

U.S. Tuna Trade Summary, 1982

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Introduction

During 1982 there was a substantial decline in U.S. canned tuna sales, cannery receipts of domestically caught and imported raw tuna, and domestic production activity. Preliminary information indicates that total U.S. cannery receipts (domestic catches plus imports) of albacore, *Thunnus alalunga*, and tropical tunas (skipjack tuna, *Euthynnus pelamis*; yellowfin tuna, *T. albacares*; bluefin tuna, *T. thynnus*; and bigeye tuna, *T. obesus*) were down 16 percent from 1981 and 17 percent below the 1977-81 average volume of annual receipts (Table 1).

Canned tuna production during 1982 was off about 14 percent from 1981; a

decrease of 18 percent for light meat (tropical species), and a 3 percent increase for white meat (albacore) packs. Compared with the 1977-81 annual average, the 1982 total pack was down 12 percent, reflecting a 15 percent decrease in the light meat pack and no change in the white meat pack (Table 2).

Popular accounts attribute the 1982 tuna industry downturn to a number of factors, including a drop in sales, an apparent excess of beginning canned inventories, and foreign competition. These conditions led to shutdowns and slowdowns in the canning operations of the three major U.S. tuna processors¹: Bumble Bee Seafoods, a division of Castle and Cooke, closed its San Diego, Calif., plant in June 1982, idling 900 workers; the leading producer, Starkist, Heinz Foods, imposed a 3-week work stoppage at its plants in San Pedro, Calif., in Puerto Rico, and in American Samoa; and Van Camp Seafoods, Ralston Purina, reduced operations at its San Diego cannery. All processors imposed 40-60 day tie-up periods for those tuna seiners in which they held a major interest.

Owing to market conditions, the midrange wholesale list price of advertised light meat tuna fell from \$51.00 per standard case in January 1982 to \$45.65 in December 1982, a 10 percent decrease. The midrange wholesale list price of advertised white meat tuna rose initially in 1982, but then fell from

\$66.05 in May to \$62.48 in December, a decline of 5 percent.

Market conditions also led to the reduction in ex-vessel prices experienced by domestic fishermen in 1982. The average ex-vessel prices paid by U.S. processors since August 1982 ranged from \$795 per short ton for skipjack tuna to \$1,036 per short ton for yellowfin/bigeye tuna—decreases of approximately 24 and 14 percent, respectively, from 1981. The top ex-vessel price for albacore (accounting for size differentials) fell about 25 percent during 1982, from \$1,800 per short ton at the close of 1981 to \$1,350 per short ton at the close of 1982.

Since the United States has historically imported far more raw tuna than it catches, the situation within the U.S. tuna industry during 1982 has had a global impact. Total cannery receipts of imported raw tuna declined about 24 percent from 1981 to 1982, reflecting decreases of 32 and 39 percent, respectively, for skipjack and yellowfin/bigeye tuna, but an increase of about 7 percent for albacore.

In the following sections of this paper, preliminary information pertaining to the production of raw and processed tuna by the U.S. tuna industry during 1982 is reviewed in more detail. In the last section, the economic impact of reduced tuna harvesting and processing activity during 1982 is analyzed for the California-based segment of the U.S. tuna industry.

Table 1.—Estimated total U.S. cannery receipts (short tons) of albacore and tropical tunas 1981-82.

Species	1981	1982	% Change	1977-81 avg.	% Change
Albacore	102,167	101,183	-1	103,154	-2
Tropical	495,535	399,087	-20	501,888	-20
Total	597,702	500,270	-16	605,047	-17

Source: Statistics and Market News, Southwest Region, NMFS, NOAA.

Table 2.—Estimated U.S. canned tuna production, 1981-82 (thousands of standard cases¹).

Pack	1981	1982	% Change	1977-81 avg.	% Change
White	5,826	6,012	3	6,012	0
Light	25,928	21,221	-18	24,948	-15
Total	31,754	27,233	-14	30,960	-12

¹A standard case consists of 48 6.5-ounce cans. Source: NMFS Statistics and Market News, Southwest Region.

