

NOAA Technical Memorandum NMFS

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SURIMI SUPPLY, DEMAND, AND MARKET OF JAPAN

Sunee C. Sonu

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
West Coast Region

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EXECUTIVE SUMMARY

Japan is the world's largest market for surimi, utilizing an average of 219,000 metric tons (mt) during 1995-2012. Supply for this market comes from both domestic production and imports. The share of the Japanese surimi market supplied by imports increased from 39 percent in 1995 to 41 percent in 2012.

Japan's surimi production increased rapidly from 43,000 mt in 1966 to 423,000 mt in 1973 and reached a record of 424,000 mt in 1976. Since 1977, however, surimi production has steadily declined, and the production in 2012 of 84,000 mt was less than 20 percent of the record production.

Japan is the world's largest importer of frozen Pollock surimi. In 2014, Japan imported 111,135 mt of frozen Pollock surimi valued at 30,973 million yen. Japanese imports of frozen Pollock surimi came mostly from the United States.

Imports of frozen cod and Pacific whiting surimi, fluctuated between 3,000 and 8,000 mt from 2008 to 2014. The United States has consistently been the leading supplier of frozen Pacific whiting surimi to Japan, providing over 99 percent of the total in 2014.

Prices of surimi are primarily determined by supply and demand, but quality, origin, and species are also important. Wholesale prices for frozen surimi generally fall during summer

Japan regulates imports of surimi with import quota (IQ) and tariffs. As the United States and Japan are signatories to the World Trade Organization (WTO), WTO tariffs apply to U.S. exports of fishery products. The current tariff for frozen surimi is 6 percent, calculated as a percentage of cost, insurance, and freight (CIF) value

INTRODUCTION

Surimi, a refined form of minced fish meat, is the raw material used in making a wide range of finished products such as imitation crab meat, chikuwa (broiled surimi product), satuma-age (fried), itatsuki kamaboko (steamed), fish hams, fish sausages, and other seafood analogs (Sonu 1986).

Although the technique for making surimi has been practiced in Japan for many centuries, only during the past 50 years has the tradition evolved into a major industrial operation.

Before 1960, freeze denaturation of protein was a poorly understood phenomenon. When a protein becomes denatured, it loses its native structure and its ability to perform certain biochemical functions such as forming a gel, an important property in surimi.

A new technology for processing Alaska pollock into a stable frozen surimi, which is protected from freeze denaturation, was developed in the early 1960s in Japan. It allowed surimi manufacturing to evolve into an automated mass-production system to keep pace with expanding demand. Automation of surimi manufacturing procedures was essentially completed both on board and on shore within about 10 years following the introduction of frozen surimi.

Alaska pollock, *Theragra chalcogrammus*, is the most widely utilized species in the Japanese surimi industry because of its abundance, good gel-forming capability, year-round availability, white flesh, and reasonable price.

Japan was once the world's largest producer of surimi. Recently, however, the Japanese production of surimi has dropped significantly due mainly to shortage of supply of fish from domestic and foreign waters, and Japan has become increasingly more dependent on imports for its supply. This need is likely to remain because increased catches of fish in foreign waters by the Japanese fleet are not likely in the near future.

Japan is the major user of surimi and the most important export market for U.S. surimi.

This report provides a detailed examination of the Japanese surimi production as well as its imports, exports, supply, demand, and market, in order to identify potential opportunities for export by U.S. surimi producers.

SURIMI PRODUCTION

The history of frozen surimi production in Japan from 1960 to 2012 is illustrated in Figure 1 and Table 1. Surimi production increased rapidly during the 6-year period between 1967 and 1973. This trend was facilitated by the advent of automated facilities for surimi production and by the introduction of factoryship operations. By 1973, total annual output of surimi rose to 423,000 mt, more than five times the 1967 production. From 1974 to 1984, the production of surimi hovered around 350,000 to 420,000 mt per year. From 1985 to the present, the production has steadily declined due mainly to shortage of supply of fish in domestic and foreign waters. The production was 413,000 mt in 1984 but only 84,000 mt in 2012.

Most of the Japanese on-shore surimi processing industry is located on Hokkaido Island, where domestic landings of Alaska pollock and Atka mackerel, the two major species used as raw material, take place. Of the 84,000 mt of land-processed frozen surimi processed in 2012, it is estimated that 65,000 mt were made from Alaska pollock, 12,000 mt from Atka mackerel, 3,000 mt from Japanese sardine and Pacific mackerel and 5,000 mt from other species.

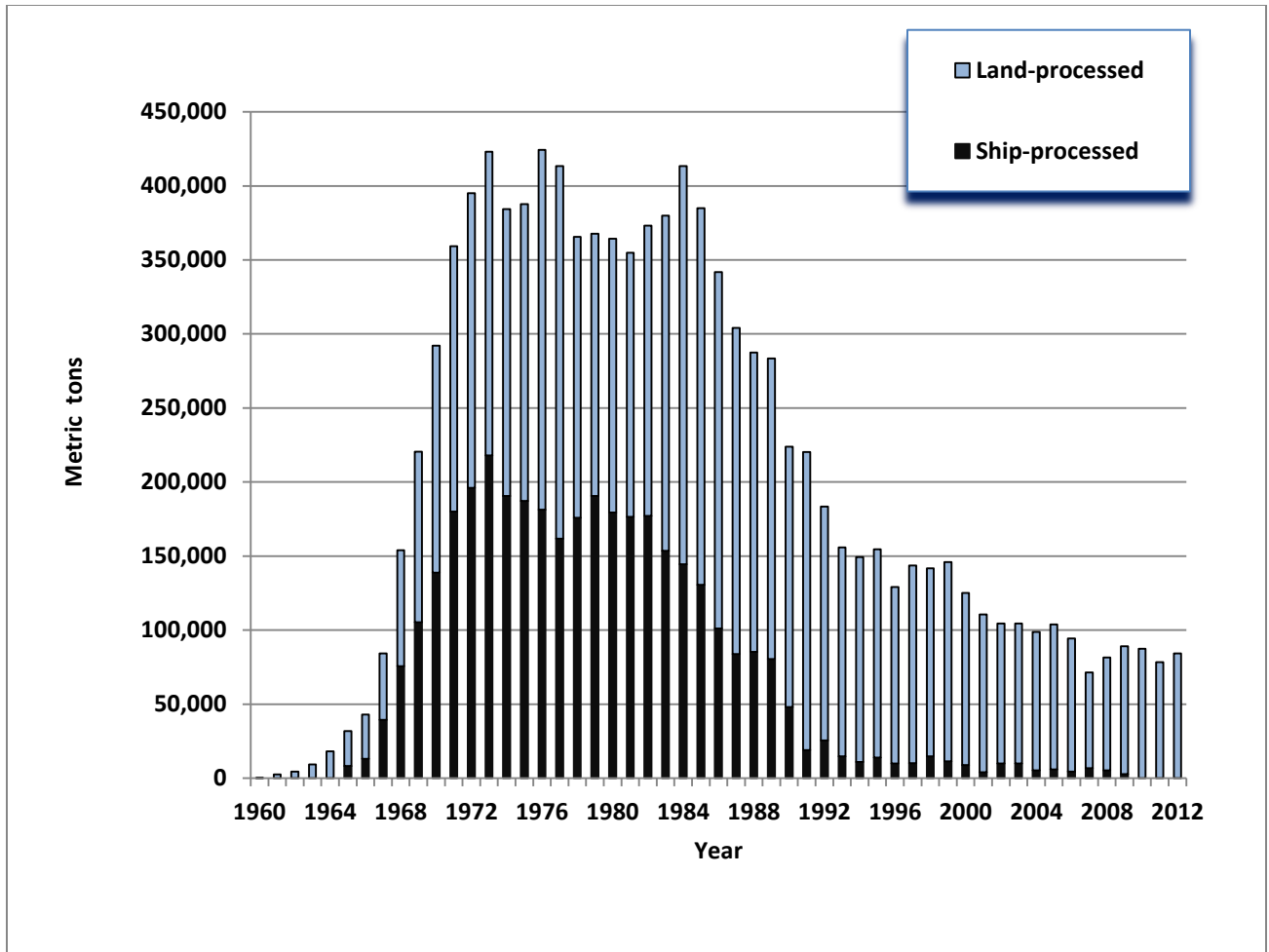


Figure 1. Japanese surimi production, 1960-2012 (metric tons).

