



---

**U.S. Department of Commerce**

**National Oceanic and Atmospheric Administration**

**National Marine Fisheries Service**

---

NOAA Technical Memorandum NMFS-SEFC-233
---

## **Situation and Outlook for Surimi and Surimi-Based Food**

---

**by:**

**John Vondruska  
National Marine Fisheries Service  
9450 Koger Blvd.  
St. Petersburg, FL 33702**

**Richard Kinoshita  
National Marine Fisheries Service  
7600 Sand Point Way, NE  
Seattle, WA 98115**

**Matteo Milazzo  
National Marine Fisheries Service  
1335 East-West Highway  
Silver Spring, MD 20910**

**August 1989**



## **Situation and Outlook for Surimi and Surimi-Based Food**

by: **John Vondruska  
Richard Kinoshita  
Matteo Milazzo**

---

U.S. Department of Commerce  
Robert Mosbacher, Secretary

National Oceanic and Atmospheric Administration  
John A. Knauss, Administrator

National Marine Fisheries Service  
James W. Brennan, Assistant Administrator for Fisheries

---

**August 1989**

---

Technical Memoranda are used for documentation and timely communication of preliminary results, interim reports, or special purpose information, and have not received complete formal review, editorial control or detailed editing.

## **Notice**

---

The National Marine Fisheries Service (NMFS) does not approve, recommend or endorse any proprietary product or proprietary material mentioned in this publication. No reference shall be made to NMFS, nor to this publication furnished by NMFS, in any advertising or sales promotion which would indicate or imply that NMFS approves, recommends or endorses any proprietary product or proprietary material mentioned herein, or which has as its purpose an intent to cause directly or indirectly the advertised product to be used or purchased because of this NMFS publication.

This report should be cited as follows:

John Vondruska, Richard Kinoshita, and Matteo Milazzo. 1989. Situation and Outlook for Surimi and Surimi-Based Food. NOAA Technical Memorandum NMFS-SEFC-233 , 16 p.

Copies may be obtained by writing:  
National Technical Information Service  
5258 Port Royal Rd.  
Springfield, VA 22161

## **Acknowledgement**

---

The authors appreciate help from Paul Niemeier, Karen Kelsky and Steve Koplin in obtaining Japanese and U.S. data, and help from Carolyn Dempsey and Debbie Protomaster in manuscript preparation using Xerox Ventura Publisher software.

# **Situation and Outlook for Surimi and Surimi-Based Food**

## **Summary**

---

U.S. consumption of imitation crab and other surimi-based food rose 20 percent to an estimated 135 million pounds in 1988. Output moved well ahead of declining imports. The same is true for surimi, for which exports accounted for over half of U.S. production (Tables 1-4). Strong growth is expected in 1989.

In 1988, surimi surpassed fillets as the leading U.S. product of Alaska pollock. Output of fish meal was significant. Key market prices averaged lower for surimi, imitation crab, fillets and blocks, but higher for fish meal. U.S. surimi prices may continue to be weak, depending on the Japanese market and the yen.

## **Imitation Crab and Other Surimi-based Food**

---

In 1988, U.S. consumption of imitation crab and other surimi-based food was an estimated 135 million pounds, up 22 million pounds or 20 percent (Figure 1). Imports declined, and production moved close to consumption (Tables 2 and 4). Prices were volatile.

Imitation crab in general was reportedly \$1.60-\$1.65 a pound at the processor level in early 1988, but \$1.25-\$1.40 by late 1988. Figure 2 implies that comparable U.S. market prices of some imports containing shellfish meat were higher, perhaps \$1.75-\$2.50, with some decline for Japanese product in the third quarter (prices in Figure 2 are f.o.b. Japan and South Korea, excluding transportation and the U.S. 10 percent import duty).

Japan's processors have sold imitation shellfish at mostly falling prices, but a much stronger yen since late 1985 has meant mostly rising dollar prices and falling sales of their products in the U.S. market, which had accounted for some forty percent of their output in 1985 (Figure 3 and Table 5). Inventories grew but were reduced by the end of 1988 to 86,200 metric tons, which still exceeds a year's production (Minato Shimbun, 4/19/89, translated by Kelsky).

In 1989, U.S. consumption could reach 150 million pounds, and the 12-percent, 16-million pound increase could keep downward pressure on prices, but probably less than in 1988 if the forecasts are not too far off the mark. U.S. processors have identified several factors that could affect the market in the next few years (Frozen Food Age, January 1989). Their sales have expanded on the basis of both market growth and import displacement since 1985, and the estimated import share of the market has fallen from 78 percent in 1985 to 24 percent in 1988. However, imports from countries other than Japan have increased and there is some concern that proliferation of imports at the lower end of the price (quality) range will affect demand. There is also concern

about need for consumer-oriented market development. Greater consumer awareness of the product, a broader market base in terms of the number of frequent consumers, new value-added products and new outlets would increase demand.

## **Surimi Supplies**

---

In 1988, U.S. production of surimi was an estimated 126 million pounds, triple the 40 million pounds for 1987. Over half came from vessels (Tables 1 and 3). Exports to Japan were an estimated 67 million pounds, up from 12 million in 1987. Seven vessels produced surimi in 1988 compared with two in 1987.

In 1989, the industry expects to have 5 shoreside plants and 17 vessels and to produce 311 million pounds of surimi.<sup>1</sup> They plan to export 234 million pounds, notably to Japan (198 million pounds) and South Korea, but also to Canada and Europe. Japan's supply and use of surimi could increase in 1989 largely because of greater imports from the United States (Table 6).<sup>2</sup> Japan's imports could double, offset lower production, and represent nearly a third of the apparent use of surimi by food processors.

