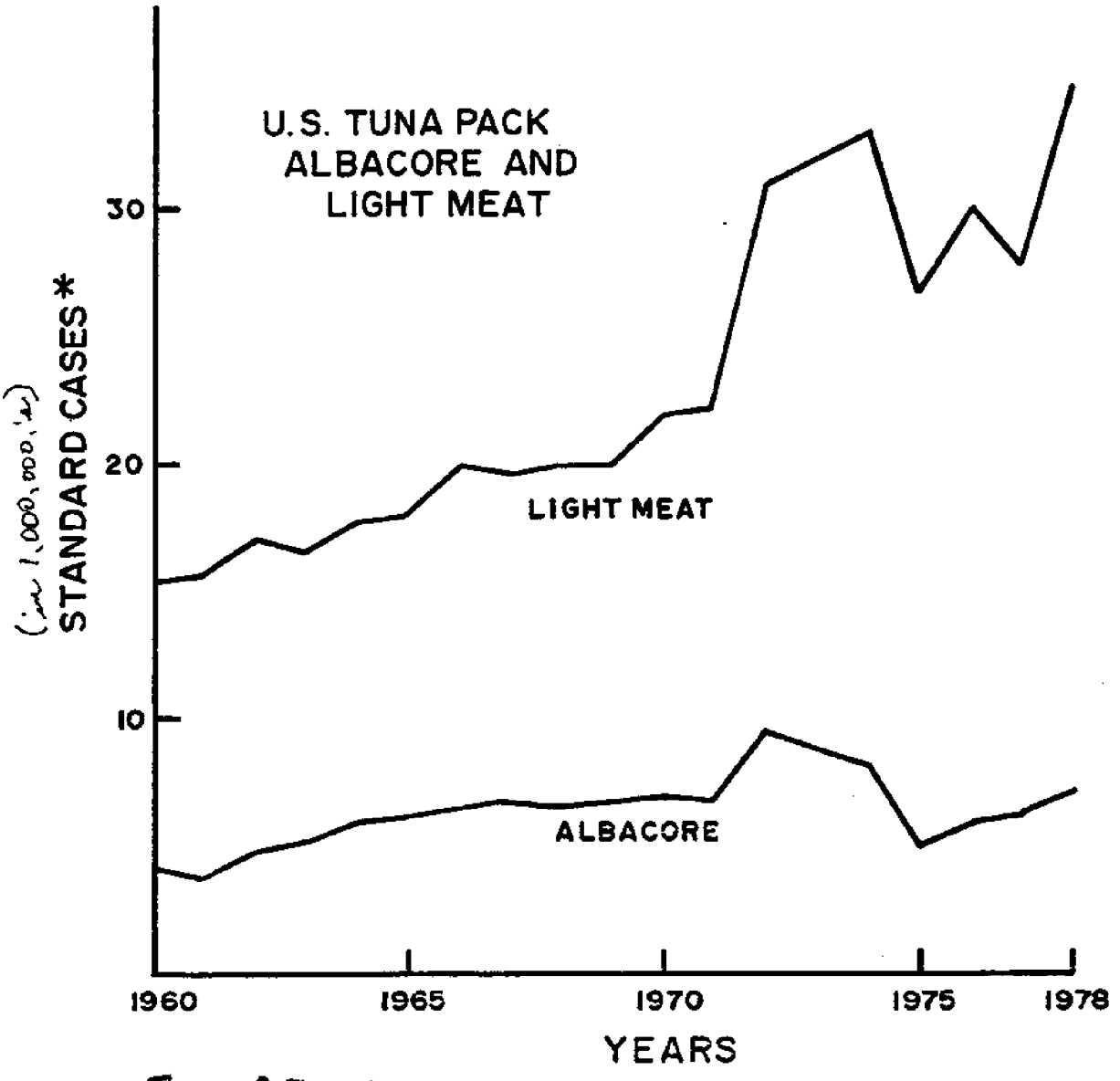


FIGURE 10:

PACIFIC PACKERS REPORT 1980

* 48 HALVES PER CASE

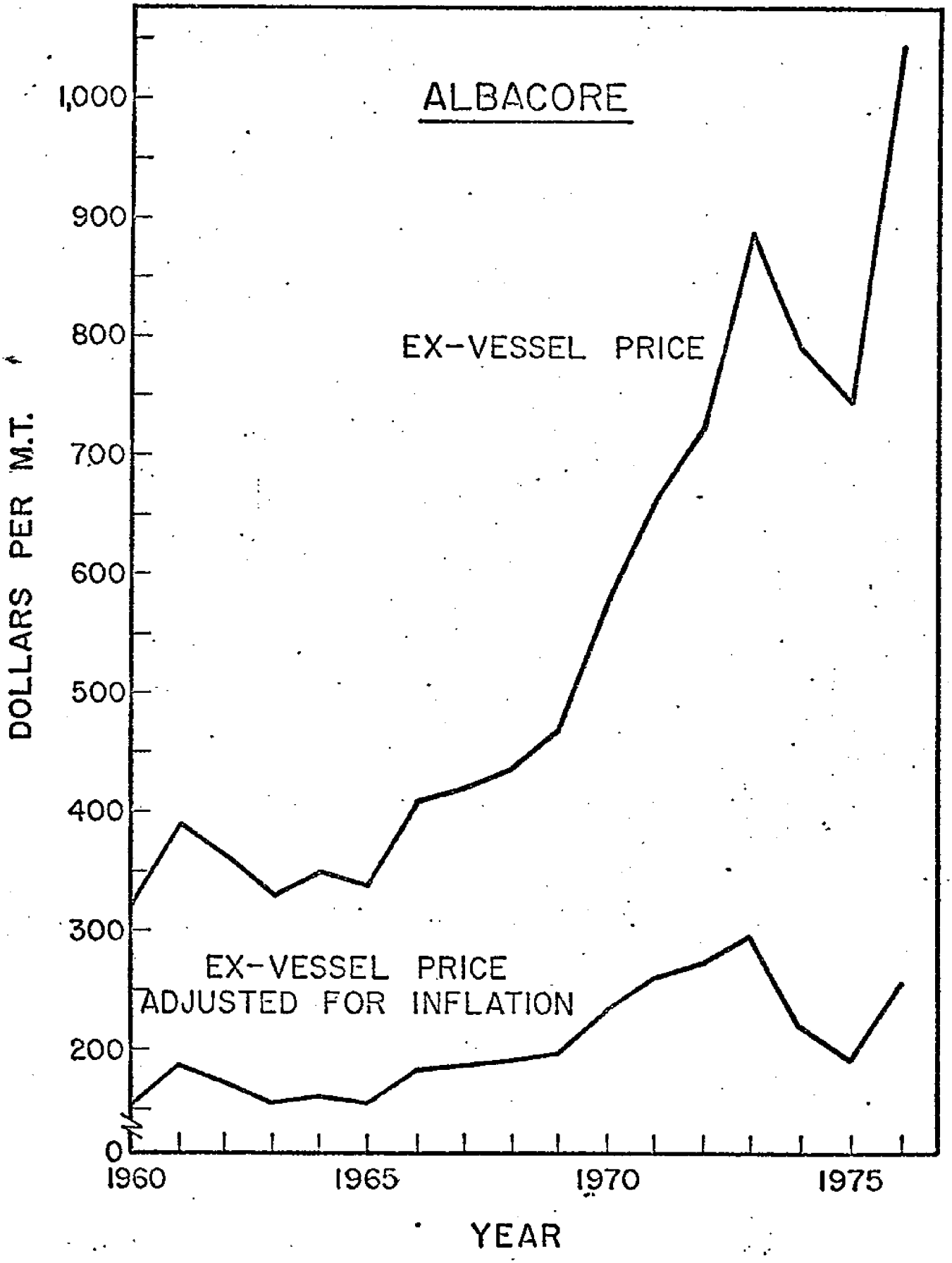


FIGURE 11:

SOURCE: National Marine Fisheries Service

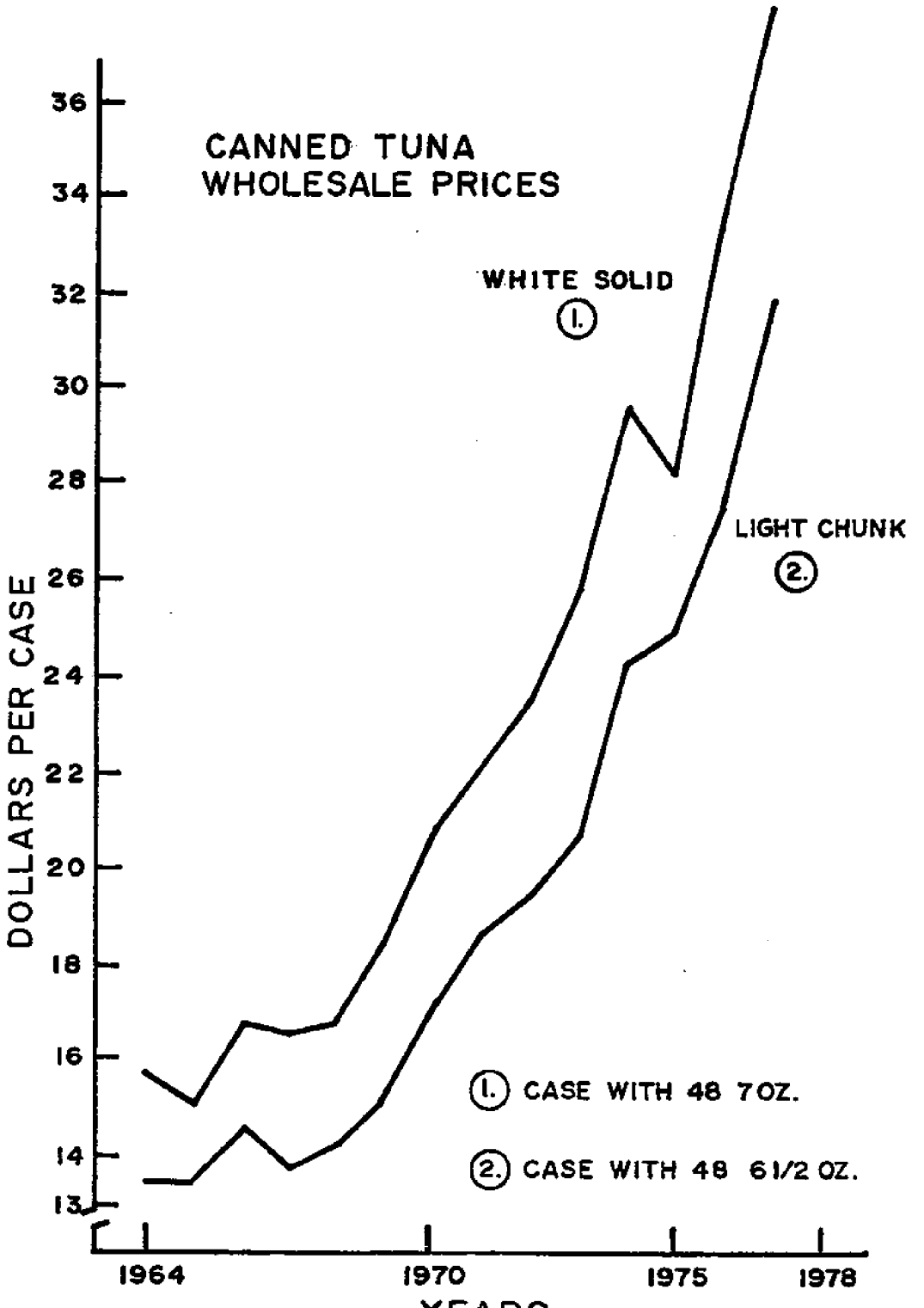

CANNED TUNA
WHOLESALE PRICES
WHITE SOLID
(1.)
LIGHT CHUNK
(2.)
DOLLARS PER CASE
36
34
32
30
28
26
24
22
20
18
16
14
13
(1.) CASE WITH 48 7OZ.
(2.) CASE WITH 48 6 1/2 OZ.
1964
1970
1975
1978
YEARS
NATIONAL MARINE FISHERIES SERVICE

FIGURE 12.

The National Marine Fisheries Service researchers also concluded that "the large quantity of Japanese supplied albacore both canned and fresh/frozen may not continue to be as stable in the future as in the past, particularly due to the relatively recent development of a fast growing domestic canned tuna market in Japan." (10)

The possibility of reduced albacore imports from other countries may also coincide with a growing market for canned tuna in western Europe. These shifts will particularly impact the value of U.S. west coast albacore supplies by increasing their value.

ESTABLISHING TUNA CANNING LINE BUDGETS

Establishing tuna canning line budgets is not a simple task for a number of reasons. Table 8 for example, adapted from an article by E. B. Dewberry, indicates the wide range of tasks involved with canning tuna. (11)

Secondly, because of the nature of the tuna processing industry with four large companies accounting for the vast majority of total production, cost estimates are not easily obtained.

In a broad economic sense, Table 9 indicates seafood processing costs per $1.00 of output of final product for Tillamook County in 1973 and Clatsop County in 1968 and 1977. (12) At first glance, the nature of the seafood industry for the two counties differs. Tillamook County's seafood industry is characterized by a few small, locally owned and operated firms. Clatsop County's seafood industry is quite large and historically dominated by the large tuna processing facility in Astoria. Any changes occurring within the coefficients of production costs for Clatsop County are most likely to reflect changes at the tuna plant. From Table 9,

TABLE ~~8~~ 9. — STEPS IN TUNA PROCESSING

1. UNLOADING (RAW PRODUCT)
2. SORTING AND DELIVERY — COLD STORAGE; WASHING, THAWING
3. BUTCHERING/RACKING
4. PRE-COOKING
5. COOLING
6. TO CANNING LINE
   - SKINNING
   - STRIPPING/*CUTTING*
   - FILLING
   - WATER/OIL/~~ADDED~~ *SALT ADDED*
   - QUALITY CONTROL
   - SEALING
   - RACKING
   - *WASHING (CANS)*
8. TO RETORT (PRESSURE CANNING)
9. COOLING
10. *LABELING* ~~BOXING~~
11. *CASING* ~~STORAGE~~

~~12. LABELING~~

12. ~~13.~~ SHIPMENT/*STORAGE*

TABLE 10: Seafood Processing costs from ~~I-O~~ Input-Output tables (per $1.00 of output)