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

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Cannery Receipts

Preliminary U.S. Cannery Receipts of Domestically Caught Tuna

Domestically caught² albacore, skipjack, and yellowfin (includes relatively minor amounts of bluefin, bigeye, and blackfin tuna, *T. atlanticus*) tuna, the major market species, comprised 45 percent of the total reported U.S. cannery receipts for 1982, up from 40 percent in 1981. However, while domestically caught receipts as a proportion of total U.S. cannery receipts increased in 1982, reported total receipts of domestically caught major market species declined, reflecting a disproportionate decrease in the amount of 1982 fresh and frozen tuna imports. Total domestically caught receipts, 227,784 short tons, were down about 5 percent, with albacore and yellowfin tuna off 56 and 6 percent, respectively, while domestically caught receipts of skipjack tuna increased about 5 percent. Yellowfin tuna comprised over 52 percent of the total domestically caught, U.S. cannery receipts of major market species in 1982, with albacore and skipjack tuna contributing about 3 percent and 45 percent, respectively, of the total (Table 3).

Pacific-caught tuna accounted for over 99 percent of the domestically caught U.S. tropical tuna received at U.S. canneries in 1982. The eastern Pacific provided most of the domestically caught, Pacific-wide tropical tuna receipts, 154,778 short tons, or 68 percent of the Pacific total. Domestically caught receipts from the eastern Pacific consisted of 57,098 short tons of skipjack tuna and 92,967 short tons of yellowfin tuna, 56 and 78 percent, respectively, of the estimated total domestically caught receipts of each of these species in 1982. Domestically caught tropical tuna receipts from the western Pacific during 1982 are estimated to be 72,890 short tons; 45,357

²Includes only U.S.-caught tuna destined for U.S. canneries; excludes U.S.-caught tuna landed at foreign sites, U.S.-caught tuna landed at U.S. sites destined for foreign canneries, and U.S.-caught tuna destined for the fresh-fish market. Cannery receipt figures will not correspond to those for U.S. tuna landings.

Table 3.—Domestically caught U.S. cannery receipts¹ (short tons) of albacore, skipjack, and yellowfin (including bluefin, bigeye, and blackfin) tuna by landings site, 1981-82.

Species	Continental ²			Am. Samoa/Hawaii			Puerto Rico			Total		
	1981	1982	% ³	1981	1982	%	1981	1982	%	1981	1982	%
Albacore	14,109	4,713	-66	757	1,868	146	2	3	50	14,868	6,584	-56
Skipjack	63,305	56,164	-11	20,522	26,600	30	13,950	19,691	41	97,777	102,455	5
Yellowfin	85,581	79,588	-7	14,535	13,926	-4	26,049	25,231	-3	126,165	118,745	-6
Total	162,995	140,465	-14	35,814	42,394	18	40,001	44,925	12	238,810	227,784	-5

¹Includes only U.S.-caught tuna destined for U.S. canneries; excludes U.S.-caught tuna landed at foreign sites, U.S.-caught tuna landed at U.S. sites destined for foreign canneries, and U.S.-caught tuna destined for the fresh-fish market. Source: NMFS Statistics and Market News, Southwest Region.

²U.S.-caught tuna received at California canneries includes fish transshipped from Oregon, Washington, Alaska, Hawaii, Guam, the U.S. Gulf and East Coasts, and other areas.

³A % symbol denotes the percent change between 1981 and 1982.

Table 4.—Domestically caught U.S. cannery receipts¹ (short tons) by species and ocean of origin, 1981-82.