Japan's production of Alaska pollock surimi will decline in 1989, mostly because U.S. allocations for "joint ventures" (at-sea sales by U.S. catcher vessels to foreign processing vessels) were greatly reduced.<sup>3</sup> The Japanese industry forecasts that 44 percent of the total production in 1989 will be based on Japan's catch in the "donut hole," a part of the Bering Sea not in the exclusive economic zone (EEZ) of any country. They forecast no change from 1988 in this catch. However, there is speculation about the amount of catch by several countries in the donut hole and their use of it as a staging area for illegal fishing in the USSR and U.S. EEZs. Beginning in 1988, foreign fishing quotas were eliminated in U.S. waters off the Alaska coast.

- 
- 1 The estimates for the number of U.S. vessels, U.S. production and U.S. exports for 1989 were reduced to reflect recent bankruptcy of the vessel Bering Trader and a disabling fire (on about May 9-10, 1989) in the vessel Golden Alaska.
  - 2 Other assessments suggest a decline in supplies in 1989, based mostly on much higher estimates of production of frozen Alaska pollock surimi for 1988, 427 kt rather than the 324 kt in Table 6 (Minato Shinbum, 4/19/89, translated by Kelsky).
  - 3 In Japan's official foreign trade statistics such whole fish purchases are counted inseparably at surimi product weight as "imports of surimi" along with the imports of surimi processed by other countries, which were probably less than 10, 000 metric tons annually until 1985. That is, until 1985, imports of surimi shown in Japan's official trade statistics represented for the most part Japan's own production and not additional supplies.

## Surimi Prices

---

Americanization and greater dependence on imports, per se, probably did not disrupt Japan's surimi market in 1986-89. However, demand by Japan's food processors appears to be declining in the wake of negative market reaction to significant cost-based price increases for their products. Because demand apparently weakened since 1983-84 and supplies increased after 1987, surimi prices in yen have trended downward since early 1986 (Figure 4).

Figure 5 shows that real prices of surimi in Japan rose almost as much in 1981-86 as in the 1970s. Although the rise in real prices was more gradual than in the 1970s, market reaction still had the effect of slowing and then reversing what was a pattern of increasing output in the early 1980s for broiled (chikuwa), fried (agekamaboko), and fish ham/sausage items (Table 7). Actual use of surimi in these food products may vary depending on relative prices and other factors, but typical recipes (in Miyake et al.) imply that the declines in their output affected mostly the demand for lower grade surimi. On the other hand, the demand for top grade surimi has been affected more by the unabated decline in output of steamed (kamaboko) items since 1976 and the flat pattern for imitation shellfish since 1984.

By way of comparison with the more gradual increases in real prices of surimi in Japan during 1981-86, the "EEZ shock" suddenly boosted real prices in the 1970s. That price jump and other factors contributed to the market decline through 1980 for surimi-based food, and led to financial problems for surimi processors (Hirasawa; Vondruska). Because of generally stronger economic conditions, including the absence of a comparable increase in energy prices, it seems unlikely that market reaction will depress surimi prices as deeply from 1986 onward as it did in 1978-81. Nevertheless, any price weakness in Japan will affect U.S. surimi processors, because Japan is the dominant market for surimi with forecast imports from the United States of 90,000 metric tons in 1989, and apparent use of 430,000 metric tons compared with apparent use of 35,000 metric tons for the United States (Tables 3 and 6).

During the 1990s, U.S. surimi processors may face problems because of the rapid growth in overall groundfish production capacity in Alaska. U.S. joint-venture catcher boats face more imminent problems of viability, because of displacement associated with the sharp curtailment of catch quotas for them in 1989 in U.S. waters off the Alaska coast. Counting all products, some 50 to 60 U.S.-flag vessels are expected to target on Alaska pollock by the early 1990s, fully utilizing the resource. Among the many factors that help explain the expansion in overall groundfish production capacity in Alaska during the 1980s are prices, including the effect on dollar prices of a much stronger yen in the case of surimi and other products destined for Japan.

In dollar equivalents, the Tokyo price of top-grade Alaska pollock surimi doubled in 1983-88, from 77 cents a pound to \$1.61, and grade-2 surimi rose from 52 to 88 cents. This occurred in part because of increasing strength of the yen which also masked the

downward trend of Tokyo's prices in yen since early 1986 (compare prices in yen and dollar equivalents in Figure 4). In 1988, the top grade surimi averaged 4.6 percent higher than in 1987, although it fell from \$1.78 a pound in January 1988 to \$1.66 in December. Changes in strength of the yen help explain the dip to \$1.48 a pound in August-October 1988.

## **Fillets and Other Alaska Pollock Products**

---

U.S. production of Alaska pollock fillets rose from less than a half million pounds in the early 1980s to 75 million pounds by 1987 compared with 40 million pounds of surimi. According to estimates for 1988, the output of surimi, 126 million pounds, surpassed that of fillets, 110 million pounds. The difference in expansion for these two major products could have been a response to prices, which weakened more for fillets than for surimi in 1988. Of course, any one year's U.S. output mix depends on individual business decisions based on price, production, market and other factors which may vary among seasons, locations, and firms.

While prices of many groundfish products were above previous levels in 1986-88, they averaged lower in 1988 than in 1987. For example, individually quick frozen (IQF) Alaska pollock fillets averaged \$1.26 a pound in 1988 in Seattle, down 16 percent. In Boston, lower priced fillets fell more deeply than higher priced fillets (Canadian cod, -27% to \$1.54; ocean perch, -14% to \$1.32; Icelandic cod, -1.5% to \$2.41; and flounder, +1.7% to \$2.03). During 1989 it is expected that cod supplies will fall and that prices will rise, especially in the second half as major producing countries reach their catch quotas, but the effect on lower priced fillets is less certain.