Sources: Ministry of Agriculture, Forestry, & Fisheries
1964-2015

Table 1. Japan's frozen surimi production, 1960-2012, (metric tons).

Year	Land-processed surimi				Sub- Total	Ship- processed surimi	Total
	Alaska Pollock	Sardine/ mackerel	Atka mackerel	Other fish			
1960	0 *	0	0	0	250	0	250
1961	0	0	0	0	2,500	0	2,500
1962	0	0	0	0	4,500	0	4,500
1963	0	0	0	0	9,282	0	9,282
1964	0	0	0	0	18,060	0	18,060
1965	0	0	0	0	23,639	8,184	31,823
1966	0	0	0	0	29,913	13,034	42,947
1967	0	0	0	0	44,869	39,283	84,152
1968	61,355	0	0	16,962	78,317	75,525	153,842
1969	99,140	0	0	15,955	115,095	105,297	220,392
1970	134,834	0	0	18,457	153,292	138,743	292,035
1971	165,895	0	0	13,264	179,159	180,138	359,297
1972	180,223	0	0	18,685	198,909	196,131	395,040
1973	190,555	0	4,697	9,938	205,191	217,891	423,082
1974	173,765	0	11,638	8,339	193,744	190,556	384,300
1975	193,978	0	2,908	3,569	200,455	187,228	387,683
1976	233,406	0	6,361	3,223	242,990	181,243	424,233
1977	234,269	0	13,044	4,338	251,651	161,798	413,449
1978	177,655	0	5,669	6,406	189,730	175,853	365,583
1979	162,422	0	7,459	7,084	176,965	190,621	367,586
1980	165,818	0	10,353	8,744	184,915	179,331	364,246
1981	160,200	0	0	18,280	178,480	176,442	354,922
1982	178,941	0	0	17,013	195,954	177,095	373,049
1983	210,855	3,914	3,141	8,370	226,280	153,593	379,873
1984	248,186	5,463	3,975	11,300	268,924	144,440	413,364
1985	230,036	5,599	3,540	15,115	254,290	130,588	384,878
1986	205,074	5,481	4,451	25,773	240,779	101,053	341,832
1987	195,921	5,260	2,464	16,682	220,327	83,844	304,171
1988	177,887	4,471	5,286	14,434	202,078	85,328	287,406
1989	180,305	3,215	5,973	13,435	202,928	80,415	283,343
1990	147,817	4,156	13,453	10,557	175,983	47,962	223,945
1991	154,653	3,957	19,282	23,435	201,327	18,959	220,286
1992	130,797	3,813	9,276	14,092	157,978	25,450	183,428
1993	108,528	3,496	13,734	15,251	141,009	14,812	155,821
1994	103,336	7,592	12,237	15,107	138,272	11,032	149,304
1995	95,238	5,027	22,363	18,121	140,749	13,805	154,554
1996	69,553	6,067	29,825	13,833	119,278	9,808	129,086
1997	83,152	5,260	28,417	16,580	133,409	10,214	143,623
1998	84,196	4,331	26,775	11,784	127,086	14,730	141,816
1999	97,413	3,373	23,809	9,968	134,563	11,373	145,936
2000	84,508	1,747	20,195	9,929	116,379	8,783	125,162
2001	73,259	2,845	20,632	9,745	106,481	4,000	110,481
2002	64,448	2,896	16,645	10,556	94545	9,890	104,435
2003	64,448	2,896	16,645	10,556	94545	9,890	104,435
2004	60,221	2,744	15,411	14,980	93356	5,356	98,712
2005	50,687	2,375	35,539	9,441	98042	5,876	103,918
2006	51,712	2,448	26,810	8,744	89714	4,524	94,238
2007	35,314	2,440	17,598	9,298	64650	6,665	71,315

2008	42,408	4,876	20,697	8,259	76240	5,249	81,489
2009	45,940	2,236	28,189	9,943	86308	2,755	89,063
2010	55,147	4,188	17,252	10,805	87392	0	87,392
2011	60,374	3,183	10,754	4,047	78358	0	78,358
2012	64,655	2,609	11,787	5,136	84187	0	84,187

0*.....not available Sub-total may not add due to rounding
Source: Ministry of Agriculture, Forestry, & Fisheries 1974-2015

ALASKA POLLOCK

Alaska pollock, *Theragra chalcogrammus*, is the most widely utilized species in the Japanese surimi industry. Though almost any fish can be used to make surimi, no other species can match the combination of its abundance, good gel-forming capability, year-round availability, white flesh, and reasonable price (Sonu 1986).

Alaska pollock is widely distributed in the North Pacific, from Central California into the eastern Bering Sea, along the Aleutian arc, around Kamchatka, in the Okhotsk Sea and into the southern Sea of Japan (Cohen et al. 1990).

World catch of Alaska pollock

Alaska pollock constitute one of the world's major fishery resources (Table 2). Total world catches of Alaska pollock ranged between 2.5 and 3.2 million mt annually in recent years. Alaska pollock are caught exclusively in the North Pacific (Table 3).

The development of Alaska pollock fisheries was stimulated in the early 1960s by successful implementation by Japan of mechanized processing of Alaska pollock into frozen surimi. By 1972, the fishery had expanded throughout the North Pacific, mostly by Japan and to a lesser extent by the former Soviet Union and the Republic of Korea. The combined harvests of Alaska pollock by these three countries increased ninefold, from 464,000 mt in 1961 to 4.2 million mt in 1972 (Figure 2).

Total world harvest of Alaska pollock reached a peak of 6.76 million mt in 1986 but have been on a downward trend since then, falling to 3.36 million mt in 1999 (Figure 2). The decrease in global landings of Alaska pollock was due mainly to sharply declined catches by Russia and Japan. Combined landings by these two countries declined from 5.01 million mt in 1986 to 1.79 million mt in 2013.

Of six nations that reported Alaska pollock landings in 2013, Russia ranked highest with 48 percent of the total (Table 3). The United States was second with 42 percent, while Japan, the world's largest producer during 1951-1976, was in third place. Japan's share of the world catch decreased sharply from over 83 percent during the 1950s to 7 percent in 2013. Democratic People's Republic of Korea and the Republic of Korea respectively harvested 2 and 1 percent of the world total.

Russian annual harvest of Alaska pollock reached a high in 1986 at 3.58 million mt annually, but has since declined sharply (FAO 2015). The catch in 2013 of 1.56 million mt was about 44 percent of the record landings.

The U.S. fishing industry initially embarked on an exploratory Alaska pollock fishing venture in 1974 (Koslow 1976). The industry was stimulated by a strong domestic demand for Alaska pollock as an acceptable substitute for Atlantic cod (*Gadus morhua*) for breaded fish products. The Alaska pollock fishing operation, however, remained at a small scale, until the late-1980s (Figure 2).