Ocean	Albacore			Skipjack tuna			Yellowfin tuna ³			Total		
	1981	1982	% ³	1981	1982	%	1981	1982	%	1981	1982	%
E. Atlantic	2	0	-100	3,327	0	-100	1,966	0	-100	5,295	0	-100
W. Atlantic	0	0	0	109	0	-100	502	115	-77	611	115	-81
E. Pacific	13,202	4,713	-64	73,770	57,098	-23	109,354	92,967	-15	196,326	154,778	-21
W. Pacific	1,644	1,871	14	20,571	45,357	120	14,343	25,662	79	36,578	72,890	99
Indian	0	0	0	0	0	0	0	0	0	0	0	0
Total	14,868	6,584	-56	97,777	102,455	5	126,165	118,744	-6	238,810	227,783	-5

¹Includes only U.S.-caught tuna destined for U.S. canneries; excludes U.S.-caught tuna landed at foreign sites, U.S.-caught tuna landed at U.S. sites destined for foreign canneries, and U.S.-caught tuna destined for the fresh-fish market. Source: NMFS Statistics and Market News, Southwest Region.

²A % symbol denotes the percent change between 1981 and 1982.

³Also includes bluefin, bigeye, and blackfin tuna.

short tons of skipjack tuna and 25,662 short tons of yellowfin tuna (44 and 22 percent, respectively, of the estimated 1982 total domestically caught receipts of each of these species).

In 1982, domestically caught tuna receipts from the Atlantic Ocean consisted of 115 short tons of blackfin tuna which are included in the U.S. receipts under yellowfin tuna. While domestically caught tuna receipts from the Atlantic and eastern Pacific Oceans declined about 98 and 21 percent, respectively, during 1982, there was a 99 percent increase in domestically caught tropical tuna receipts from the western Pacific. All U.S. cannery receipts of domestically caught albacore during 1982 came from the north Pacific Ocean. Table 4 presents preliminary estimates of 1982 domestically caught U.S. cannery receipts by species and ocean of origin.

The major U.S. tuna receiving and

processing sites are San Diego and San Pedro, Calif.; Mayaguez and Ponce, Puerto Rico; Honolulu, Hawaii; and Pago Pago, American Samoa. For reporting purposes, tuna receipts are combined for California sites (Continental) and for American Samoa and Hawaii (American Samoa/Hawaii). Sixty-one percent of the domestically caught U.S. receipts in 1982 were received at Continental sites and 19 percent and 20 percent of the total were received in American Samoa/Hawaii and Puerto Rico, respectively. U.S. cannery receipts at the Continental sites totaled 140,465 short tons in 1982, a 14 percent reduction from 1981. Receipts in American Samoa/Hawaii of U.S.-caught tunas totaled 42,394 short tons in 1982, an increase of about 18 percent over those for 1981. Puerto Rican receipts of U.S.-caught tuna in 1982 totaled 44,925 short tons, an increase of about 12 percent compared with

1981. The distribution of preliminary 1982 U.S. tuna receipts by species and cannery site is shown in Table 3.

In 1982, receipts of U.S.-caught albacore and tropical tunas generated about \$237 million in ex-vessel revenues, down 16 percent from 1981. Domestically caught, U.S. albacore receipts produced ex-vessel revenues of about \$9 million, 67 percent below 1981, which, when divided by total volume, results in a weighted ex-vessel price of \$1,382 per short ton, down 25 percent from 1981. Domestically caught, U.S. receipts of skipjack tuna generated about \$98 million in ex-vessel revenues, 8 percent below 1981, at an average weighted price of \$957 per short ton, down 7 percent from 1981. Receipts of U.S.-caught yellowfin tuna produced about \$130 million in ex-vessel revenues, 8 percent below 1981, at an average weighted price of \$1,117 per short ton, which is 6 percent below the 1981 average weighted price per ton.

Preliminary U.S. Cannery Receipts of Imported Tuna

U.S. cannery receipts of imported³ raw (whole and other than whole) tuna during 1982 are estimated to be 272,486 short tons, a decrease of 24 percent from 1981. Imports of albacore totaled 94,599 short tons in 1982, 8 percent above 1981, while imports of skipjack tuna (127,106 short tons) and yellowfin tuna (50,781 short tons) were both down from 1981, 32 and 39 percent, respectively (Table 5).