## **Fish Meal**

---

U.S. production of Alaska pollock meal may have reached 15 kt (15,000 metric tons) in 1988. Alaska pollock meal is a by-product, white-fish (groundfish) meal, not a whole-fish meal, for which output is much greater. Future U.S. production will depend on fish meal prices, yields, protein content and other factors that affect the feasibility of installing and operating on-board and in-plant fish meal processing facilities. Could output eventually exceed the 200-300 kt for U.S. menhaden meal? Perhaps, but Japan's output of white-fish meal was less than that in the late 1970s, some 140 kt, and it declined in the early 1980s, a period of falling real prices, largely causing world output of white-fish meal to drop from 360 kt to 187 kt during 1977-86 (FAO, 1988). Meanwhile, Japanese and world production of all fish meals rose, despite the downward trend in real prices of animal feed meals to a postwar low in 1985 (Figure 6). World output rose from 4.6 to 6.7 million metric tons during 1977-86.

Prices of various animal feed meals tend to be closely linked in a complex international market, for which prices of a leading product, soybean meal, are often used as indicators. U.S. menhaden meal averaged \$485 per short ton in 1988, up 36 percent from 1987 and well above the \$259 of 1985. During 1988, it peaked at \$578 in June and moved down to \$481 in December. According to forecasts of April 1989, soybean meal

(44 percent protein) could average \$230-\$240 in the 1988/89 crop year compared with \$222 in the 1987/88 crop year (crop years end September 30; USDA, 1989). While many factors could affect soybean meal prices during the next few months, they have been declining from a peak in June 1988 through late May 1989, and this suggests lower fish meal prices in the fall 1989 Alaska pollock fishing season than a year earlier.

Fig. 1. U.S. Supplies of Surimi-based Food

(Data for 1989 are forecasts)

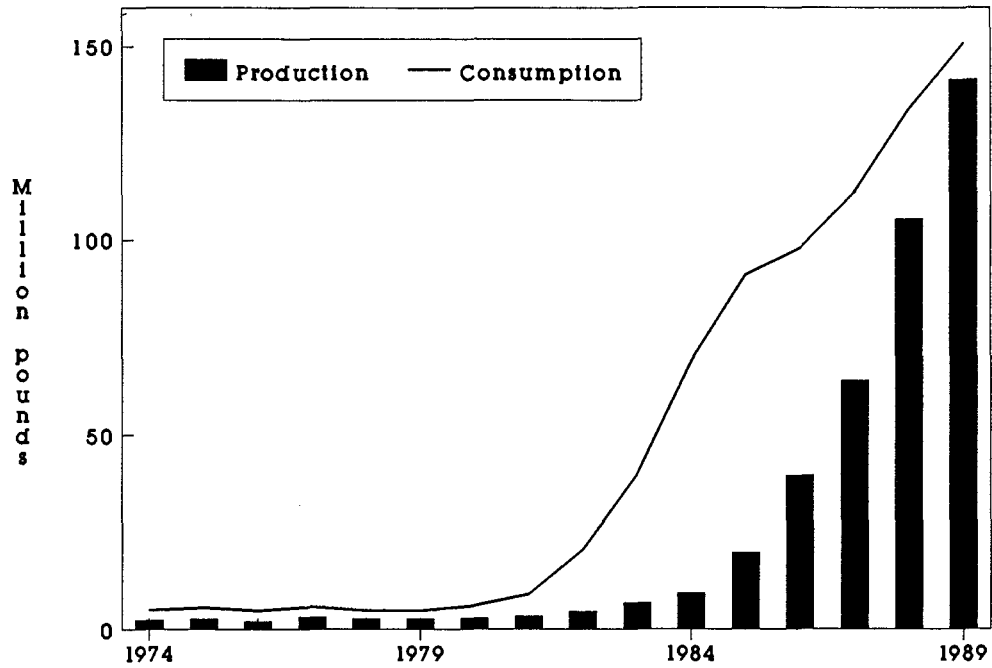


Fig. 2. U.S. Prices of Imported Imitation Shellfish

(f.o.b. foreign country, excluding transp. & 10% U.S. duty)