Foreign access to U.S. waters was restricted following the establishment of the U.S. EEZ in 1977. The U.S. commercial fishery for Alaska pollock experienced a short period of joint venture operations in the mid-1980s and was fully a U.S. fishery by 1988, when foreign fishing was phased out. To fill the strong demand for surimi, the U.S. fishery expanded each year and the harvests of Alaska pollock continued to increase, reaching a peak in 1990 at 1.41 million mt. Catches have since remained relatively stable and averaged about 1.29 million mt during the period 1991-2013 (Figure 2).

Table 2. World landings of principal species, 2008–2013, (1,000 metric tons).

Species	2008	2009	2010	2011	2012	2013
Peruvian anchovy	7,419	6,910	4,206	8,320	4,693	5,674
Alaska pollock	2,649	2,502	2,828	3,207	3,271	3,240
Atlantic herring	2,479	2,517	2,204	1,780	1,773	1,817
Chub mackerel	1,938	1,641	1,642	1,716	1,581	1,655
Atlantic cod	771	868	952	1,052	1,114	1,360
European pilchard/Sardine	1,065	1,245	1,246	1,037	1,019	1,001
Atlantic mackerel	611	707	887	946	911	982
Croakers, drums nei	740	754	771	849	872	867
Cyprinids nei	460	452	712	590	848	767
Capelin	254	365	507	853	992	759
Blue whiting	1,284	641	551	108	379	632
Akiami paste shrimp	558	602	574	550	589	585
Argentine shortfin squid	838	261	190	205	341	525
American alligator	230	297	370	311	327	481
Bigeye tuna	441	418	395	416	460	435
Cephalopods nei	348	365	418	409	449	431
Clupeoids nei	357	340	367	381	426	419
European anchovy	551	538	588	607	490	406
European sprat	562	667	630	559	409	394
Daggertooth pike conger	332	351	351	369	372	381
Chilean jack mackerel	1,471	1,301	727	635	455	355
Argentine hake	316	331	346	352	318	349
Cape horse mackerel	223	234	219	258	357	332
Aquatic plants nei	404	303	274	307	288	314
Chilean kelp	202	223	191	242	269	313
Common squids nei	208	216	254	311	296	302
Cape hakes	262	249	267	285	283	286
Bombay-duck	280	262	225	208	257	277
Anchovies, etc. nei	268	266	266	273	262	275
Cuttlefish, bobtail squids nei	258	282	259	266	275	274
Bonga shad	225	239	221	235	254	259
California pilchard	742	758	697	639	364	255
Flatfishes nei	198	221	210	232	224	253
Carangids nei	228	247	294	253	241	250
Albacore	198	233	239	223	258	247
Antarctic krill	157	126	215	181	188	240
Araucanian herring	795	855	751	887	848	237
American sea scallop	270	281	275	281	268	219

Source: FAO 2015

Table 3. World landings of Alaska Pollock by FAO fishing area and country, 2007-2013 (1,000 metric tons).

FAO fishing area/ Country	2007	2008	2009	2010	2011	2012	2013
Pacific ocean:							
Northwest:							
Japan	217	211	227	251	239	230	228
Korea, D.P.Rp.	60	60	59	59	61	62	63
Korea, Rep.of	20	26	39	47	49	39	24
Russian Fed.	1,218	1,316	1,327	1,581	1,576	1,303	1,554
Area total	1,514	1,613	1,652	1,937	1,924	1,634	1,870
Pacific ocean:							
Northeast:							
Canada	3	1	3	4	4	5	3
Russian Fed.	1	3	0*	4	4	4	4
U.S.A.	1,391	1,032	847	883	1,275	1,303	1,362
Area total	1,395	1,036	850	891	1,283	1,312	1,370
Species total	2,909	2,649	2,502	2,828	3,207	2,946	3,240

0* More than zero but less than 500 metric tons
Total may not add due to rounding

Source: FAO 2015

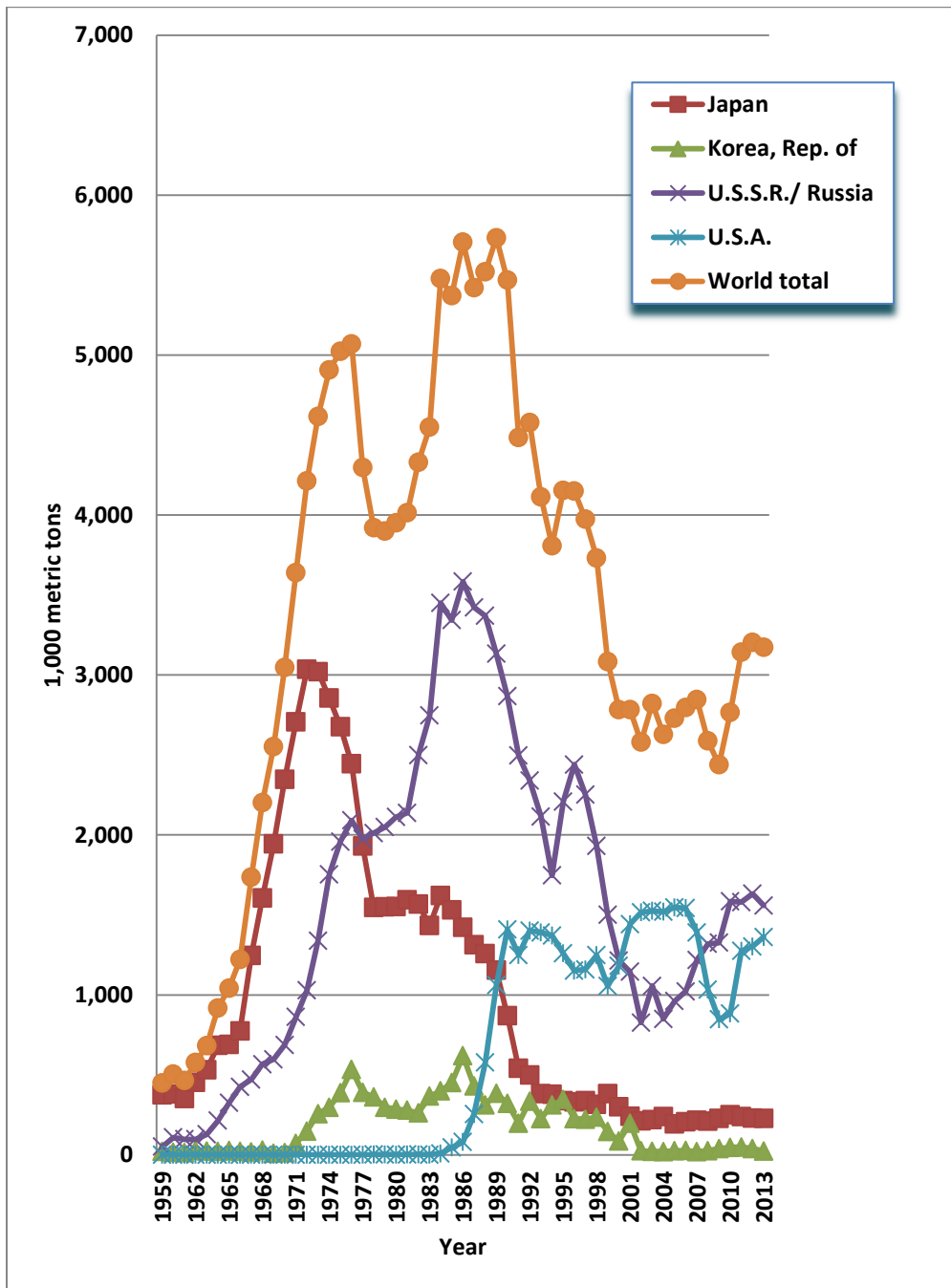


Figure 2. World landings of Alaska pollock by major countries, and world total, 1959-2013, (1,000 metric tons).