Of the estimated combined albacore and tropical raw tuna imports for 1982, 49 percent were from the Pacific Ocean, with the Atlantic Ocean and the Indian Ocean providing 44 and 7 percent, respectively, of the total. Forty-three percent of the total 1982 albacore imports were of Atlantic origin, with the Pacific and Indian Oceans contributing 39 and 18 percent, respectively. The Atlantic Ocean provided 52 percent of the total skipjack tuna imports in 1982, the Pacific Ocean provided 46 percent,

³Includes only imported tuna destined for U.S. canneries; excludes tuna imported as flakes, tuna not fit for human consumption, and "sushi" grade tuna.

Table 5.—U.S. cannery receipts¹ (short tons) of imported raw albacore, skipjack, and yellowfin (including bigeye and blackfin) tuna by landings site, 1981-82.

Species	Continental			Am. Samoa/Hawaii			Puerto Rico			Total		
	1981	1982	% ²	1981	1982	%	1981	1982	%	1981	1982	%
Albacore	14,600	11,115	-23	28,643	22,814	-20	44,056	60,670	38	87,299	94,599	8
Skipjack	50,763	37,107	-26	21,424	8,729	-59	115,819	81,270	-30	188,006	127,106	-32
Yellowfin	19,348	8,171	-58	19,944	9,637	-51	44,295	32,941	-26	83,587	50,781	-39
Total	84,711	56,393	-34	70,010	41,180	-41	204,171	174,913	-14	358,892	272,486	-24

¹Includes only imported tuna destined for U.S. canneries; excludes tuna imported as flakes, tuna not fit for human consumption, and "sushi" grade tuna. Source: NMFS Statistics and Market News, Southwest Region.

²A % symbol denotes the percent change between 1981 and 1982.

Table 6.—U.S. cannery receipts¹ (short tons) of imported raw tuna by species and ocean of origin, 1981-82.

Ocean	Albacore			Skipjack tuna			Yellowfin tuna ³			Total		
	1981	1982	% ²	1981	1982	%	1981	1982	%	1981	1982	%
E. Atlantic	17,105	19,816	16	67,011	49,417	-26	19,561	9,320	-52	103,677	78,553	-24
W. Atlantic	16,894	21,129	25	8,754	17,119	96	5,200	3,026	-42	30,848	41,274	34
E. Pacific	23	48	109	9,409	11,916	27	16,039	19,341	21	25,471	31,305	23
W. Pacific	47,608	36,760	-23	101,760	46,890	-54	42,477	18,321	-57	191,845	101,971	-47
Indian	5,669	16,846	191	1,072	1,764	65	310	773	149	7,057	19,383	175
Total	87,299	94,599	8	188,006	127,106	-32	83,587	50,781	-39	358,892	272,486	-24

¹Includes only imported tuna destined for U.S. canneries; excludes tuna imported as flakes, tuna not fit for human consumption, and "sushi" grade tuna. Source: NMFS Statistics and Market News, Southwest Region.

²A % symbol denotes the percent change between 1981 and 1982.

³Also includes bigeye and blackfin tuna.

and the Indian Ocean provided 2 percent. Seventy-four percent of the total yellowfin tuna imports came from the Pacific Ocean during 1982, with the Atlantic Ocean contributing 24 percent and the Indian Ocean 2 percent. Tuna imports from the western Atlantic, eastern Pacific, and Indian Ocean rose during 1982; there were substantial decreases in imports from the eastern Atlantic and western Pacific (Table 6).

Puerto Rico was the major receiving site for U.S. imported tuna in 1982, with about 174,913 short tons being received, or 64 percent of the total imports. Continental sites, with 56,393 short tons of tuna imports in 1982, accounted for 21 percent of the total; American Samoa/Hawaii, with 41,180 short tons of tuna imports in 1982, contributed the remaining 15 percent. A breakdown of 1982 raw tuna imports by species and receiving site is given in Table 5.