Sector	Clatsop 1977	Clatsop 1968	Tillamook 1973
1. Fishermen	.16	.07	.43
2. Other Seafood Processors	.01	—	.02
3. Agriculture	—	—	—
4. Manufacturing	.02	.09	—
5. Construction	—	--	.01
6. Automotive Sales/Service	—	—	—
7. Retail/Wholesale Goods	.03	.02	—
8. Retail Services	—	—	.02
9. Professional Services	—	.01	.01
10. Transportation	—	.04	.03
11. Government	.02	.04	—
12. Households	.16	.09	.24
Imports:	.59	.62	.24
Subtotal:	.99	.98	1.00
Inventory/Depreciation:	—	.01	—
Subtotal:	.99	.99	—
Rounding Error:	.01	.01	—
TOTAL:	1.00	1.00	1.00

Source: Oregon State University — Input-Output Models

it is evident that definite changes have taken place between 1968 and 1977 for the Clatsop County seafood industry. Two changes are most dramatic and reflect labor payments to fishermen and processing plant workers.

In 1968 the total seafood production costs accounted by sector 1, fishermen (0.07) and sector 12, households (0.09) totalled 16 percent of total costs. By 1977 these same two sectors accounted for 32 percent of total costs; double the 1968 totals. These shifts reflect the increased value for raw product and increasing costs for processing labor. Production costs for imports remained essentially the same shifting from 0.59 to 0.62 during the ten-year period. Some additional shifts in production costs are also noted in sector 7, manufacturing, and sector 10, transportation. These shifts could be due to technological changes in the seafood processing industry or changes in purchasing patterns where fewer local inputs were obtained in the local community by Clatsop County seafood processors in 1977 when compared to 1968. For example, in 1968 seafood processors purchased $0.04 of transportation locally for every $1.00 of seafood product output. In 1977 they made little if any purchases from the transportation sector.

The following budget statements were developed by three graduate students, Leonardo Alvarez, Miles Croom and Mohammed Nur, attending Oregon State University during the spring term, h980. The students completed these estimates as a class project for Dr. Fred Smith using a format outlined in an Oregon State University Sea Grant publication. (15) While the statements were not derived by experienced professional financial specialists, they do represent a first round attempt to provide useful and practical information on the economic effectiveness of a tuna processing facility in Clatsop County.

The data sources used in these financial projections ranges from extremely reliable to wholly fanciful. The key piece of information which drives the entire model is projected landings of albacore in Astoria. According to a source in the fish processing business in Astoria, albacore landings over the past six years have averaged 6500 tons, or 13,000,000 pounds. However, this figure exceeds landings reported by the Oregon Department of Fish and Wildlife for the entire State of Oregon (Table 4). In any event, it is our conclusion, and that of the citizens in Astoria we have talked to, that the success or failure of a tuna canning venture depends on the landings of albacore in Astoria. If additional tuna must be obtained in order to supplement local catches, the costs associated with importing the tuna would have to be evaluated and included in our projections. It is impossible to predict the production of harvestable tuna and to project landings in any given year. Thus there is a high degree of risk associated with a decision to start up a new processing line for albacore tuna.

The more speculative and imprecise data include gross sales and fixed costs. Gross sales are projected from estimated landings. The following process was used to calculate gross sales. For each ton of tuna landed, approximately 46 cases per ton of solid pack white meat is produced, 7 cases per ton of pet food, 4 cases per ton of grated white meat, and the remainder is processed and sold as fish meal. Initial prices were $52.50 per case for solid pack white meat, $17.35 per case for pet food, $25.30 per case for grated white meat, and $0.01 per pound for fish meal. These production and price figures were obtained from a processor in Astoria. Gross slaes were figures as follows:

	1980 3rd Qtr.	1980 4th Qtr.	1981 Jan-June	1981 July-Dec.	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Tons landed	1,000	750	10	4,000	5,500	6,000	6,500
Solid pack cases	46,000	34,500	460	184,000	253,000	276,000	299,000
Solid pack sales ($)	2,415,000	1,811,250	24,150	9,660,000	13,915,000	16,560,000	17,940,000
Pet food cases	7,000	5,250	70	28,000	38,500	42,000	45,500
Pet food sales ($)	121,450	91,088	1,215	485,800	706,475	840,000	910,000
Grated meat cases	4,000	3,000	40	16,000	22,000	24,000	26,000
Grated meat sales ($)	101,200	75,900	1,012	404,800	594,000	708,000	767,000
Fish meal sales ($)	8,030	6,023	80	32,120	66,248	87,480	93,951
Total sales	2,645,680	1,984,261	26,457	10,582,720	15,281,723	18,195,480	19,710,951

It was estimated that prices would continue to rise and in 1982, prices were changed to $55.00 per case for solid pack white meat, $18.35 for pet food, and $27.00 for grated white meat. Meal sold for $0.015 per pound. Similar increases are also used for 1983 and 1984.

The other data which was conisdered to be highly impricse are fixed costs. Estimates were obtained for a fairly large processing facility in Astoria. Since the tuna canning lines are to be added to existing facilities, the additional fixed costs of supporting the tuna lines were computed at 20 percent of the estimates of fixed costs for the entire facility. Thus these estimates of fixed cost are subject to error in two ways: the accuracy of the estimate for the entire cannery, and the estimate of the marginal increase resulting from the addition of the tuna lines.

Most of the variable cost data are fairly accurate. Fish costs, of course, are the greatest variable cost and depend on the (unpredictable) albacore landings. Ex-vessel prices for fish, however, are easy to obtain, so it is possible to make good estimates of fish costs. Cans and freight charges are available from American Can Company. Labor costs were estimated from an average hourly wage scale taken from a labor union contract between the local seafood workers' union and Bumble Bee. (14) Packing machine data were estimated from information obtained from the machine manufacturer, E. H. Carruthers of Warrenton, Oregon. (15) The remaining variable costs are less reliable, having been calculated from very rough estimates obtained in Astoria.

The data in the cash flow projections and net assets are also of varying reliability. Cash inflow is calcualted on cash receipts from sales. Income taxes were estimated at 20 percent of the profit shown on

the profit and loss sheets. Interest on the $500,000 loan was computed using the formula

$$I - nP \frac{1 - (1 + i)^{-n}}{i} - P$$

where

I = interest

n = number of payments

i = interest rate

P = principal

Interest earned on the capital investment (i.e. opportunity cost) shown in the profit and loss statement was computed using the following formula:

$$I = P (1 + i)^n - P.$$

The estimates of assets and liabilities used in the balance sheet are very rough approximations based on information obtained from a fish processor in Astoria.

In summary, it appears that a tunna processing line could be profitable. However, it should be borne in mind that sales could be highly variable due to the unpredictability of tuna supplies. Also, a better evaluation of fixed costs should be made in order to minimize the risk inherent in fish processing business and to improve the accuracy of the financial projections.