Sources: FAO 2015

Japanese catch of Alaska pollock

Prior to 1959, Japanese harvests of Alaska pollock remained below 300,000 mt a year (Table 4), mostly caught in its coastal waters and off the Siberian coast. During the 1960s and the early 1970s Japanese harvests of Alaska pollock steadily escalated, reaching a peak in 1972 at over 3 million mt. The impetus for expanding the Alaska pollock fishery was the development of automated processing of Alaska pollock into frozen surimi and the introduction of factoryship operations in the 1960s. By 1972, Japan expanded its Alaska pollock fishing fleet as well as its range of operations throughout the North Pacific Ocean (Sonu 1986). At that time, Alaska pollock was Japan's major fishery, accounting for about one-third of its total marine fisheries catch (Table 4). The majority of the catch took place in U.S. waters (Figure 3).

The long period of steady growth in catch was followed by a downturn which came mainly as a result of the oil shock in 1974, which made fishing operations very expensive, but also because of restrictions on Japanese catches in the U.S. and the former Soviet EEZs, instituted in 1977. From 1978 through 1985, annual Japanese catches of Alaska pollock fairly stabilized at about 1.5 million mt. Since 1986, however, Japan's total catch of Alaska pollock has declined sharply as Japanese catch allocations within the U.S. and the former Soviet EEZs were greatly reduced. In 1987, the fishery was completely stopped off the United States. The total catch in 2014 of 198,000 mt was less than 7 percent of the record landings.

Alaska pollock is taken mostly by trawl, gillnet and longline. In 2013, about 68 percent of Alaska pollock were caught by trawl, 27 percent by gillnet, 2 percent by longline, and the rest by hook and line, dragnet, purse seine, and set net (Table 5). Annual catches for the trawl fishery decreased notably from 1987 to 2013 as Japanese trawling was prohibited in U.S. waters and significant catch restrictions were imposed in Russia waters.

Total allowable catch

In January 1997, Japan began implementing total allowable catch (TAC) levels for several species including Alaska pollock, Japanese sardine, Pacific saury, jack mackerel, chub mackerel, Tanner crab, and Japanese flying squid (Ministry of Agriculture, Forestry, and Fisheries 1999). The TAC is set by the Ministry of Agriculture, Forestry, and Fisheries together with prefectural governments (Ministry of Agriculture, Forestry, and Fisheries 1998).

The TAC for Alaska pollock was set at 290,000 mt in 2012, but due to low catches and abundance, it was decreased to 275,000 mt in 2013, and to 257,400 mt in 2015 (Table 6).

Japanese catch in U.S. waters

The Japanese Alaska pollock fishery in Alaskan waters began in 1958 in the Bering Sea and in 1961 in the Gulf of Alaska (Suisan Sha 1969). The fishery grew rapidly in these areas and catches peaked in 1972 at 1.65 million mt, about 54 percent of its total landings of Alaska pollock for that year (Figure 3).

Since then, the Japanese harvest of Alaska pollock in U.S. waters has declined, following catch restrictions implemented after passage of the Magnuson Fishery Conservation and Management Act (MFCMA) in 1976 (Table 7). The Alaska pollock catch allocation to Japan in U.S. EEZ was reduced from 942,572 mt in 1980 to only 3,950 mt in 1987. Japanese Alaska pollock fishing was phased out in 1987 in the Gulf of Alaska and in 1988 in the Bering Sea and Aleutian Islands.

Japanese catch in Soviet/ Russian waters

Prior to 1977, Japanese fishermen caught large amounts of Alaska pollock off the former Soviet Unions's coast (Table 8). The Soviet Union, however, implemented its EEZ in 1977 and government representatives of Russia and Japan have met annually in recent years to determine catch quotas in their respective 200-mile fishing zones.

Japan's mutual catch quota which is "free-of-charge" for Alaska pollock in Soviet (now Russian) waters was significantly reduced from 370,000 mt in 1977 to 51,300 mt in 1986 and to 1,500 mt in 2015 (Table 8). To supplement Japan's declining Alaska pollock allocation, the Soviets have provided an additional fee-based catch allocation since 1987. However, this was also reduced steeply from 73,430 mt in 1987 to 11,500 mt in 1992, and to only 1,078 mt in 2015. The 2015 combined mutual and fee-based catch quota in Russian waters for Alaska pollock was 2,578 mt.

Table 4. Japanese landings of fish used for surimi materials by species of fish and total annual catch of marine fishes, 1951-2014 (1,000 metric tons).

Year	Sardine	Jack mackerel	Chub mackerel	Alaska pollock	Atka mackerel	Croaker	Marine fishes Total
1951	368	87	151	184	- *	-	3,774
1952	258	187	287	206	-	-	4,646
1953	344	239	235	225	-	-	4,387
1954	246	251	297	242	-	-	4,304
1955	211	238	244	231	-	-	4,658
1956	206	246	266	235	121	98	4,512
1957	212	313	275	281	106	112	5,069
1958	137	324	268	285	48	107	5,199
1959	120	432	296	376	100	115	5,569
1960	78	596	351	380	116	129	5,818
1961	127	542	338	353	185	116	6,287
1962	108	520	409	453	122	102	6,397
1963	56	469	465	532	150	103	6,200
1964	16	520	496	684	205	74	5,869
1965	9	560	669	691	107	101	6,382
1966	13	514	624	775	106	98	6,558
1967	17	423	687	1,247	82	86	7,241
1968	24	358	1,015	1,606	87	71	7,993
1969	21	341	1,011	1,944	103	66	7,976
1970	17	269	1,302	2,347	147	64	8,598
1971	57	315	1,254	2,707	147	50	9,149
1972	58	194	1,190	3,035	181	42	9,400
1973	297	183	1,135	3,021	115	45	9,793
1974	352	216	1,331	2,856	144	52	9,749
1975	526	235	1,318	2,677	115	45	9,573
1976	1,066	207	979	2,445	229	39	9,605
1977	1,420	186	1,355	1,931	235	40	9,688
1978	1,637	153	1,626	1,546	135	37	9,683
1979	1,817	184	1,414	1,551	119	39	9,477
1980	2,198	145	1,301	1,552	117	32	9,909
1981	3,089	122	908	1,595	123	33	10,143
1982	3,290	174	718	1,567	103	30	10,231
1983	3,745	174	805	1,434	56	27	10,697
1984	4,179	234	814	1,621	66	24	11,501
1985	3,866	225	773	1,532	66	21	10,877
1986	4,210	181	945	1,422	89	20	11,341
1987	4,362	252	701	1,313	99	19	11,129
1988	4,488	290	649	1,259	104	17	11,259
1989	4,099	280	527	1,154	115	14	10,440
1890	3,678	331	273	871	134	13	9,570
1991	3,010	315	255	541	130	13	8,511
1992	2,224	286	269	499	98	11	7,771
1993	1,714	362	665	382	136	8	7,256
1994	1,189	374	633	379	153	8	6,590
1995	661	385	470	339	177	9	6,007
1996	319	388	760	331	182	7	5,974
1997	284	373	849	339	207	6	5,985
1998	167	370	511	316	241	5	5,315
1999	351	258	382	382	169	5	5,239
2000	150	282	346	300	165	5	5,022
2001	178	256	375	242	161	4	4,753
2002	50	238	280	213	155	4	4,434
2003	52	280	329	220	168	4	4,722
2004	50	280	338	239	176	3	4,455