In 1982, Japan led all foreign countries in overall exports of raw tuna to the United States with an estimated

43,581 short tons, or 16 percent of the total tuna imports. Taiwan was the leading exporter of albacore to the United States during 1982 with 27,377 short tons, or 29 percent of the total albacore tuna imports. Japan exported more skipjack tuna to the United States in 1982 than any other single country, with 19,372 short tons, which represents 15 percent of the total. Panama led all countries in exports of yellowfin tuna to the United States in 1982 with 12,656 short tons, or 25 percent of the total. Preliminary 1982 U.S. raw tuna imports from the 20 leading exporting countries are presented in Table 7.

The value of imports received at U.S. canneries in 1982 approached \$354 million, 26 percent below the corresponding value for 1981 (\$479 million). Albacore, skipjack, and yellowfin tuna imports were valued at about \$177 million, \$116 million and \$61 million, respectively, down 2, 42, and 38 percent, respectively, from 1981.

In terms of total cannery supply (domestically caught receipts plus im-

Table 7.—Preliminary U.S. imports (short tons) of fresh, frozen, and partially processed whole tuna by exporting country for the 20 leading exporters during 1981-82. (Species totals do not agree with totals reported in Table 5 due to the presence of unidentified landings by country and the absence of foreign transshipments.)

Exporting Country	Albacore		Skipjack tuna		Yellowfin tuna		Not identified		Total		Percent change
	1981	1982	1981	1982	1981	1982	1981	1982	1981	1982	
Japan	16,474	21,263	33,091	19,372	4,352	2,891	40	55	53,957	43,581	-19
Taiwan	16,600	27,377	763	2,057	562	765	53	35	17,978	30,234	68
France	0	2,732	13,322	18,744	8,527	4,561	0	165	21,849	26,202	19
Panama	0	0	5,533	10,299	8,968	12,656	1,224	909	15,725	23,864	51
Brazil	123	608	6,754	14,509	36	415	0	2	6,913	15,534	124
Ghana	20	0	11,873	13,573	1,148	1,064	0	41	13,041	14,678	12
Venezuela	0	0	4,939	5,470	4,577	4,731	1,451	347	10,967	10,575	-3
Spain	473	532	9,439	8,274	3,552	1,203	4,011	256	17,475	10,265	-41
Cayman Islands	0	0	1,404	3,421	696	5,195	0	0	2,100	8,616	310
Philippines	101	359	14,855	5,424	11,045	2,071	7	1	26,008	7,855	-69
Rep. of											
South Africa	8,963	4,832	21	1,507	311	798	107	165	9,402	7,302	-22
Rep. of Korea	2,385	1,901	10,148	3,702	2,782	882	111	642	15,426	7,127	-53
Singapore	2,949	1,986	7,043	2,549	1,177	353	0	63	11,169	4,951	-55
Indonesia	22	0	5,594	3,900	244	389	25	0	5,885	4,289	-27
Trust Terr.											
Pacific	0	0	6,785	3,341	2,494	875	0	0	9,279	4,216	-54
New Zealand	2,136	2,584	1,150	641	0	0	0	2	3,286	3,227	-1
Fr. Indian Ocean	1,487	3,176	0	0	0	0	0	0	1,487	3,176	113
United Kingdom	0	0	0	1,874	0	894	0	0	0	2,768	100
South Asia	0	0	618	1,661	242	466	0	0	860	2,127	147
Mauritius	1,128	1,965	0	0	0	0	0	0	1,128	1,965	74
Other	32,681	24,187	50,891	5,314	31,191	9,983	194	448	114,857	39,934	-66
Total	85,542	93,502	184,223	125,632	81,904	50,192	7,223	3,160	358,892	272,486	-24

Source: U.S. Department of Commerce, Bureau of the Census.

ports) the United States is mainly dependent on tuna resources in the Pacific Ocean, which in 1982 accounted for about 72 percent of all U.S. tuna receipts; the Atlantic and Indian Oceans provided about 24 and 4 percent, respectively, of the 1982 total U.S. tuna receipts, virtually all imports. These proportions were not greatly different from 1981. However, as Tables 4 and 6 indicate, there were some significant shifts between 1981 and 1982 with respect to suboceanic area of origin and domestic or foreign source of supply. Of particular interest in this regard was the large increase in domestically caught receipts relative to the decline in imports from the western Pacific Ocean, as well as the increase in imports from the western Atlantic and Indian Oceans.