Astoria tuna cannery

Profit and loss projections

	1980 3rd quarter	1980 4th quarter	1981 Jan.-June	1981 July-Dec.
Gross sales:	2,645,680	1,984,261	26,457	10,582,720
Variable costs				
Fish	1,500,000	1,125,000	15,000	6,000,000
Cans	231,192	173,394	2,312	924,768
Freight on cans	5,440	4,352	544	20,672
Packing machines deposit	10.000			
Packing machines rental	9,291	6,968	93	34,590
Processing line labor	330,096	330,096	25,392	660,192
Processing line labor taxes/unemp.	34,000	34,000	2,600	68,000
Misc. processing costs: oil, salt, etc.	37,050	2,779	380	140,000
Operating utilities/water	7,125	5,344	800	11,000
Frozen storage	500	375		2,000
Inventory storage	300	225		400
Selling costs: advertising, shipping	53,427	32,056	2,000	60,000
Total:	$2,218,421	$1,714,589	$49,121	$ 7,921,622
Fixed costs:				
Administrative/managerial	6,250	6,250	12,500	13,500
Office supplies/misc.	450	400	600	850
Insurance	1,500	1,500	3,000	3,000
Depreciation	3,000	3,000	6,000	6,000
Telephone/utilities	4,900	4,500	8,500	9,430
Packer's Association dues	500	500	1,000	1,000
Operating licenses	1,000	1,000	2,000	2,000
Interest payments		12,660	25,320	25,320
Total:	17,600	29,810	58,920	61,100
Opportunity cost of investment at 10%	28,332	28,332	56,664	56,664
Profit [Loss]	381,327	211,530	[138,248]	2,543,334

Astoria tuna cannery

Profit and loss projections

	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Gross sales	15,281,723	18,195,480	19,710,951
Variable costs			
Fish	8,800,000	9,974,000	11,050,000
Cans	1,154,320	1,526,688	1,653,912
Freight on cans	35,360	39,900	46,500
Packing machines deposit			
Packing machines rental	48,390	52,380	56,370
Processing line labor	740,130	740,130	799,200
Processing line labor taxes/ unemployment	75,000	75,000	81,000
Misc. processing costs: oil, salt, etc.	155,000	163,750	170,000
Operating utilities/water	15,000	16,300	17,245
Frozen storage	1,000	1,200	1,345
Inventory storage	500	600	650
Selling costs: advertising, shipping	65,000	68,000	70,000
Total	11,089,700	12,657,948	13,946,222
Fixed costs			
Administrative/managerial	32,400	38,880	46,656
Office supplies/misc.	1,830	1,945	1,989
Insurance	6,250	6,300	6,300
Depreciation	12,200	12,300	12,300
Telephone/utilities	19,125	19,345	20,646
Packers' Association dues	2,100	2,100	2,100
Operating licenses	4,000	4,100	4,100
Interest payments	50,640	50,640	50,640
Total	128,545	135,610	144,731
Opportunity cost of investment at 10%	113,328	113,328	113,328
Profit (Loss)	3,950,150	5,288,594	5,506,670

Astoria tuna cannery

Cash flow projections

	1980 3rd quarter	1980 4th quarter	1981 Jan.-June	1981 July-Dec.
Balance forward	500,000	336,394	536,870	461,286
Cash inflow				
Sales	2,645,680	1,984,261	26,457	10,582,720
Long-term borrowing	500,000			
Short-term borrowing				
Total cash available	3,645,680	2,320,655	563,327	11,044,006
Cash outflow				
Variable costs	2,218,421	1,714,589	49,121	7,921,622
Other costs[1/]	14,600	14,150	27,600	29,780
Income taxes	76,265	42,306		508,667
Capital purchases	1,000,000			
Long-term principal pmnts.				16,667
Long-term interest		12,660	25,320	25,320
Short-term principal pmnts.				
Short-term interest				
Total cash outflow	3,309,286	1,783,785	102,041	8,502,056
Net cash	336,394	536,870	461,286	2,541,950

[1/] Other costs = Fixed costs - (Depreciation + Interest)

Astoria tuna cannery

Cash flow projections

	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Balance forward	2,451,950	5,794,265	10,117,435
Cash inflow			
Sales	15,281,723	18,195,480	19,710,951
Long-term borrowing			
Short-term borrowing			
Total cash available	17,823,673	23,989,745	29,828,386
Cash outflow			
Variable costs	11,089,700	12,657,948	13,946,222
Other costs[1/]	65,705	72,670	81,791
Income taxes	790,030	1,057,719	1,101,334
Capital purchases			
Long-term principal pmnts	33,333	33,333	33,333
Long-term interest	50,640	50,640	50,640
Short-term principal pmnts.			
Short-term interest			
Total cash outflow	12,029,408	13,872,310	15,213,320
Net cash	5,794,265	10,117,435	14,615,066

Astoria tuna cannery

Balance sheet projections

	1980 3rd quarter	1980 4th quarter	1981 Jan.-July	1981 July-Dec.
Assets				
Current				
Cash	336,394	536,870	461,286	2,541,950
Accounts receivable		406,000		67,000
Inventory	600,000	49,000		183,000
Fixed				
Land	320,000	320,000	351,150	366,230
Buildings	850,000	848,000	844,000	840,000
Equipment	150,000	149,000	147,000	145,000
Total assets	2,256,394	2,308,870	1,803,436	4,143,180
Liabilities				
Current				
Accounts payable	175,000	89,000	38,000	1,689,320
Long-term				
Mortgage, interest		746,968	721,648	1,196,328
Total liabilities	175,000	835,968	759,648	2,885,648
Net worth	2,081,394	1,472,902	1,043,788	1,257,532

Astoria tuna cannery

Balance sheet projections

	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Assets			
Current			
Cash	5,794,265	10,117,435	14,615,066
Accounts receivable	83,000		
Inventory	483,170		
Fixed			
Land	402,300	485,230	491,150
Buildings	832,000	823,900	815,700
Equipment	140,800	136,600	132,500
Total assets	7,735,535	11,563,165	16,054,416
Liabilities			
Current			
Accounts payable	764,450	6,143,000	4,130,240
Long-term			
Mortgage, interest	1,095,689	1,011,716	927,743
Total liabilities	1,860,139	7,154,716	5,057,983
Net Worth	5,875,396	4,408,449	10,996,433

Astoria tuna cannery

Financial ratios

	1980 3rd quarter	1980 4th quarter	1981 Jan.-June	1981 July-Dec.
Net capital ratios	1.08	1.57	1.73	3.29
Debt/net worth	0.08	0.57	0.73	2.29
Current difference	761,394.00	902,870.00	423,286.00	1,102,630.00
Current ratio	5.35	11.14	12.14	1.65

Astoria tuna cannery

Financial ratios

	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Net capital ratio	1.32	2.62	1.46
Debt/net worth	0.32	1.62	0.46
Current difference	5,595,985.00	3,974,435.00	10,484,826.00
Current ratio	8.32	1.65	3.54

FINANCING TUNA PROCESSING FACILITIES

Three distinct opportunities exist for financing a new tuna processing facility in Clatsop County in light of the Bumble Bee plant closure. The first consideration most frequently discussed is orientated towards government assistance. Because of the scale for the Bumble Bee closure and the devastating impact it will eventually spread on a rural economy already heavily dependent on two or three basic industries (timber, seafood and tourism), it would not be uncommon for government to lend assistance. This governmenet assistance can be received at either the federal, state, or local level. Often, public assistance received for such occurrences comes in the form of several levels of government working together.