2005	28	214	620	194	140	3	4,457
2006	53	191	652	207	116	3	4,470
2007	79	196	457	217	139	0	4,397
2008	35	207	520	211	170	0	4,373
2009	57	192	471	227	119	0	4,147
2010	70	185	492	251	84	0	4,122
2011	176	193	393	239	63	0	3,824
2012	136	158	444	230	69	0	3,759
2013	218	151	386	230	53	0	3,734
2014	202	147	502	198	28	0	3,739

-*.....not available

Sources: Ministry of Agriculture, Forestry & Fisheries 1967-2015

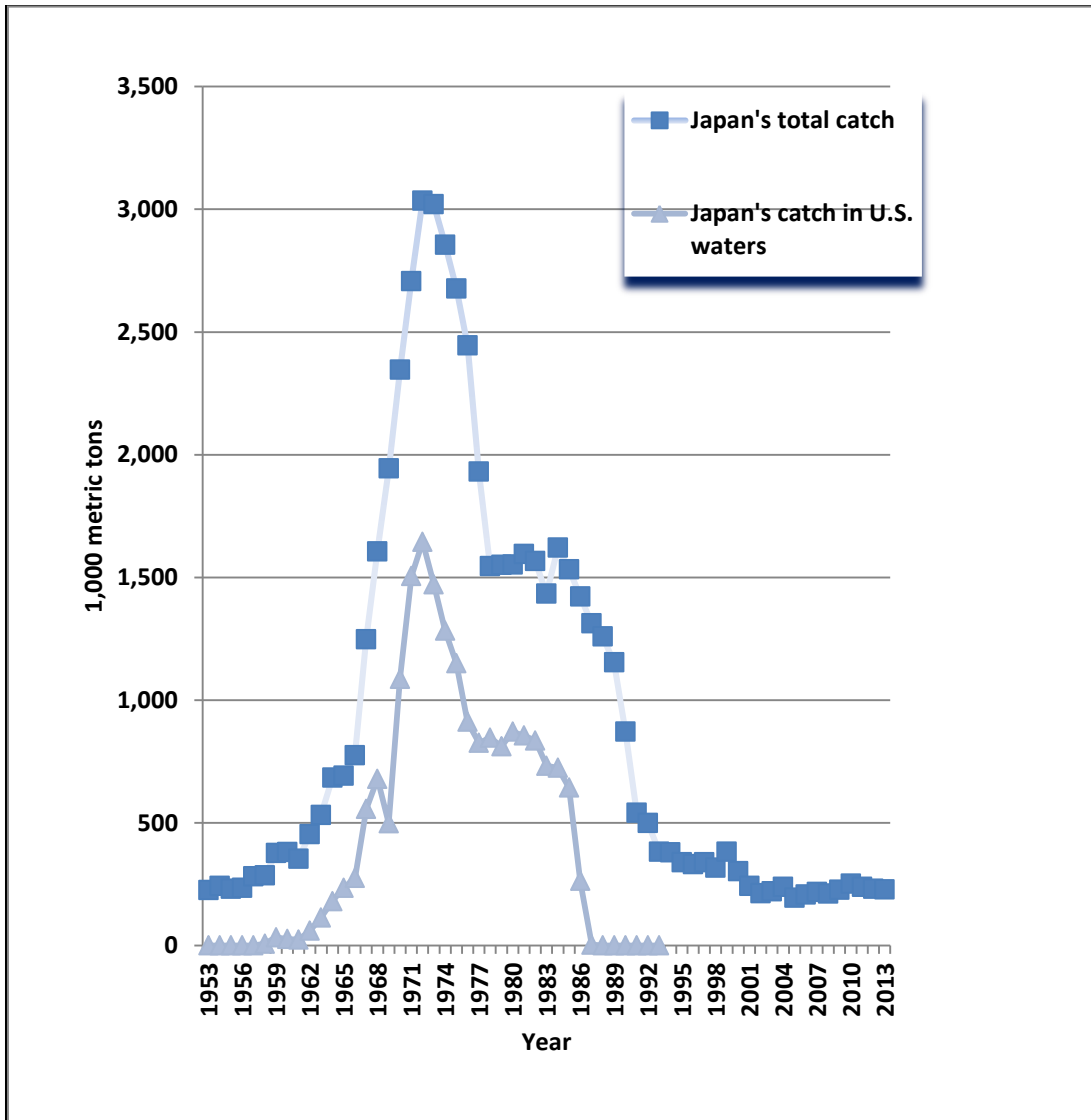


Figure 3. Japan's total catch of Alaska pollock and catch of Alaska pollock in U.S. waters, 1953-2013, (1,000 metric tons).

Sources: International North Pacific Fisheries Commission 1969
 Japan Food Economy Company 1978
 Suisan Sha 1974
 Ministry of Agriculture, Forestry & Fisheries, 1967, 1970, 1978, 1983, 1999, 2002, 2015

Table 5. Japanese landings of Alaska pollock by fishery type, 1987-2013 (metric tons).

Year	Trawls			Gillnets	Longlines	Others	Total
	Distant	Offshore	Small				
1987	840,572	221,014	10,421	202,192	28,056	10,254	1,312,509
1988	784,178	267,366	9,628	154,310	30,981	9,632	1,259,095
1989	676,518	240,620	8,091	179,574	33,036	15,911	1,153,750
1990	417,050	235,615	5,832	169,469	28,114	15,328	871,408
1991	144,068	223,701	5,760	132,418	27,940	7,059	540,946
1992	140,639	214,856	4,103	101,870	25,405	11,883	498,756
1993	118,419	147,705	2,958	86,566	19,916	6,744	382,308
1994	121,068	149,959	2,349	70,368	18,802	16,805	379,351
1995	71,640	162,199	2,453	71,255	16,095	14,865	338,507
1996	83,104	156,596	2,098	58,694	16,136	14,535	331,163
1997	81,898	158,117	1,831	53,195	20,811	22,933	338,785
1998	49,516	151,242	1,595	70,856	13,795	28,983	315,987
1999	43,585	177,927	1,563	107,650	14,291	37,369	382,385
2000	41,916	160,501	1,466	63,200	12,979	19,939	300,001
2001	30,056	113,000	1,154	72,721	16,764	8,186	241,881
2002	4,834	137,864	1,177	48,022	14,479	6,878	213,254
2003	5,900	138,318	1,284	45,474	13,698	14,978	219,652
2004	4,312	141,786	1,323	55,153	12,286	24,512	239,372
2005	6,969	106,444	1,197	59,381	9,816	10,242	194,049
2006	6,385	112,609	1,110	70,597	9,263	6,830	206,794
2007	4,416	129,327	1,090	70,079	7,521	4,203	216,636
2008	5,273	141,496	1,217	49,574	5,845	7,633	211,038
2009	5,302	122,624	1,377	79,514	5,134	13,310	227,261
2010	6,929	141,591	1,748	71,149	5,142	24,607	251,166
2011	0	144,742	872	61,028	3,271	29,007	238,920
2012	4,263	159,070	479	49,990	3,417	12,604	229,823
2013	9,621	146,697	528	62,765	3,518	6,448	229,577

Others include hook and line, dragnet, purse seine, and set net

Sources: Ministry of Agriculture, Forestry, & Fisheries 1999-2015

Table 6. Total allowable catch (TAC) and actual landings of Alaska pollock, 1997-2015.