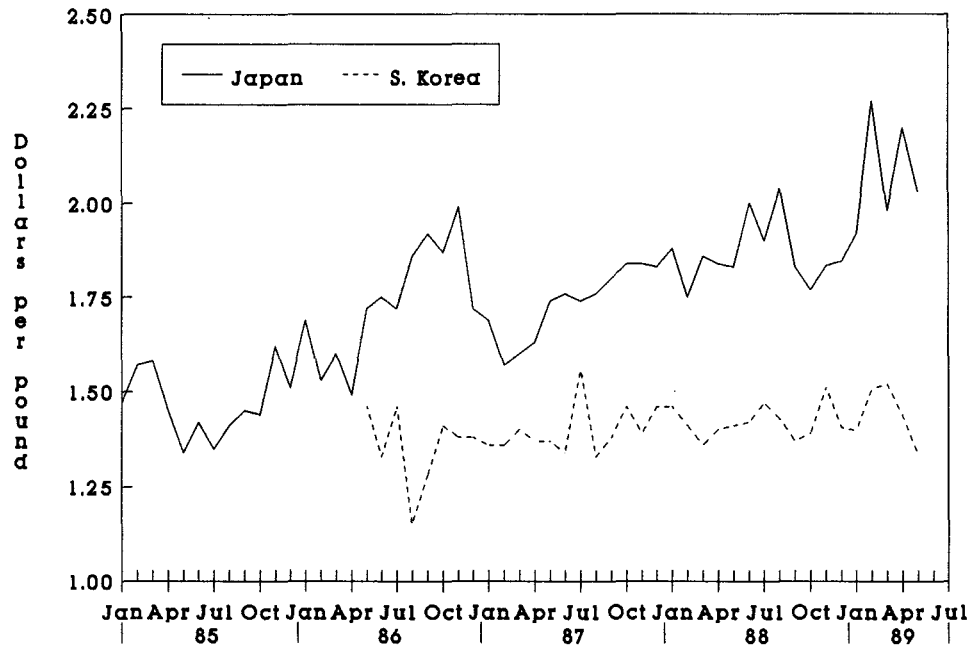


Fig. 3. Prices of Imitation Shellfish Exported by Japan

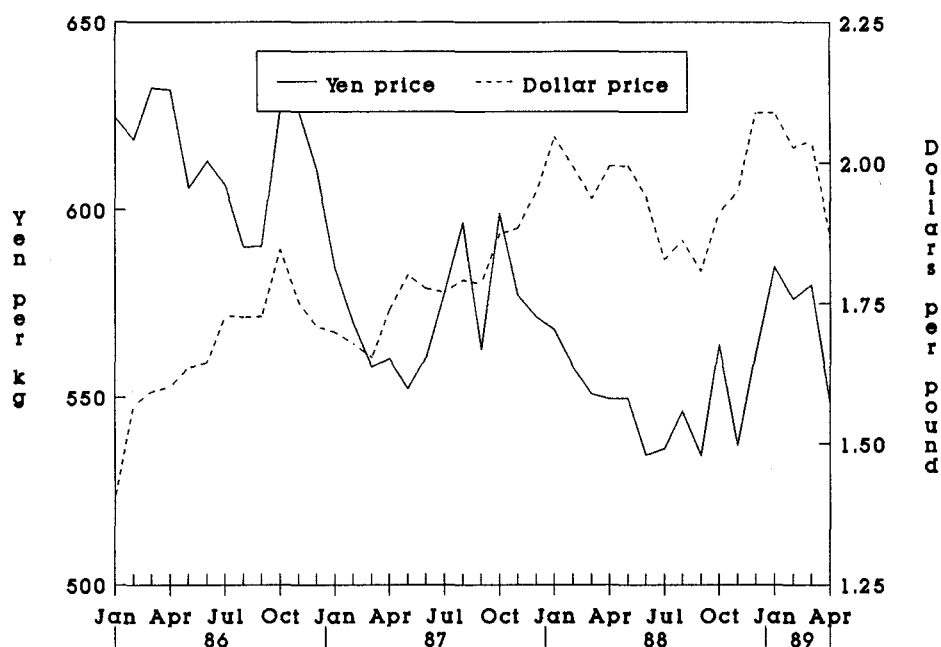


Fig. 4. Tokyo Prices of Alaska Pollock Surimi  
(Prices of top-grade sea-based & grade-2 land-based surimi)

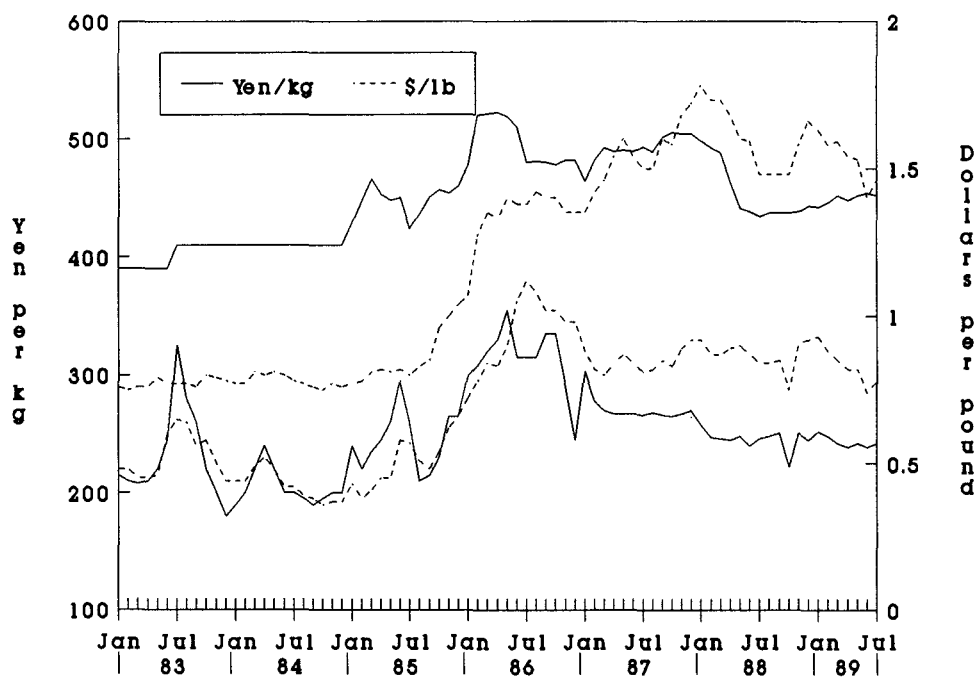


Fig. 5. Real Prices of Alaska Pollock Surimi in Tokyo

(Prices of top-grade sea-based & grade-2 land-based surimi)