At the federal level a program for "Business Development Assistance" is offered by the Economic Development Administration. (16) This pro-ram is essentially a guaranteed loan or lease program. Outright "grants" are generally not available for development of profit making businesses.

Because of the large financial assistance needed to establihs a tuna processing facility, federal small business administration assistance is not likely to be available. The National Marine Fisheries Service is also unlikely to be available for direct financial assistance on establishing a tuna facility nor is the Pacific Northwest Regional Commission.

At the time of this writing, financial assistance from the Oregon Economic Development Commission is unknown. Considering the fiscal condition for Oregon State government as a whole during the near future, revenues to assist in the establishment of a tuna processing facility could be extremely limited.

At the local level, Oregon public ports have a great sphere of influence to encourage and engage in economic development opportunities. (17) The Port of Astoria is Clatsop County's only public port and could provide its revenue bonding authority to assist with the development of a tuna processing facility. In this case, bonds would be issued by the local port to finance capital construction needs. Revenues gained through the sale of processed tuna could be applied towards retiring the bonds. The key issue, however, is the necessity for the tuna processing facility to raise enough revenue through the sale of canned tuna to meet operating expenses and repayment of the port-issued revenue bonds.

Turning to the private sector, some concern has been voiced as to the willingness of private investors to seriously consider a tuna processing facility in Clatsop County as a sound investment in light of the Bumble Bee closure. During the course of this study several local lending institutions were informally contacted and their opinion on the matter requested.

Contrary to the popular belief, little resistance or hesitation was discovered as to the private financial sector's willingness to discuss investment in a tuna processing facility. One representative stated quite clearly, "You show me a good deal and I'll show you some money." Need more be said.

A final financing opportunity could be to organize a cooperative. Stated simply, "A fishery cooperative consists of a group of individuals acting together for mutual benefit and is designed to accomplish group objectives. Through the cooperative, members jointly perform or obtain services which individuals usually could not accomplish alone." (18)

Under the cooperative, seafood workers unemployed by the Bumble Bee closure could commonly pool thier financial resources and their skills to establish a tuna processing facility in the county. These workers already possess skills which could provide a large force towards forming a cooperative. The organization could even include local tuna fishermen in addition to processing workers.

A successful processing cooperative already exists in Clatsop County in the form of the Astoria Plywood Mill. Representatives from the Astoria mill could serve as an advisory resource towards helping to establish a tuna processing cooperative.

AVAILABLE ALTERNATIVES AND THEIR IMPLICATIONS

The following alternatives are considered and included for discussion:

--A. Do nothing; allow the current situation to prevail.

--B. Establish a temporary tuna processing line.

--C. Establihs a new tuna processing facility.

--D. Delay new tuna facility development.

--E. Form a cooperative for tuna processing.

A. Do Nothing

While this alternative may seem unacceptable at first glance, it is the one most likely to be realized unless some drastic change is initiated in the local community. Since the formal announcement of the Bumble Bee closure little active initiative has surfaced in Clatsop County to counteract the effects of the tuna plant closure. This may be due in part to a feeling of community helplessness.

The economic effects of this alternative are previously shown in Table 1. Some additional impacts should be stated although no formal analysis has been concluded. They include:

--Possible economic losses to the fish harvesting supply firms in the community. Since Clatsop County would no longer be designated a "canning port," albacore tuna fishermen are much less likely to unload their catches there. As such, they will not enter the community and will not purchase necessities such as fuel, ice, food or repair services to electronic or mechanical equipment. while this impact is seasonal, it does bring economic activity into the community which would normally not occur.

--Permanent population shifts can and are likely to result from the Bumble Bee plant closure. These shifts are likely to occur in the younger age ranks of the workers who were unemployed by the closure. While it is commonly held that the majority of processing jobs at the cannery were held by women and considered "second income" jobs, it should not be discounted that in times of high inflation two incomes are desired just to keep abreast of rising prices while maintaining an acceptable standard of living.

--Albacore fishermen landing tuna in Clatsop County will receive a lower price for their catch because of the "canning port" designation loss. No estimates of how large this loss will be have been made.

--The Bumble Bee closure will have additional impacts that cannot

be estimated until they occur. These are unforeseen events which are difficult, if not impossible, to predict although they are very likely to occur. Economists often refer to these effects as "agglomeration effects." For example, the Oregon State University Seafoods Laboratory could be impacted by a reduction in research staff who previously devoted a portion of their efforts to working with the tuna processing industry. Unless other seafood research opportunities surface in Clatsop County, the OSU facility could be impacted. It is difficult to predict what will occur to the research lab. This is one example of an agglomeration effect.

B. Establish a Temporary Tuna Processing Line

There has remained some hope and persistence of re-opening the Bumble Bee plant, perhaps under some form of lease agreement. Although the majority of non-stationary canning equipment has already been removed from the Bumble Bee plant, much of the basic capital fixtures still remain intact such as the buildings, boiler plant, ovens, fish meal reduction plant, etc. However, the costs of re-equipping the plant for production have not been estimated. At the time of this writing the plant is "for sale" and industrial realtors have been visiting the facility to consider its possible future use. Until some competent cost estimations are developed for re-opening the old plant, this alternative should be considered viable.

C. Establish a New Tuna Processing Facility

This alternative would require a new facility to be developed either at an existing seafood processing facility or perhaps at an entirely new

site located away from the Columbia River waterfront. The desirability of this alternative stems from the knowledge that an entirely new facility could be designed to meet the local community's needs. Contrary to the old Bumble Bee plant, a new facility could be constructed to service only the local albacore catch whereas canning all species (yellowfin, skipjack, etc.). This would allow for the ca-nery to become more cost effective by gearing down the size and scope of the cannery to service the local catch. The new facility could perhaps be designed as a seasonal operation rather than attempting to construct an all-year operational facility.

D. Delay New Tuna Facility Development

This alternative will allow for more time to study all the alternatives and decide which course of action to follow. Additional research on the cost effectiveness of all strategies could be developed. Also, the 1980 albacore tuna catch could be analyzed and compared to the 1979 harvests which were extremely low. The negative aspects of delaying a decision to move ahead on development of a tuna plant should, however, be examined. They include:

--Skilled labor, vital to establishing a tuna facility are not likely to stay in the local community the longer a decision is delayed.

--Community interest and support in the project is likely to seriously diminish the longer a decision is delayed.

--Costs for constructing a facility are likely to increase during the delay.

--An albacore tuna processing facility is another community on the

west coast could be initiated and developed. An attempt to establish a tuna facility is already underway in Eureka, California.

E. Form a Cooperative for Tuna Processing

Forming a cooperative has previously been discussed in the financing section of this report. One key ingredient to forming a cooperative seems to exist and that is the availability of a competent and enthusiastic individual or small group to direct and manage the effort. This is essentially the most important element to forming and managing a cooperative. If such a person or small group of individuals does not exist or surface in Clatsop county, this alternative would not be possible to implement.

SUMMARY AND CONCLUSIONS

A list of key summary statements and conclusions are presented here as discussion items for further consideration.

1. There is little doubt as to the devastating economic and possible social impact the Bumble Bee cannery closure will have in Clatsop County. No rural community can absorb the loss of over 600 jobs without serious consequences.