Production of Canned Tuna for Human Consumption

Domestic Production

Tuna canned for human consumption in the United States consists of white meat or albacore and light meat tuna, a

Table 8.—Estimated¹ U.S. canned production (thousands of standard cases) of white and light meat tuna, 1981-82.

Pack	Continental			Am. Samoa/Hawaii			Puerto Rico			Total		
	1981	1982	% ²	1981	1982	%	1981	1982	%	1981	1982	%
White	1,532	1,022	-33	1,689	1,503	-11	2,605	3,487	33	5,826	6,012	3
Light	11,703	9,549	-18	3,721	2,971	-20	10,504	8,701	-17	25,928	21,221	-18
Total	13,235	10,571	-20	5,410	4,474	-17	13,109	12,188	-7	31,754	27,233	-14

¹Derived from estimated proportions of the total 1981 and 1982 white and light meat packs at individual canning sites applied to total white and light meat packs reported in USDC (1983).

²A % symbol denotes the percent change between 1981 and 1982.

blend of the tropical species, packed in either oil or water. Both light and white meat tuna are canned in either the solid, chunk, or grated form.

Of the three major canned tuna production centers, Puerto Rico was the leading U.S. processing site during 1982, accounting for 45 percent of the combined light and white meat pack. Puerto Rico-based processors led in the production of white meat in 1982 with 58 percent of the total, followed by American Samoa/Hawaii with 25 percent. Continental processors had the largest share of light meat production in

1982, 45 percent; Puerto Rico followed with 41 percent. Except for the increase in white meat production at Puerto Rico during 1982, white and light meat production in all areas was down from 1981. Table 8 presents estimates of the 1981 and 1982 white and light meat production at major canning sites in thousands of standard cases⁴.

Imports

Imports of canned tuna in 1982 to-

⁴A standard case consists of 48 6.5-ounce cans for chunk-style pack, 48 7-ounce cans for solid pack, and 48 6-ounce cans for grated.

taled approximately 4,496,000 standard cases (based on 19.5 pounds to the standard case), an increase of 26 percent from 1981. Imports of canned white meat tuna amounted to 572,000 standard cases, a 4 percent decrease from 1981, while approximately 3,912,000 standard cases of light meat tuna were imported in 1982, up 32 percent from 1981.

The Philippines was the leading exporter of canned tuna to the United States in 1982 with 1,417,000 standard cases, all light meat, or 32 percent of the 1982 total. Japan was the foremost exporter of canned white meat tuna, accounting for 372,000 standard cases, representing 65 percent of the total U.S. canned white meat imports for 1982. The imports of canned light meat tuna from the Philippines in 1982 represented 36 percent of the total canned light meat imports. Estimates of 1982 canned tuna imports by exporting country are given in Table 9.

U.S. production of canned tuna in 1982 was valued at \$885 million, down nearly 25 percent from 1981. Based upon total light and white meat volume, this results in a weighted average standard case price of \$32.49 for 1982, compared with \$37.17 for 1981, a 13 percent decrease. The value of imported canned tuna was \$113 million in 1982, a 2 percent increase from 1981, this despite a 19 percent decrease in the weighted average price of imported canned tuna (white and light combined) from \$30.87 to \$25.13 per standard case.

Economic Impacts

The following discussion attempts to assess the economic impact of the U.S. tuna industry decline during 1982 using results from an input-output study of California fisheries conducted by King and Shellhammer (1982). These investigators derived California economic impact multipliers for tuna purse seiners (which accounted for almost all of the U.S.-caught tropical tuna receipts in 1982), salmon/albacore vessels, and tuna processors based in California. Their findings indicate that every \$1,000 of California tropical tuna cannery receipts supplied by California-

Table 9.—Preliminary U.S. imports (thousands of standard cases) of canned tuna by exporting country, 1981-82.