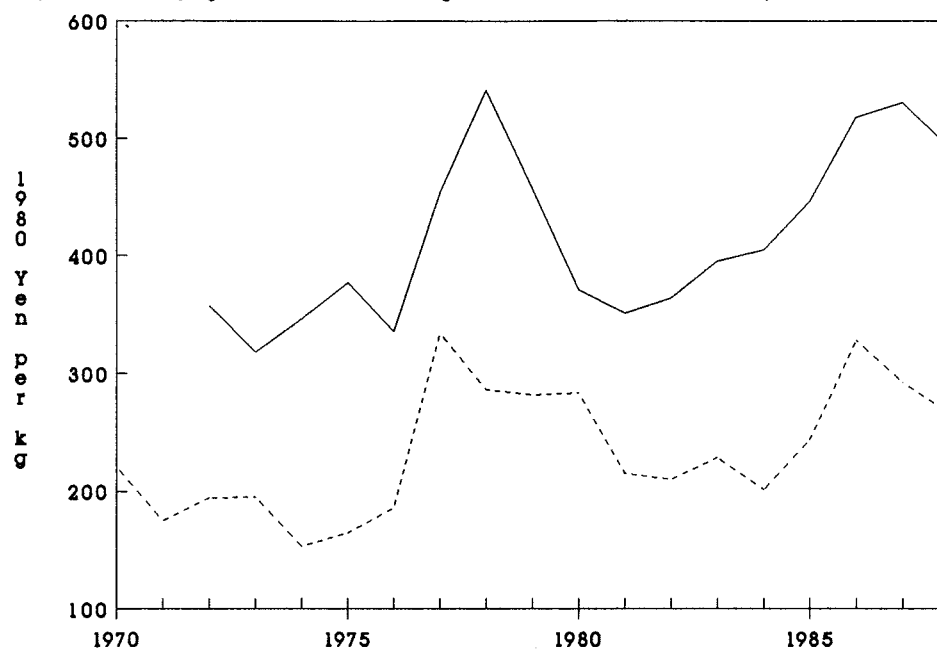


Fig. 6. Real U.S. Prices of Menhaden Meal and Soybean Meal

(1987 dollars per short ton)

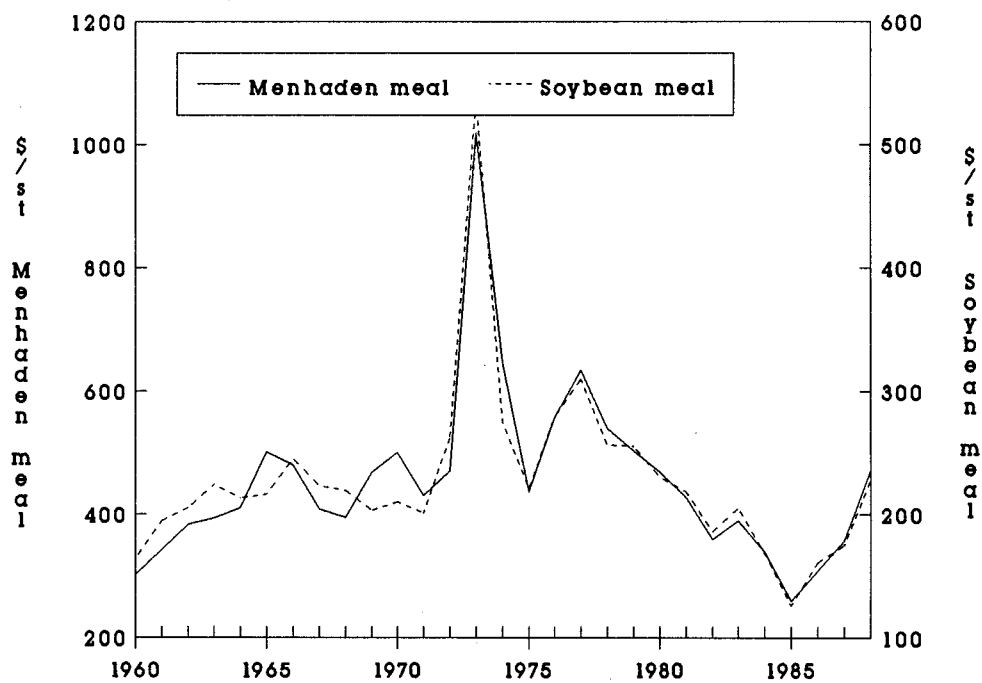


Table 1.--Estimated U.S. supply and use of surimi (thousand pounds, uncooked product weight)

Year	Beginning holdings (1)	U.S. production (2)			Imports from		Exports (2)	Ending holdings	Apparent use
		At-sea	Shoreside	Total	Japan (3)	Other (4)			
1974					1,321				1,321
1975					1,513				1,513
1976					1,076				1,076
1977					1,700				1,700
1978					1,445				1,445
1979					1,502				1,502
1980					1,550				1,550
1981					1,828				1,828
1982					2,455				2,455
1983					3,766				3,766
1984					5,085				5,085
1985					10,584	269			10,853
1986	1,389	8,818		8,818	13,351	3,369	0	5,222	21,705
1987	5,222	17,637	22,046	39,683	2,205	4,773	12,125	4,582	35,175
1988	4,582	66,579	59,524	126,103	1,764	4,409	67,240	11,776	57,842
1989	11,776	231,483	79,366	310,849	882	1,102	233,688	13,228	77,694

(1) Data for 1986 for Jan. 31. (2) Based on Milazzo (1989). (3) Japan's export data; 1987-89 estimated from Table 6. (4) South Korean export data for 1985-87 (An, 1988).