Year	TAC ---(metric tons)-----	Landings*	Percent of TAC
1997	267,000	245,415	92%
1998	311,000	258,599	83%
1999	374,000	342,819	92%
2000	374,000	245,228	66%
2001	363,000	204,936	56%
2002	338,000	189,313	56%
2003	315,000	198,044	63%
2004	321,000	233,052	73%
2005	282,000	196,118	70%
2006	247,000	184,977	75%
2007	221,000	200,622	91%
2008	239,000	207,924	87%
2009	227,000	219,483	97%
2010	265,000	236,473	89%
2011	288,000	236,558	82%
2012	290,000	232,086	80%
2013	275,000	206,559	75%
2014	296,000	-**	-
2015	257,400	-	-

*...Japanese catch in foreign waters are not included

**..Not available

Source: Ministry of Agriculture, Forestry and Fisheries 2015,

Table 7. Japan's Alaska pollock catch allocations and the actual catch in the U.S. Exclusive Economic Zone by region, 1977-1988 (metric tons)

Year	Gulf of Alaska		Bering Sea/Aluetian Islands		Total	
	(Allocation)	(Catch)	(Allocation)	(Catch)	Allocation)	(Catch)
1977	44,100	42,415	792,300	782,419	836,400	824,834
1978	40,740	26,093	792,300	821,307	833,040	847,400
1979	38,279	31,920	774,630	779,050	812,909	810,970
1980	46,745	37,897	895,827	832,993	942,572	870,890
1981	82,385	51,885	859,502	803,461	941,887	855,346
1982	90,907	55,046	845,064	780,351	935,971	835,397
1983	58,992	47,725	738,313	684,424	797,305	732,149
1984	77,821	57,864	693,031	665,672	770,852	723,536
1985	25,000	22,937	640,601	620,112	665,601	643,049
1986	140	114	298,013	262,423	298,153	262,537
1987	0	0	3,950	3,283	3,950	3,283
1988	0	0	0	0	0	0

Source: U.S. Department of Commerce 1978-1989

**Table 8. Japan's Alaska pollock catch allocations in the Soviet/
Russian waters, 1974-2015 (metric tons)**

Year	Mutual quota	Paid quota	Total quota
1974	855,000*	0	855,000*
1975	652,000*	0	652,000*
1976	617,000*	0	617,000*
1977	370,000	0	370,000
1978	345,000	0	345,000
1979	300,000	0	300,000
1980	290,000	0	290,000
1981	290,000	0	290,000
1982	290,000	0	290,000
1983	290,000	0	290,000
1984	270,000	0	270,000
1985	250,000	0	250,000
1986	51,300	0	51,300
1987	51,300	73,430	124,730
1988	53,860	73,740	127,600
1989	53,480	67,000	120,480
1990	25,736	15,000	40,736
1991	25,727	16,000	41,727
1992	25,732	11,500	37,232
1993	21,732	7,500	29,232
1994	21,726	7,100	28,826
1995	17,976	7,000	24,976
1996	14,009	3,000	17,009
1997	14,167	3,000	17,167
1998	12,167	3,577	15,744
1999	6,667	3,414	10,081
2000	6,300	3,370	9,670
2001	1,551	3,250	4,801
2002	3,204	3,250	6,454
2003	7,242	3,200	10,442
2004	5,242	3,200	8,442
2005	9,204	3,200	12,404
2006	9,454	3,200	12,654
2007	4,704	3,000	7,704
2008	6,204	3,000	9,204
2009	5,652	3,000	8,652
2010	7,952	3,000	10,952
2011	4,752	3,000	7,752
2012	4,752	3,000	7,752
2013	10,126	3,000	13,126
2014	10,126	2,900	13,026
2015	1,500	1,078	2,578

*...Actual catch

Source: Suisan Sha 1975-2015

Japan Fisheries Agency 2003-2015

IMPORTS

Japan is the world's largest importer of frozen Pollock surimi. In 2014, Japan imported 111,135 mt of frozen Pollock surimi valued at 30,973 million yen (Tables 9 and 10). Japanese imports of frozen Pollock surimi came mostly from the United States, with lesser quantities imported from Russia, and Thailand (Tables 9 and 10).

Imports of frozen cod and Pacific whiting surimi, fluctuated between 3,000 and 8,000 mt from 2008 to 2014 (Table 11). The United States has consistently been the leading supplier of frozen Pacific whiting surimi to Japan, providing over 99 percent of the total in 2014 (Tables 12).

Japan regulates imports of fishery products with import quotas (IQ) and tariffs. Over the years, Japan has relaxed its IQ and reduced trade barriers through multilateral and bilateral trade negotiations. Tariffs have been gradually cut by about one-third since 1995 on a number of fishery products.

Japan regulates imports of frozen surimi with import quota (IQ). Import quotas are set once a year, with new quotas announced each year.

Imports of frozen surimi are subject to tariffs. As the United States and Japan are signatories to the World Trade Organization (WTO), WTO tariffs apply to U.S. exports of fishery products. The current tariff for frozen surimi is 6 percent, calculated as a percentage of cost, insurance, and freight (CIF) value.

Table 9. Japanese imports of frozen Alaska pollock surimi by country of origin and volume, 2008-2014 (metric tons).

Country of origin	2008	2009	2010	2011	2012	2013	2014
U.S.A.	70,755	55,683	62,194	79,817	93,990	94,070	109,957
Russia	327	141	920	621	119	1,686	1,178
Thailand	4	0	0	0	0	0	0
Total	71,086	55,824	63,114	80,438	94,109	95,756	111,135

Total may not add due to rounding

Data Source: Japan Ministry of Finance, 2009-2015

Table 10. Japanese imports of frozen Alaska pollock surimi by country of origin and value, 2008-2014 (Million yen).

Country of origin	2008	2009	2010	2011	2012	2013	2014
U.S.A.	33,388	16,882	20,723	19,580	26,441	23,452	30,693
Russia	156	64	224	132	20	365	279
Thailand	2	0	0	0	0	0	0
Total	33,546	16,946	20,947	19,712	26,461	23,817	30,973

Total may not add due to rounding

Data Source: Japan Ministry of Finance, 2009-2015

Table 11. Japanese imports of frozen cod surimi (excluding Alaska pollock surimi) by country of origin and volume, 2008-2014 (metric tons).

Country of origin	2008	2009	2010	2011	2012	2013	2014
China	0	0	24	949	601	26	24
Canada	0	91	84	0	0	0	0
U.S.A.	7,268	2,708	5,038	2,454	3,122	3,679	5,275
Peru	336	192	0	0	0	0	0
Total	7,604	2,991	5,146	3,403	3,723	3,705	5,299

Total may not add due to rounding

Data Source: Japan Ministry of Finance, 2009-2015

Table 12. Japanese imports of frozen cod surimi (excluding Alaska pollock surimi) by country of origin and value, 2008-2014 (Million yen).

Country of origin	2008	2009	2010	2011	2012	2013	2014
China	0	0	4	179	125	5	4
Canada	0	15	19	0	0	0	0
U.S.A.	3,238	693	1,366	579	822	815	1,346
Peru	142	74	0	0	0	0	0
Total	3,380	782	1,390	758	947	820	1,350
	3,380	782	1,390	758	947	820	1,350

Total may not add due to rounding

Data Source: Japan Ministry of Finance, 200902015

EXPORTS

Japan's export of frozen cod surimi (including Alaska pollock surimi) hovered near a meager 700 mt until about 1980 (Table 13). Exports began to rise sharply in 1981 and continued the trend through 1986. Total exports of surimi increased almost 10 times, from 709 mt in 1980 to 6,676 mt in 1986. The U.S. share of the exports was about 91 percent in 1986.

The sudden surge in the Japanese sale of frozen cod surimi to the United States from 1981 to 1986 stemmed from the interest shown by the U.S. food industry in producing imitation crab meat in this country. Exports of frozen cod surimi to the United States began to decline in 1987.

In 2014, Japan exported only 643 mt of frozen cod surimi, a decrease of 54 percent from the 1,399 mt exported during 2012. New Zealand was the major market taking 72 percent in volume of Japanese exports of frozen cod surimi in 2014. Other important buyer in 2014 was Russia (28 percent). The United States has not purchased frozen cod surimi since 2012.