2. The world-wide supply of seafood products is swiftly reaching a "a maximum sustainable yield" condition because of resource limitations. Coupled with growing world populations, and a constant or growing demand for seafood, available harvests from the sea will become increasingly more valuable.

3. Growing demands for canned albacore tuna in Japan and Western Europe will place serious limitations on imports of albacore to the United

States. This will make the available resource stock of west coast albacore all that more valuable.

4. Any tuna canned for household consumers is most likely to successfully be marketed only through one of the "big four" companies. Households are accustomed to purchasing brand name products for their consistency and high quality. However, a large share of albacore tuna is sold for institutional consumption. Institutions are more sensitive to price considerations than brand names. Institutional markets for Clatsop County canned tuna need to be investigated and established. Albacore tuna canned in Clatsop County could be marketed directly to wholesalers who supply institutions. (19)

5. Competent production budgets need to be established for all alternatives previously stated. This will allow for more precise determination of the most cost effective alternative. This will also allow determination in finding whether any of the alternatives are "feasible" in a business, profit-making sense.

6. If production line budgets show an acceptable alternative, and if institutional markets for Clatsop County canned albacore tuna are discovered, every effort should be given towards establishing a tuna processing facility.

7. Most of the resources needed, in establishing a tuna processing facility in Clatsop County are already available in the local community. It is the responsibility of local officials to identify and organize these resources.

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APPENDIX A

Personnel References

Astoria

Dave Crawford/Duncan Law, OSU Seafoods Lab.	325-4531
Peggy Duncan, Seafoods Workers Union	325-2081
Bud Forrester, The Daily Astorian	325-3211
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Fred Shaylor, Port of Astoria	325-2144
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APPENDIX B

Statistical Analysis - Oregon Albacore Tuna Landings 1936-1979

Summary statistics of catches by month and year are presented in Table 1. Tuna landings are characterized by a high degree of variability. For example, although the average total landings by year is about 10.6 million pounds. The catch was as low as 27,600 pounds in 1936 and 469,440 pounds in 1954 and as high as 37.8 million pounds in 1968. The standard deviation[1] of total landings is over 8.8 million pounds or almost 86% of the mean.

Landings by month are even more variable. The coefficients of variation by month range from 84.6% in October to 280.7% in December. The maximum landings in each month are at least three times the average catch for the month. This means that predicting a month's landings on the basis of past averages would not be expected to produce good results.

From the landings data there are, basically, three possible methods of predicting the total landings for the year (Y_t). These methods are purely statistical. They describe certain relationships found to exist but do not explain why. Nor are any economic or technical relationships implied by the results. For example, there is no accounting for effort or size of the fishing fleet nor is there any implied relationships among landings, costs, and revenues. All three methods project past, observed relationships into the future.

$$\hat{Y}_t = -4{,}581{,}820 + 259{,}287\ (\text{year}) \qquad (1)$$
$$(2.44)$$

Equation (1) predicts landings for a year ($\hat{Y}_t$) according to what year it is (year, year = 36 to 79). Figure 1 shows this predictive equation

[1] The standard deviation is a measure of variability. Intuitively it is the absolute value of the average difference between any year's landings and the average level of landings over the range of the sample.

equation plotted against actual landings and the average over the active sample (1936 to 1979). This equation implies that landings increase over time at a rate of increase of about a quarter of a million pounds per year. The "t" value in parenthesis indicates that the slope is statistically significant; i.e., there is a definite upward trend in Y_t over time. The R^2 value of 0.13, however, indicates that equation (1) does not explain variation in Y_t very well (only 13% of the variation in Y_t around the mean, $\bar{Y}$) and is probably a poor predictive equation from year to year, although it may be better in the long run.

$$\hat{Y}_t = 3121247.6 + \underset{(6.53)}{0.7081Y_{t-1}} \qquad (2)$$

Equation (2) predicts Y_t according to the previous year's total landings (Y_{t-1}). Figure 2 verifies that equation (2) follows the observed data much better than equation (1). This equation implies that there is a strong relationship between previous year's landings and current landings. The "t" value of 6.53 is significant at the α=0.01 level. Thus large catches last year are associated with large catches in the current year. The R^2 value is 0.51 which means that just over half of the variation in Y_t around its mean is explained by Y_{t-1}. This model is not too bad as a predictor but it can lead to large errors. The standard error of the estimate, $\hat{Y}$, is nearly 60% of the mean so large relative errors of prediction (percent error) may be large. Observe, for example, predicted vs actual values for 1978 and 1979.

$$\hat{Y}_t = 1753491 + \underset{(19.87)}{1.693\ Y_{Aug}} \qquad (3)$$

Equation (3) predicts Y_t according to the August landings (Y_{Aug}). This equation is the statistically superior one of the three. The "t" value of 19.87 is highly significant and the R^2 value of 0.91 is high. Over 90% of the variation in $\hat{Y}$ is explained by the August catch. The coefficient of variation (C.V.) indicates that the typical error of prediction is about one-fourth of the mean value $\bar{Y}$.* Hence, knowing the value of Y_{Aug} allows one to predict $\hat{Y}_t$ with some degree of confidence. The usefulness of such an equation is another matter. If, however, August landings are high (low) its a safe bet, total landings for the year will be high (low).

Finally, it is possible to observe a cyclical trend on Y_t in the figures. This trend may be more apparent than real. Spectral analysis of the data was attempted to discern any underlying cycles (of any nature). None were found. In the absence of biological, technical, and economic data, further trend analysis of Y_t would be unlikely to produce meaningful results in a statistical sense or in any other sense.

Y = landings of tuna in pounds.

$\hat{Y}$ = predicted value of y

Y_t = total landings in year t (current year)

Y_{Aug} = total August landings

Y_{t-1} = total landings in year t-1 (last year)

$\bar{Y}$ = average value of y

---

*To be grossly simple anyway.

TABLE 1

Month	Minimum	Average $\bar{x}$	Maximum	Standard deviation s	Coefficient of variation $(s/\bar{x}) \times (100\%)$
July	0	1,243,104	8,082,701	1,860,224	149.6%
August	0	5,214,466	18,260,000	4,992,683	95.7%
September	26,881	3,070,353	10,460,000	2,677,240	87.2%
October	0	981,326	3,142,838	830,549	84.6%
November	0	64,107	296,257	80,045	124.9%
December	0	4,860	66,049	13,642	280.7%
Total	27,600	10,580,307	37,754,817	8,812,032	85.7%

Demand

Demand for canned tuna is strong and has been strong over the years. Per Capita Consumption, Figure 7, of canned tuna has increased in a regular and firm way over the years. This does not happen with other sea products like canned salmon which is decreasing, and with fresh and frozen products that presents large fluctuations.

This tendency will continue because "red meat" is getting more expensive so consumers are turning to poultry and sea related meat.

Increase of demand for canned tuna and the inability of the processor to supply the product because of irregulare catch of albacore tuna have increased sharply both wholesale and retail prices, Figures 8 and 9.