Table 2.--Estimated U.S. supply and use of surimi-based food (1,000 pounds, cooked edible weight)

Year	Beginning holdings (1)	Production (2)	Imports from Japan (3)			Imports other (4)	Ending holdings	Apparent consumption
			Imitation crab	Other	Total			
1974		2,401						
1975		2,750			2,842			5,592
1976		1,956			2,817			4,774
1977		3,091			2,672			5,763
1978		2,627	829	1,367	2,196			4,822
1979		2,730	851	1,292	2,143			4,873
1980		2,818	2,765	503	3,267			6,085
1981		3,323	4,912	827	5,739			9,062
1982		4,464	14,879	1,259	16,138			20,602
1983		6,847	30,474	2,555	33,029			39,877
1984		9,245	58,986	789	59,776			69,021
1985		19,733	68,122	2,648	70,769	584		91,086
1986	3,996	39,464	55,790	2,011	57,800	3,191	6,525	97,926
1987	6,525	63,955	38,849	2,628	41,477	7,767	7,402	112,322
1988	7,402	105,167	19,244	1,305	20,549	11,109	9,483	134,744
1989	9,483	141,261	2,205	1,102	3,307	9,921	13,228	150,744

(1) Data for 1986 for Jan. 31. (2) Production = (apparent use from table 3 / 0.55).  
 (3) Japan's export data. (4) U.S. import data (TSUSA 183.0505 and TSUSA 113.0810).

Table 3.--Estimated U.S. supply and use of surimi (metric tons, uncooked product weight)

Year	Beginning holdings (1)	U.S. production (2)			Imports from		Exports (2)	Ending holdings	Apparent use
		At-sea	Shoreside	Total	Japan (3)	Other (4)			
1974					599				599
1975					686				686
1976					488				488
1977					771				771
1978					655				655
1979					681				681
1980					703				703
1981					829				829
1982					1,114				1,114
1983					1,708				1,708
1984					2,306				2,306
1985					4,801	122			4,923
1986	630	4,000		4,000	6,056	1,528	0	2,369	9,845
1987	2,369	8,000	10,000	18,000	1,000	2,165	5,500	2,078	15,955
1988	2,078	30,200	27,000	57,200	800	2,000	30,500	5,342	26,237
1989	5,342	105,000	36,000	141,000	400	500	106,000	6,000	35,242

(1) Data for 1986 for Jan. 31. (2) Based on Milazzo (1989). (3) Japan's export data; 1987-89 estimated from Table 6. (4) South Korean export data for 1985-87 (An, 1988).

Table 4.--Estimated U.S. supply and use of surimi-based food (metric tons, cooked edible weight)

Year	Beginning holdings (1)	Production (2)	Imports from Japan (3)			Imports other (4)	Ending holdings	Apparent consumption
			Imitation crab	Other	Total			
1974		1,089						
1975		1,247			1,289			2,536
1976		887			1,278			2,165
1977		1,402			1,212			2,614
1978		1,191	376	620	996			2,187
1979		1,238	386	586	972			2,210
1980		1,278	1,254	228	1,482			2,760
1981		1,507	2,228	375	2,603			4,110
1982		2,025	6,749	571	7,320			9,345
1983		3,106	13,823	1,159	14,982			18,088
1984		4,193	26,756	358	27,114			31,308
1985		8,951	30,900	1,201	32,101	265		41,317
1986	1,813	17,901	25,306	912	26,218	1,448	2,960	44,419
1987	2,960	29,010	17,622	1,192	18,814	3,523	3,358	50,949
1988	3,358	47,703	8,729	592	9,321	5,039	4,301	61,120
1989	4,301	64,076	1,000	500	1,500	4,500	6,000	68,377

(1) Data for 1986 for Jan. 31. (2) Production = (apparent use from table 1 / 0.55). (3) Japan's export data. (4) U.S. import data (TSUSA 183.0505 and TSUSA 113.0810).

Table 5.--Japan's exports and production of surimi-based imitation shellfish (metric tons)

Year	Exports of imita- tion crab to U.S.	Total exports imita- crab	Exports of all shellfish analog to U.S.	Total exports of all shellfish analog	Production of all shellfish analog
1975			1,289	1,546	1,324
1976			1,278	1,379	9,931
1977			1,212	1,579	16,086
1978	376	405	996	1,316	16,615
1979	386	442	972	1,331	17,589
1980	1,254	1,444	1,482	2,253	18,037
1981	2,228	4,033	2,603	5,825	25,350
1982	6,749	9,330	7,320	12,364	36,555
1983	13,823	18,829	14,982	23,472	59,328
1984	26,756	32,462	27,114	35,482	71,323
1985	30,899	38,985	32,100	44,000	73,356
1986	25,306	35,675	26,218	38,101	73,633
1987	17,622	28,356	18,814	39,051	69,000
1988	8,729	21,096	9,321	24,066	

Sources: Katayama (1985); FFIR, various issues; 1987 production, Nakane (1988). Total exports of surimi-based food were 40,855 mt in 1986, 39,911 mt in 1987 and 27,566 mt in 1988.

Table 6.--Estimated Japan supply and use of frozen surimi (Alaska pollock surimi, except as noted), 1960-88, and 1989 forecast (metric tons)