Exporting country	Albacore (not in oil)		Light meat (not in oil)		Not identified (in oil)		Total		Percent change
	1981	1982	1981	1982	1981	1982	1981	1982	
Australia	0	0	3	99	0	0	3	99	3,200
Azores	0	0	0	0	3	2	3	2	-33
France	0	0	0	0	1	0	1	0	-100
Hong Kong	0	0	3	4	0	0	3	4	33
Indonesia	0	0	7	30	0	0	7	30	328
Italy	0	0	0	0	1	1	1	1	0
Japan	368	372	689	955	0	0	1,057	1,327	25
Macao	0	0	0	1	0	0	0	1	100
Malaysia	18	23	16	14	0	0	34	37	8
Peru	0	0	3	0	0	0	3	0	-100
Philippines	13	0	1,084	1,417	0	0	1,097	1,417	29
Portugal	1	0	0	1	0	2	1	3	200
Rep. of Korea	0	2	2	1	0	0	2	3	50
South Asia	0	0	30	17	0	0	30	17	-43
Singapore	0	0	3	6	0	0	3	6	100
Spain	0	0	0	0	9	6	9	6	-33
Taiwan	195	166	597	417	0	0	792	583	-26
Thailand	1	8	526	950	0	1	527	959	81
Trinidad	0	0	2	0	0	0	2	0	-100
West Africa	0	1	0	0	0	0	0	1	100
Total	596	572	2,965	3,912	14	12	3,575	4,496	26

Source: U.S. Department of Commerce, Bureau of the Census.

Table 10.—Estimated impacts of tuna harvesting on the California economy.

Item	Tropical tuna			Albacore		
	Economic production (\$)	Household income (\$)	Employment (full-time jobs)	Economic production (\$)	Household income (\$)	Employment (full-time jobs)
<i>A. Per \$1,000 of lost tuna landings (before processing).</i>						
Direct	-1,000	-611	-0.006	-1,000	-438	-0.076
Direct and indirect	-1,514	-751	-0.012	-1,720	-641	-0.085
Direct, indirect, and induced	-3,663	-1,042	-0.028	-3,554	-890	-0.098
<i>B. Given the decline in domestically caught cannery receipts at continental sites, 1981-82.</i>						
Direct	-14,000,000	-8,554,000	-84	-13,000,000	-5,694,800	-988
Direct and indirect	-21,196,000	-10,514,880	-168	-22,360,000	-8,333,000	-1,105
Direct, indirect, and induced	-51,282,000	-14,588,000	-392	46,202,000	-11,570,000	-1,274

based purse seiners generates about \$3,633 in California production activity, \$1,042 in household income, and 0.028 full-time jobs. For each \$1,000 of California albacore cannery receipts supplied by California-based salmon/albacore vessels, California production activity increased by \$3,554, household income increases \$890, and about 0.098 full-time jobs are created. The

overall impact on the California economy of a \$1,000 change in ex-vessel albacore or tropical tuna sales is shown in Table 10A, broken down according to direct economic activity, indirect economic activity (generated through purchases of goods and services by the tuna harvesting sector), and induced economic activity (generated by the expenditures of firms and

households with respect to the income they derive from the sale of goods and services to the harvesting sector).