Data Sources and Accuracy

The data sources used in these financial projections ranges from extremely reliable to wholly fanciful. The key piece ofinformation which drives the entire model is projected landings of albacore in Astoria. According to a source in the fish processing business in Astoria, albacore landings over the past six years have averaged 6500 tons, or 13,000,000 pounds. However, this figure exceeds landings reported by the Oregon Department of Fish and Wildlife for the entire State of Oregon (Table 28). In any event, it is our conclusion, and that of the citizens in Astoria we have talked to, that the success or failure of a tuna canning venture depends on the landings of albacore in Astoria. If additional tuna must be obtained in order to supplement local catches, the costs associated with importing the tuna would have to be evaluated and included in our projections. It is impossible to predict the production of harvestable tuna and to project landings in any given year. Thus there is a high degree of rish associated with a decision to start up a new processing line for albacore tuna.

The more speculative and imprecise data include gross sales and fixed costs. Gross sales are projected from estimated landings. The following process was used to calculate gross sales. For each ton of tuna landed, approximately 46 cases per ton of solid pack white meat is produced, 7 cases per ton of pet food, 4 cases per ton of grated white meat, and the remainder is processed and sold as fish meal. Initial prices were $52.50 per case for solid pack white meat, $17.35 per case for pet food, $25.30 per case for grated white meat, and $.01 per pound for fish meal. These production and price figures were obtained from a processor in Astoria. Gross sales were figured as follows:

	1980 3rd Qtr.	1980 4th Qtr.	1981 Jan-June	1981 July-Dec.	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Tons landed	1,000	750	10	4,000	5,500	6,000	6,500
Solid pack cases	46,000	34,500	460	184,000	253,000	276,000	299,000
Solid pack sales ($)	2,415,000	1,811,250	24,150	9,660,000	13,915,000	16,560,000	17,940,000
Pet food cases	7,000	5,250	70	28,000	38,500	42,000	45,500
Pet food sales ($)	121,450	91,088	1,215	485,800	706,475	840,000	910,000
Grated meat cases	4,000	3,000	40	16,000	22,000	24,000	26,000
Grated meat sales ($)	101,200	75,900	1,012	404,800	594,000	708,000	767,000
Fish meal sales ($)	8,030	6,023	80	32,120	66,248	87,480	93,951
Total sales	2,645,680	1,984,261	26,457	10,582,720	15,281,723	18,195,480	19,710,951

It was estimated that prices would continue rising, so in 1982, prices were changed to $55.00 per case for solid pack white meat, $18.35 for pet food, and $27.00 for grated white meat. Meat sold for $.015 per pound. Similar increases are also used for 1983 and 1984.

The other data which was considered to be highly imprecise is fixed costs. Estimates were obtained for a fairly large processing facility in Astoria. Since the tuna canning lines are to be added to existing facili ties, I computed the additional fixed costs of supporting the tuna lines at 20 percent of the estimates of fixed costs for the entire facility. Thus these estimates of fixed cost are subject to error in two ways: the accuracy of the estimate for the

entire cannery, and the estimate of the marginal increase resulting from the addition of the tuna lines.

Most of the variable cost data are fairly accurate. Fish costs, of course, are the greatest variable cost and depend on the (unpredictable) albacore landings. Ex-vessel prices for fish however, are easy to obtain, so it is possible to make good estimates of fish costs. Cans and freight charges are available from American Can Company. Labor costs were estimated from an average hourly wage scale taken from a labor union contract between the local seafood workers' union and Bumble Bee. Packing machine data were estimated from information obtained from the machine manufacturer, E.H. Carruthers of Warrenton, Oregon. The remaining variable costs are less reliable, having been calculated from very rough estimates obtained in Astoria.

The data in the cash flow projections and net assets are also of varying reliability. Cash inflow is calculated on cash receipts from sales. Income taxes were estimated at 20 percent of the profit shown on the profit and loss sheets. Interest on the $500,000 loan was computed using the formula

$$I = nP \frac{1 - (1 + i)^{-n}}{i} - P$$

where

I = interest

n = number of payments

i = interest rate

P = principal

Interest earned on the capital investment (i.e. opportunity cost) shown in the profit and loss statement was computed using the following formula:

$$I = P\ (1 + i)^n - P.$$

The estimates of assets and liabilities used in the balance sheet are very rough approximations based on information obtained from a fish processor in Astoria.

In summary, it appears that a tuna processing line could be profitable. However, it should be borne in mind that sales could be highly variable due to the unpredictability of tuna supplies. Also, a better evaluation of fixed costs should be made in order to minimize the risk inherent in the fish processing business and to improve the accuracy of the financial projections.

Astoria tuna cannery

Profit and loss projections

	1980 3rd quarter	1980 4th quarter	1981 Jan.-June	1981 July-Dec.
Gross sales:	2,645,680	1,984,261	26,457	10,582,720
Variable costs				
Fish	1,500,000	1,125,000	15,000	6,000,000
Cans	231,192	173,394	2,312	924,768
Freight on cans	5,440	4,352	544	20,672
Packing machines deposit	10.000			
Packing machines rental	9,291	6,968	93	34,590
Processing line labor	330,096	330,096	25,392	660,192
Processing line labor taxes/unemp.	34,000	34,000	2,600	68,000
Misc. processing costs: oil, salt, etc.	37,050	2,779	380	140,000
Operating utilities/water	7,125	5,344	800	11,000
Frozen storage	500	375		2,000
Inventory storage	300	225		400
Selling costs: advertising, shipping	53,427	32,056	2,000	60,000
Total:	$2,218,421	$1,714,589	$49,121	$ 7,921,622
Fixed costs:				
Administrative/managerial	6,250	6,250	12,500	13,500
Office supplies/misc.	450	400	600	850
Insurance	1,500	1,500	3,000	3,000
Depreciation	3,000	3,000	6,000	6,000
Telephone/utilities	4,900	4,500	8,500	9,430
Packer's Association dues	500	500	1,000	1,000
Operating licenses	1,000	1,000	2,000	2,000
Interest payments		12,660	25,320	25,320
Total:	17,600	29,810	58,920	61,100
Opportunity cost of investment at 10%	28,332	28,332	56,664	56,664
Profit [Loss]	381,327	211,530	[138,248]	2,543,334

Astoria tuna cannery

Profit and loss projections

	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Gross sales	15,281,723	18,195,480	19,710,951
Variable costs			
Fish	8,800,000	9,974,000	11,050,000
Cans	1,154,320	1,526,688	1,653,912
Freight on cans	35,360	39,900	46,500
Packing machines deposit			
Packing machines rental	48,390	52,380	56,370
Processing line labor	740,130	740,130	799,200
Processing line labor taxes/ unemployment	75,000	75,000	81,000
Misc. processing costs: oil, salt, etc.	155,000	163,750	170,000
Operating utilities/water	15,000	16,300	17,245
Frozen storage	1,000	1,200	1,345
Inventory storage	500	600	650
Selling costs: advertising, shipping	65,000	68,000	70,000
Total	11,089,700	12,657,948	13,946,222
Fixed costs			
Administrative/managerial	32,400	38,880	46,656
Office supplies/misc.	1,830	1,945	1,989
Insurance	6,250	6,300	6,300
Depreciation	12,200	12,300	12,300
Telephone/utilities	19,125	19,345	20,646
Packers' Association dues	2,100	2,100	2,100
Operating licenses	4,000	4,100	4,100
Interest payments	50,640	50,640	50,640
Total	128,545	135,610	144,731
Opportunity cost of investment at 10%	113,328	113,328	113,328
Profit (Loss)	3,950,150	5,288,594	5,506,670