Year	Beginning holdings	Production		Total	Imports, by country of origin				Total with JV	Supplies	Ending holdings	Exports, total	Apparent use in food
		On land	At sea		United States	South Korea	Thai-land*	Sub-total**					
1960		250	0	250						250			250
1961		2,500	0	2,500						2,500			2,500
1962		4,500	0	4,500						4,500			4,500
1963		9,283	0	9,283						9,283			9,283
1964		18,060	0	18,060						18,060			18,060
1965		23,639	8,184	31,823						31,823			31,823
1966		29,912	13,014	42,926						42,926			42,926
1967		44,869	37,550	82,419						82,419			82,419
1968		69,635	73,625	143,260						143,260			143,260
1969		92,719	103,610	196,329						196,329			196,329
1970		118,249	142,802	261,051						261,051			261,051
1971		137,848	183,535	321,383						321,383	35,000		321,383
1972	35,000	161,308	193,548	354,856						389,856	43,000		346,856
1973	43,000	159,145	223,599	382,744						425,744	55,000		360,744
1974	55,000	152,829	195,297	348,126						403,126	65,000	603	327,523
1975	65,000	169,034	191,730	360,764						425,764	75,000	695	350,069
1976	75,000	197,560	187,806	385,366						460,366	90,000	489	369,877
1977	90,000	193,123	168,823	361,946						451,946	106,080	793	451,153
1978	106,080	132,432	183,012	315,444					8,979	421,524	124,735	661	296,128
1979	124,735	114,426	180,402	294,828					13,607	419,563	95,598	693	323,272
1980	95,598	105,669	183,232	288,901					9,346	384,499	120,735	709	263,055
1981	120,735	114,393	192,264	306,657					12,521	427,392	146,882	928	279,582
1982	146,882	142,000	198,534	340,534					27,101	487,416	134,834	1,276	351,306
1983	134,834	160,000	180,000	340,000					68,085	474,834	125,860	1,963	347,011
1984	125,860	183,314	224,444	407,758		1,000		1,000	93,730	534,618	133,481	2,580	395,979
1985	133,481	181,411	231,213	412,624		4,000	10,000	14,000	112,200	560,105	117,855	5,158	435,574
1986	117,855	172,561	222,272	394,833		9,000	12,000	21,000	130,672	533,688	108,708	6,676	423,747
1987	108,708	172,487	184,478	356,965	5,500	8,000	21,000	34,500	154,828	500,173	116,590	1,233	382,350
1988	116,590	166,286	157,247	323,533	30,500	8,000	25,000	63,500	145,162	503,623	101,220	926	401,477
1989	101,220	168,400	131,000	299,400	90,000	10,000	30,000	130,000		530,620	100,000	500	430,120

\*Made from threadfin bream and croaker. \*\*The subtotal of industry estimates of imports by country is counted as part of supplies in this table (U.S., from Milazzo, 1989; others, Minato Shimbun, 1/19/89, see Kelsky, 1989). Japan's official imports of surimi [plus some other products before 1986, item 03.01.231, frozen tara (cod and cod-like fish), excluding fillets] are not counted as part of supplies in this table since they comprised mostly surimi processed in Japanese vessels from fish purchased at sea from foreign catcher vessels ("joint venture" operations) until 1988-89. Other sources: production, Sonu (1984), FFIR 89-10 (for 1975-88), Suisan Keizai (4/19/89 for 1989, translated by Y. Nasaka). Exports, FFIR 86-19 (1974-85), selected FFIR (1986-88).

Table 7.--Japan's production of surimi-based food (metric tons)

Year	Steamed (kam- aboko)	Broiled (chikuma)	Other, mostly fried	Fried (agekam- aboko) only	Imita- tion shell- fish (a)	Fish hams, sausages (+other, 1970-78) (b)	Fish ham- burger (b)	Fish sau- sage	Fish hams & sausage (b)	Total
	1	2	3	4	5	6	7	8	9	10
1953	103,000									227,000
1954	102,000								2,000	271,000
1955	113,000									307,000
1956	120,000								18,300	369,000
1957	146,000								35,900	434,000
1958	136,000								59,600	437,000
1959	149,000								71,500	476,000
1960	152,000	96,000	160,000						101,400	509,000
1961	187,000	98,000	165,000						123,681	573,445
1962	214,000	104,000	189,000						142,441	649,645
1963	205,000	112,000	213,000						158,666	688,054
1964	219,874	119,455	219,446						175,864	734,639
1965	245,116	121,774	242,194						188,094	797,178
1966	270,214	157,636	291,260						176,026	895,136
1967	294,782	171,745	280,929						164,431	911,887
1968	336,365	194,035	307,225						161,753	999,378
1969	368,000	204,300	336,100						168,800	1,077,200
1970	356,397	221,484	333,900	313,552	6,381	183,516	13,977	115,714	169,538	1,081,331
1971	379,814	238,539	343,400	322,151	6,381	180,107	14,839	113,706	165,368	1,127,105
1972	399,782	244,615	351,400	326,623	6,381	178,801	16,403	110,150	162,398	1,156,205
1973	425,057	249,172	348,400	329,692	1,589	179,586	15,280	111,585	164,306	1,185,100
1974	437,638	250,946	339,700	324,149	3,271	132,693	12,175	82,757	120,518	1,148,701
1975	446,988	258,882	337,800	327,058	1,324	120,708	9,408	88,622	111,300	1,154,970
1976	451,495	235,278	337,300	316,929	9,931	123,114	10,514	91,942	112,600	1,136,747
1977	428,171	214,393	327,500	303,224	16,086	124,088	8,188	91,884	116,900	1,086,962
1978	427,100	190,911	312,000	289,481	16,615	113,109	5,909	82,572	107,200	1,037,216
1979	402,420	177,192	289,800	272,175	17,589	106,815		84,098	106,815	976,191
1980	362,104	174,377	287,200	269,211	18,037	89,457		72,895	87,412	913,186
1981	359,577	180,678	316,700	291,412	25,350	91,865		76,786	91,865	948,882
1982	352,074	187,734	325,900	289,361	36,555	95,152		78,056	95,152	960,876
1983	346,557	194,931	356,600	297,257	59,328	98,098			98,098	996,171
1984	330,154	196,221	369,400	298,063	71,323	94,688			94,688	990,449
1985	327,290	199,861	364,300	290,979	73,356	92,279			92,279	983,765
1986	309,375	195,351	349,800	276,209	73,633	90,732			90,732	945,300
1987	307,000	189,000		271,000	69,000	89,000			89,000	925,933

(a) Sonu (1986, p. 33) indicates data are for imitation shellfish only since 1978, and Okada (1985, p. 36) indicates invention of the product in 1975 with production in that year of 1,300 metric tons. (b) Data were obtained from several sources, which differ in how specific items are classified over time. Apparently columns 3 and 6 include data for fish hamburger up to 1978. Data for fish hamburger for 1970-78 (estimated for 1975-78 from other data in table) were subtracted from the data in col. 6 to obtain the data in col. 9, which compares with data from another source. Sources: Data in columns 1, 2, 4, 5, 6 and 10 for 1970-86 from Sonu (1986), FFIR-86-17, and FFIR-87-14. Data for 1987 from Nakane (1988) and B. Atkinson (9/28/88). Other data from Fishery Statistics of Japan (annual, various years), C.E. Atkinson (circa 1965), Dewitt (1976), and Apold (1984).