Based on the decline in continental tropical tuna receipts from the California-based purse seine fleet between 1981 and 1982 (13,134 short tons from Table 3), and corresponding price conditions, ex-vessel sales revenue is estimated to have decreased by \$14 million. Using the multipliers from King and Shellhammer (1982), the predicted impact of this decline on the California economy is shown in Table 10B⁵. The decrease in albacore cannery receipts from California-based vessels at continental sites during 1982 (9,396 short tons from Table 3) resulted in ex-vessel albacore tuna revenues falling an estimated \$13 million. The predicted impact of the reduced 1982 albacore cannery receipts on the California economy is also shown in Table 10B. The combined decline in albacore and tropical tuna receipts between 1981 and 1982 translates into a direct harvesting-related production decline of about \$27 million, a direct decrease in household income of about \$14 million and a predicted loss of the equivalent of more than 1,000 full-time jobs⁶. While corresponding economic multipliers for American Samoa/Hawaii and Puerto Rico are not available, the situation in these areas for 1982 may not be as great as projected for the continental U.S. Domestically caught cannery receipts at these sites increased in 1982, but are smaller than those for the continent, and are relatively less important as a source of raw material to pro-

⁵The multiplier analysis as applied here assumes fixed ratios of inputs to outputs. A problem of overestimating expenditure/employment impacts arises under these conditions if, for example, there is a decrease in catch per unit effort of California purse seiners after the multipliers are derived, i.e., a lower level of output associated with the same level of inputs.

⁶The use of full-time job equivalents suggests that the contraction in labor input could have been accomplished through temporary layoffs and reduced hours of plant operation, not necessarily in this number of people actually losing jobs.

cessors and as a source of local income and employment.

The King and Shellhammer (1982) study also derived economic impact multipliers for the processing sector of the California-based segment of the U.S. tuna industry (Table 11A). These multipliers, as in the case of cannery receipts of raw tuna, can be used to assess the impact of reduced processing at continental canneries on the California economy. Production of both white and light meat tuna at California canneries fell by a reported 2.66 million standard cases between 1981 and 1982 (Table 8). At a weighted average price of \$32.49 per standard case, this amounts to a decrease of about \$87 million in white and light meat production. The direct impact of this decline on the California economy, as predicted in Table 11B, is a reduction of about \$14 million in household income and a loss of the equivalent of 870 full-time jobs. Again, multipliers for American Samoa/Hawaii and Puerto Rico are not available to assess the regional impacts of changes in canned tuna production in these areas, although lesser impacts are implied by the smaller declines in pack (Table 8).

The multiplier analysis suggests a substantial impact on the California economy due to reduced activity in the California-based segment of the U.S. tuna industry. When the predicted impacts of reduced domestically caught U.S. tuna receipts, imports, and associated canned production are combined, there is a direct loss of \$114 million in revenues generated by harvesting and processing activity. This translates into a reduction in employment equal to about 1,900 full-time jobs in the harvesting and processing sectors of the California-based segment of the U.S. tuna industry, with a corresponding loss in household income of nearly \$29 million. The overall predicted impact, which also includes indirect and induced effects, is a loss of almost \$320 million in California production

Table 11.—Estimated impacts of tuna processing on the California economy.

Item	Economic production (\$)	Household income (\$)	Employment (full-time jobs)
<i>A. Per \$1,000 of lost canned tuna production revenues.</i>			
Direct	-1,000	-161	-0.010
Direct and indirect	-1,984	-591	-0.023
Direct, indirect, and induced	-3,674	-820	-0.036
<i>B. Given the decline in U.S. tuna processing at continental sites, 1981-82.</i>			
Direct	- 87,000,000	-14,007,000	- 870
Direct and indirect	-172,608,000	-51,417,000	-2,001
Direct, indirect, and induced	-319,638,000	-71,340,000	-3,132

activity, a decrease of \$71 million in household income, and a loss of the equivalent of about 3,100 full-time jobs⁷.

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Literature Cited

- King, D. M., and K. L. Shellhammer. 1982. The California Interindustry Fisheries (CIF) Model: An economic impact calculator for California fisheries. California Sea Grant Working Paper No. P-T-5, Vol. 1.
- USDC. 1983. Fisheries of the United States, 1982. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv. Curr. Fish. Stat. 8300.

⁷These figures are found in the bottom row of Table 11B which shows the combined direct, indirect, and induced impacts of reduced processing activity. Since indirect processing impacts reflect backward linkages to the harvesting sector, the overall impact of tuna processing activities in California will incorporate those for harvesting.