Astoria tuna cannery

Cash flow projections

	1980 3rd quarter	1980 4th quarter	1981 Jan.-June	1981 July-Dec.
Balance forward	500,000	336,394	536,870	461,286
Cash inflow				
Sales	2,645,680	1,984,261	26,457	10,582,720
Long-term borrowing	500,000			
Short-term borrowing				
Total cash available	3,645,680	2,320,655	563,327	11,044,006
Cash outflow				
Variable costs	2,218,421	1,714,589	49,121	7,921,622
Other costs[1/]	14,600	14,150	27,600	29,780
Income taxes	76,265	42,306		508,667
Capital purchases	1,000,000			
Long-term principal pmnts.				16,667
Long-term interest		12,660	25,320	25,320
Short-term principal pmnts.				
Short-term interest				
Total cash outflow	3,309,286	1,783,785	102,041	8,502,056
Net cash	336,394	536,870	461,286	2,541,950

[1/] Other costs = Fixed costs - (Depreciation + Interest)

Astoria tuna cannery

Cash flow projections

	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Balance forward	2,451,950	5,794,265	10,117,435
Cash inflow			
Sales	15,281,723	18,195,480	19,710,951
Long-term borrowing			
Short-term borrowing			
Total cash available	17,823,673	23,989,745	29,828,386
Cash outflow			
Variable costs	11,089,700	12,657,948	13,946,222
Other costs[1/]	65,705	72,670	81,791
Income taxes	790,030	1,057,719	1,101,334
Capital purchases			
Long-term principal pmnts	33,333	33,333	33,333
Long-term interest	50,640	50,640	50,640
Short-term principal pmnts.			
Short-term interest			
Total cash outflow	12,029,408	13,872,310	15,213,320
Net cash	5,794,265	10,117,435	14,615,066

Astoria tuna cannery

Balance sheet projections

	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Assets			
Current			
Cash	5,794,265	10,117,435	14,615,066
Accounts receivable	83,000		
Inventory	483,170		
Fixed			
Land	402,300	485,230	491,150
Buildings	832,000	823,900	815,700
Equipment	140,800	136,600	132,500
Total assets	7,735,535	11,563,165	16,054,416
Liabilities			
Current			
Accounts payable	764,450	6,143,000	4,130,240
Long-term			
Mortgage, interest	1,095,689	1,011,716	927,743
Total liabilities	1,860,139	7,154,716	5,057,983
Net Worth	5,875,396	4,408,449	10,996,433

Astoria tuna cannery

Balance sheet projections

	1980 3rd quarter	1980 4th quarter	1981 Jan.-July	1981 July-Dec.
Assets				
Current				
Cash	336,394	536,870	461,286	2,541,950
Accounts receivable		406,000		67,000
Inventory	600,000	49,000		183,000
Fixed				
Land	320,000	320,000	351,150	366,230
Buildings	850,000	848,000	844,000	840,000
Equipment	150,000	149,000	147,000	145,000
Total assets	2,256,394	2,308,870	1,803,436	4,143,180
Liabilities				
Current				
Accounts payable	175,000	89,000	38,000	1,689,320
Long-term				
Mortgage, interest		746,968	721,648	1,196,328
Total liabilities	175,000	835,968	759,648	2,885,648
Net worth	2,081,394	1,472,902	1,043,788	1,257,532

Astoria tuna cannery

Financial ratios

	1980 3rd quarter	1980 4th quarter	1981 Jan.-June	1981 July-Dec.
Net capital ratios	1.08	1.57	1.73	3.29
Debt/net worth	0.08	0.57	0.73	2.29
Current difference	761,394.00	902,870.00	423,286.00	1,102,630.00
Current ratio	5.35	11.14	12.14	1.65

Astoria tuna cannery

Financial ratios

	1982 Jan.-Dec.	1983 Jan.-Dec.	1984 Jan.-Dec.
Net capital ratio	1.32	2.62	1.46
Debt/net worth	0.32	1.62	0.46
Current difference	5,595,985.00	3,974,435.00	10,484,826.00
Current ratio	8.32	1.65	3.54

Table 28. Oregon albacore tuna landings, in thousands pounds, by month of landing, 1936-77, Oregon Department of Fish and Wildlife

Year	July	August	September	October	November	December	Total
1936	0	0	0	0	0	0	28
1937	0	66	944	288	49	6	1,354
1938	0	0	0	0	0	0	8,000
1939	6	2,836	2,913	730	0	0	6,485
1940	2,590	5,233	1,320	144	0	0	9,286
1941	789	5,653	1,064	44	5	0	7,545
1942	2,062	5,048	2,876	957	0	0	10,943
1943	1,753	4,083	3,446	1,214	0	0	10,495
1944	1,588	8,979	8,778	3,143	4	0	22,492
1945	1,454	7,903	2,590	232	0	0	12,178
1946	394	2,371	1,186	0	0	0	3,951
1947	1,029	2,651	4,815	1,063	0	0	9,558
1948	2,620	3,707	1,372	175	129	0	8,004
1949	632	2,108	2,189	1,426	30	0	6,457
1950	1,535	1,902	496	1,242	211	0	5,386
1951	41	217	1,303	1,254	102	0	2,917
1952	14	123	1,299	840	256	53	2,585
1953	0	21	566	187	1	0	776
1954	0	0	99	360	10	0	469
1955	0	0	27	318	158	0	503
1956	0	477	2,615	425	157	9	3,653
1957	83	896	626	1,064	32	0	2,702
1958	393	5,373	3,043	945	1	0	9,754
1959	1,444	4,082	4,362	574	112	1	10,574
1960	19	900	2,605	933	105	0	4,563
1961	23	1,188	1,496	539	4	0	3,250
1962	28	4,663	2,727	1,414	104	13	8,949
1963	76	5,446	3,990	1,835	45	7	11,400
1964	39	1,067	2,096	1,229	21	0	4,452
1965	6	3,059	6,550	2,261	244	2	12,122
1966	635	11,363	3,376	2,630	37	0	18,041
1967	432	15,297	10,465	3,046	3	0	29,243
1968	8,083	18,018	8,650	2,987	14	1	37,752
1969 1/	2,913	18,265	6,906	1,526	151	66	29,828
1970	7,590	7,169	5,749	962	296	16	21,782
1971	2,799	4,887	165	530	38	0	8,420
1972	4,815	13,634	4,464	122	21	0	23,056
1973 2/	96	10,084	5,500	657	4	0	16,350
1974	2,759	12,433	8,882	1,126	25	0	25,225
1975	1,326	12,256	2,745	762	77	0	17,166
1976 3/	1,445	3,641	638	315	149	30	5,934
1977 4/	181	3,527	530	131	56	0	4,425
1978 5/	812	7,038	3,035	301	0	0	11,248
1979 6/	17	1,303	455	1,284	42	0	3,102

1/ June - 494 lb.
2/ June - 8,811 lb.
3/ February - 6,648 lb.; June - 9,948 lb.
4/ May - 69 lb.; June - 71 lb.
5/ February - 1753 lb.; June 5
6/ Preliminary Data