Table 8.--Prices of surimi, Tokyo Central Wholesale Market, Japan

Year	Current prices, yen/kg		Wholesale price index 1980=100	Real prices, 1980 yen/kg	
	Sea based top grade	Land based grade 2		Sea based top grade	Land based grade 2
1970		107	48.40		221
1971		84	48.00		175
1972	173	94	48.40	357	194
1973	178	109	56.00	318	195
1974	255	113	73.70	346	153
1975	286	125	75.90	377	165
1976	267	148	79.70	335	186
1977	368	271	81.20	453	334
1978	428	226	79.10	541	286
1979	388	239	84.90	457	282
1980	371	283	100.00	371	283
1981	356	218	101.40	351	215
1982	371	214	101.90	364	210
1983	400	231	101.20	395	228
1984	410	204	101.30	405	201
1985	448	245	100.50	446	244
1986	496	314	95.78	518	328
1987	492	271	92.76	530	292
1988	454	246	92.26	492	267

## References

---

- An, Hong K. 1988. Personal communication. Armstrong, Byrd and Associates, 1875 Connecticut Avenue, NW, Suite 1110, Washington, DC 20009.
- Anon. 1989. Surimi sales revived in 1988 but growth still stunted by narrow consumption base, and Surimi seen at crossroads: products that "aren't imitation anything" key to growth. Frozen Food Age (January 1989), 37:6:37-39, and 53.
- Apold, W.O. 1984. A comprehensive review of the surimi industry and the development potential in Atlantic Canada. A contract report for Fisheries Canada, Fisheries Development Branch, Newfoundland Region.
- Atkinson, Bill. Bill Atkinson's News Report. Selected weekly issues. 8000 Crest Drive NE, Seattle, WA 98115.
- Atkinson, C.E. 1965. Minced meat--a new basic fishery product of Japan. Unpublished internal report, Regional Fisheries Attache, American Embassy, APO San Francisco, CA 96503.
- DeWitt, Martha A. 1976. Personal communication. Commercial Officer, American Embassy, APO San Francisco, CA 96503.
- Food and Agriculture Organization of the United Nations (FAO). 1988. Fishery Statistics--Commodities, 1986, vol. 63. FAO, Rome.
- Foreign Fishery Information Release (FFIR). Various biweekly issues. National Marine Fisheries Service, 300 South Ferry Street, Terminal Island, CA 90731.
- Hirasawa, Y. 1983. Demand and market conditions for fishes in Japan, especially minced Alaska pollock. Proceedings of the International Seafood Trade Conference, Anchorage, September 8-12, 1982. Alaska Sea Grant Report No. 83-2, pp. 81-99.
- Japan, Ministry of Agriculture, Forestry and Fisheries, Statistics and Information Department. Fisheries Statistics of Japan for 1963-87.
- Katayama, H. 1985. Personal communication. Japan-U.S. Fisheries Trade Office, 2205 Wisconsin Ave., Room 510, Washington, DC 20007.

Kelsky, Karen L. 1989. Recent developments in the Asian surimi industry. Draft of a forthcoming report and some related background information. National Marine Fisheries Service, Foreign Fisheries Analysis Branch, 1335 East-West Highway, Silver Spring, MD 20910.

Milazzo, Matteo. 1989. Personal communication with industry sources. National Marine Fisheries Service, 1335 East-West Highway, Silver Spring, MD 20910.

Miyake, Yasumatsu, Yutaka Hirasawa and Michiko Miyanabe. 1985. Surimi: technology of kneaded product manufacturing. Infofish Marketing Digest, 6/85:31-34.

Nakane, Yoshiaki (All Japan Kamaboko Maker's Association--Zenkama). 1988. Keynote Report--Japan. JETRO (Japan External Trade Organization) International Forum on Surimi. JETRO, 2-5, Toranomom 2-Chome Minato-Ku, Tokyo 105.

Okada, Minoru. 1986. The history of surimi and surimi-based products in Japan. In Roy E. Martin and Robert L. Collette, editors, Proceedings of the International Symposium on Engineered Seafood, Including Surimi, November 19-21, 1985, Seattle, Washington, pp. 30-41. National Fisheries Institute, Inc., 2000 M Street, NW, Suite 580, Washington, DC 20036.

Sonu, Sunee C. 1986. Surimi, NOAA-TM-NMFS-SWR-013, National Marine Fisheries Service, 300 South Ferry Street, Terminal Island, CA 90731.

Vondruska, John. 1986. Market trends and outlook for surimi-based foods. In Roy E. Martin and Robert L. Collette, editors, Proceedings of the International Symposium on Engineered Seafood, Including Surimi, November 19-21, 1985, Seattle, Washington, pp. 329-362. National Fisheries Institute, Inc., 2000 M Street, NW, Suite 580, Washington, DC 20036.

U.S. Department of Agriculture (USDA). 1989. Oil Crops Situation and Outlook Report. USDA, Economic Research Service, 1301 New York Avenue, NW, Washington, DC 20005-4788, Report No. OCS-21 April 1989.