COLD STORAGE HOLDINGS

Table 14 shows Japan's monthly inventories of frozen Alaska pollock surimi, frozen surimi (excluding Alaska pollock surimi), and total frozen surimi between 1987 and 2014. From January to December 2014, Japanese inventories of frozen Alaska Pollock surimi had been lower than the level in the preceding year.

Table 13. Japan's exports of frozen cod surimi (including Alaska pollock surimi) by major countries of destination and volume, 1974-2014 (metric tons)

Year	Total	U.S.A.	Taiwan	China	Korea, Rep. of	Hong Kong	New Zealand	Australia
1974	603	599	- *	-	-	-	-	-
1975	695	686	-	-	-	-	-	-
1976	489	488	-	-	-	-	-	-
1977	793	771	-	-	-	-	-	-
1978	661	655	-	-	-	-	-	-
1979	693	681	-	-	-	-	-	-
1980	709	703	-	-	-	-	-	-
1981	928	829	-	-	-	-	-	-
1982	1,276	1,114	-	-	-	-	-	-
1983	1,963	1,708	-	-	-	-	-	-
1984	2,580	2,306	-	-	-	-	-	-
1985	5,158	4,801	-	-	-	-	-	-
1986	6,676	6,056	-	-	-	-	-	-
1987	1,233	-	-	-	-	-	-	-
1988	724	13	65	115	230	0**	0	1
1989	398	12	90	173	20	16	0	33
1990	707	3	77	22	514	17	0	1
1991	1,486	6	79	63	1,186	1	0	2
1992	1,155	60	16	0	692	1	0	31
1993	70	2	0	0	0	1	0	64
1994	163	3	0	23	0	0	0	90
1995	39	1	0	1	36	1	0	1
1996	843	1	100	19	395	111	214	0
1997	2,627	2	110	14	0	2,329	145	0
1998	1,085	1	217	7	0	678	163	0
1999	596	1	144	20	347	1	80	1
2000	660	0	253	117	290	0	0	0
2001	309	0	126	45	105	0	33	0
2002	3175	1	18	86	72	1	2996	0
2003	1941	0	0	53	162	1	1724	0
2004	989	1	0	1	0	1	984	0
2005	1485	0	0	0	0	3	1462	0
2006	1034	0	0	0	24	0	934	0
2007	1387	1	0	0	<0.5	<0.5	1308	0
2008	1037	0	0	0	20	3	964	0
2009	929	<0.5	<0.5	0	11	1	914	0
2010	995	22	<0.5	0	22	0	901	0
2011	1058	44	0	0	83	0	927	0
2012	1399	0	0	0	0	<0.5	880	0
2013	881	0	0	0	0	0	852	0
2014	643	0	<0.5	0	0	0	463	0

-* ...not available

0** ...no exports

Total may include other countries not listed

Sources: Japan Frozen Foods Inspection Corporation 1975-1988
 Ministry of Finance 1988-2015
 Sonu 1975-1991

Table 25. Japanese monthly cold storage holdings of frozen Alaska pollock surimi, 19870-2014 (metric tons).

Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
Frozen Alaska pollock surimi												
1987	119,971	140,394	154,720	162,640	166,783	167,716	152,711	140,781	128,781	118,281	114,192	116,590
1988	124,220	142,440	147,256	136,325	138,682	135,355	118,941	110,544	104,170	99,005	94,580	101,220
1989	117,178	129,902	125,917	115,753	109,638	101,494	90,018	82,884	79,172	85,149	91,088	95,875
1990	104,414	110,919	110,202	101,692	104,417	106,474	99,686	99,073	97,961	99,970	93,059	87,266
1991	76,815	78,158	83,706	80,601	76,518	72,574	68,353	77,114	83,336	83,250	77,986	76,976
1992	80,911	92,150	108,585	119,635	119,650	112,455	110,464	117,593	122,914	124,085	120,249	113,647
1993	113,050	107,931	117,508	117,653	109,860	101,768	93,955	86,056	88,603	106,011	101,829	93,775
1994	84,630	85,305	104,424	94,371	87,666	81,893	73,381	65,629	68,563	80,694	82,849	77,462
1995	73,555	73,282	92,122	96,638	96,173	92,806	85,097	78,369	79,584	95,856	89,295	80,440
1996	72,557	67,329	73,082	74,126	69,673	62,494	53,713	46,881	42,433	51,375	54,303	48,938
1997	43,191	40,761	47,098	47,841	46,495	44,877	43,727	41,285	42,697	57,329	57,073	56,421
1998	50,905	50,810	59,743	60,039	59,131	52,530	46,838	41,751	38,766	45,563	50,039	49,190
1999	49,100	45,334	57,062	57,125	56,014	53,659	52,252	45,185	45,035	59,368	62,388	60,930
2000	51,421	45,591	50,954	54,730	57,643	55,059	50,631	45,449	49,566	56,571	54,944	53,555
2001	52,255	46,940	54,183	58,131	61,610	58,351	55,360	49,767	54,903	58,150	59,010	53,142
2002	46,978	48,031	54,774	64,954	59,783	55,385	47,780	45,359	49,155	57,635	59,388	52,604
2003	48,881	50,042	56,674	62,892	57,346	52,254	45,657	44,060	49,369	57,813	56,866	53,932
2004	50,539	47,297	54,457	56,366	51,358	47,590	44,541	47,769	49,848	55,751	53,423	47,957
2005	37,248	35,631	41,937	44,213	42,562	40,165	35,708	37,176	42,469	50,382	48,474	44,400
2006	41,426	38,653	40,824	49,563	49,002	45,487	41,911	41,383	43,818	47,679	48,609	46,141
2007	38,731	36,183	37,401	43,461	41,532	39,738	36,777	37,986	40,173	41,191	41,887	40,191
2008	36,557	33,207	38,322	41,736	40,556	38,585	38,642	35,207	39,828	44,940	49,560	51,566
2009	48,051	50,430	50,532	47,499	48,223	47,912	45,477	42,967	44,727	44,860	42,559	38,917
2010	28,315	26,276	25,469	28,121	28,778	28,052	26,423	25,445	28,518	33,040	35,240	33,768
2011	30,162	26,013	22,846	22,057	26,571	27,728	25,446	24,376	26,310	26,847	26,930	28,654
2012	25,113	23,163	25,307	29,389	29,654	28,869	28,328	32,010	36,046	38,051	38,570	38,145
2013	34,792	34,043	33,958	33,184	33,716	33,341	32,537	34,734	35,027	36,134	35,623	33,373
2014	30,010	26,206	25,174	27,326	30,667	28,065	26,320	28,466	29,405	31,752	30,127	26,966

Sources: Ministry of Agriculture, Forestry, & Fisheries 1989-2015

Table 25. Japanese monthly cold storage holdings of frozen surimi (excluding frozen Alaska pollock surimi), 1987-2014 (metric tons).

Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
Frozen surimi, excluding Alaska pollock surimi												
1987	14,687	15,237	18,647	18,280	23,691	23,546	21,859	22,203	21,431	20,215	18,862	19,352
1988	18,324	20,500	22,376	21,205	22,135	22,091	21,450	23,704	26,465	29,061	27,366	28,069
1989	29,509	29,569	32,349	31,155	32,072	29,965	30,730	31,031	33,711	32,669	32,681	29,966
1990	27,907	26,268	25,201	23,861	22,837	24,982	25,936	26,891	27,750	29,921	28,029	22,566
1991	26,351	20,785	26,659	25,037	23,918	26,010	27,820	29,554	35,477	37,410	39,450	39,298
1992	39,120	40,982	45,644	45,544	43,148	41,599	39,748	41,923	45,345	46,703	45,200	41,722
1993	40,623	39,237	45,227	45,285	47,163	49,345	47,315	46,776	46,881	48,128	43,913	39,913
1994	38,660	38,500	39,800	41,751	42,786	45,155	45,778	44,279	45,629	48,443	40,136	36,548
1995	39,502	38,218	42,227	42,307	41,888	43,576	44,114	45,356	48,156	51,523	47,505	46,430
1996	46,966	45,311	43,569	43,336	43,675	45,187	43,233	40,218	41,426	46,418	44,640	40,087
1997	36,596	35,323	38,840	37,667	37,419	38,902	43,354	44,657	44,981	56,916	54,210	49,878
1998	48,451	47,861	48,419	47,460	47,389	44,856	46,435	46,010	50,421	58,081	57,870	50,425
1999	46,406	42,642	45,261	44,643	45,192	42,092	41,045	38,844	41,731	47,244	48,234	47,640
2000	46,990	41,912	42,751	44,167	42,545	40,842	39,798	37,472	38,114	38,496	37,021	33,273
2001	30,436	29,484	31,881	30,893	31,464	31,888	30,082	30,087	28,257	32,003	34,770	30,453
2002	27,724	24,450	26,327	28,718	29,159	27,712	25,762	28,021	30,095	32,791	33,566	31,651
2003	31,471	29,085	27,59	28,68	28,169	26,993	24,537	24,869	24,528	26,478	27,682	25,309
2004	23,145	20,447	21,402	22,001	21,953	21,891	22,782	21,788	23,695	26,516	26,515	24,969
2005	23,118	22,386	25,004	28,750	29,402	31,026	30,780	32,916	35,349	37,889	39,081	35,827
2006	34,726	32,694	32,025	35,121	35,499	36,199	36,451	36,306	31,404	34,252	35,622	34,153
2007	32,395	33,454	33,159	32,760	33,361	32,902	32,130	32,910	32,465	32,435	31,852	32,171
2008	32,423	31,797	32,407	33,900	39,214	41,989	43,509	44,306	43,461	44,047	43,695	42,800
2009	41,693	38,414	34,779	33,034	31,880	30,524	29,380	27,682	27,828	28,572	28,972	30,114
2010	34,659	35,572	34,428	36,105	37,665	39,347	38,824	36,496	36,353	36,036	34,838	34,157
2011	33,759	30,757	26,915	26,255	26,485	26,921	27,929	28,044	27,845	29,238	33,095	32,043
2012	31,793	30,770	30,253	31,602	32,945	33,715	34,985	35,684	34,576	33,380	32,985	29,599
2013	28,279	25,682	24,103	24,859	26,288	28,076	28,784	28,350	26,068	24,884	25,429	22,979
2014	23,388	22,435	22,678	23,997	26,459	28,402	28,432	28,348	25,778	25,657	26,228	25,056

Sources: Ministry of Agriculture, Forestry, & Fisheries 1989-2015

**Table 25. Japanese monthly cold storage holdings of total frozen surimi, 1987-2014
(metric tons).**

Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
Total frozen surimi												
1987	134,658	155,631	173,367	180,920	190,474	191,262	174,570	162,984	150,212	138,496	133,054	135,942
1988	142,544	162,940	169,632	157,530	160,817	157,446	140,391	134,248	130,635	128,066	121,946	129,289
1989	146,687	159,471	158,266	146,908	141,710	131,459	120,748	113,915	112,883	117,818	123,769	125,841
1990	132,321	137,187	135,403	125,553	127,254	131,456	125,622	125,964	125,711	129,891	121,088	109,832
1991	103,166	98,943	110,365	105,638	100,436	98,584	96,173	106,668	118,813	120,660	117,436	116,274
1992	120,031	133,132	154,229	165,179	162,798	154,054	150,212	159,516	168,259	170,788	165,449	155,369
1993	153,673	147,168	162,735	162,938	157,023	151,113	141,270	132,832	135,484	154,139	145,742	133,688
1994	123,290	123,805	144,224	136,122	130,452	127,048	119,159	109,908	114,192	129,137	122,985	114,010
1995	113,057	111,500	134,349	138,945	138,061	136,382	129,211	123,725	127,740	147,379	136,800	126,870
1996	119,523	112,640	116,651	117,462	113,348	107,681	96,946	87,099	83,859	97,793	98,943	89,025
1997	79,787	76,084	85,938	85,508	83,914	83,779	87,081	85,942	87,678	114,245	111,283	106,299
1998	99,356	98,671	108,162	107,499	106,520	97,386	93,273	87,761	89,187	103,644	107,909	99,615
1999	99,525	91,740	99,704	102,386	100,657	98,851	94,344	86,230	83,879	101,099	109,632	109,164
2000	98,411	87,503	93,705	98,897	100,188	95,901	90,429	82,921	87,680	95,067	91,965	86,828
2001	82,691	76,424	86,064	89,024	93,074	90,239	85,442	79,854	83,160	90,153	93,780	83,595
2002	74,702	72,481	81,101	93,672	88,942	83,097	73,542	73,380	79,250	90,426	92,954	84,255
2003	80,352	79,127	84,533	91,460	85,515	79,247	70,194	68,929	73,897	84,291	84,548	79,241
2004	73,684	67,744	75,859	78,367	73,311	69,481	67,323	69,557	73,543	82,267	79,938	72,926
2005	60,366	58,017	66,941	72,963	71,964	71,191	66,488	70,092	77,818	88,271	87,555	80,227
2006	76,152	76,152	76,152	76,152	76,152	76,152	76,152	76,152	76,152	76,152	76,152	76,152
2007	71,126	69,637	70,560	76,221	74,893	72,640	68,907	70,896	72,638	73,626	73,739	72,362
2008	68,980	65,004	70,729	75,636	79,770	80,574	82,151	79,513	83,289	88,987	93,255	94,366
2009	89,744	88,844	85,311	80,533	80,103	78,436	74,857	70,649	72,555	73,432	71,531	69,031
2010	62,974	62,974	62,974	62,974	62,974	67,399	65,247	61,941	64,871	69,076	70,078	67,925
2011	63,921	56,770	49,761	48,312	53,056	54,649	53,375	52,420	54,155	56,085	60,025	60,697
2012	56,906	53,933	55,560	60,991	62,599	62,584	63,313	67,694	70,622	71,431	71,555	67,744
2013	63,071	59,725	58,061	58,043	60,004	61,417	61,321	63,084	61,095	61,018	61,052	56,352
2014	53,398	48,641	47,852	51,323	57,126	56,467	54,752	56,814	55,183	57,409	56,355	52,022

Sources: Ministry of Agriculture, Forestry, & Fisheries 1989-2015

SUPPLY

The annual supply of frozen surimi for the Japanese market and for export is comprised of the cold storage inventory on January 1, plus domestic production and imports. Between 1995 and 2012, annual frozen surimi supplies ranged between 219,000 and 436,000 mt, averaging 305,000 mt (Table 15). During this period Japanese production averaged 108,000 mt per year, about 35 percent of the total supply. The January inventory averaged 82,000 mt (27 percent), and imports 115,000 mt (38 percent).

Total annual supply decreased steadily from 1995 to 2012 because imports did not make up for decreased domestic production.

**Table 15. Japanese supply for frozen surimi, 1995-2012
(metric tons)**

<u>Year</u>	<u>Production</u>	<u>Inventory</u>	<u>Imports</u>	<u>Supply</u>
1995	154,554	113,057	168,652	436,263
1996	129,086	119,523	143,978	392,587
1994	143,623	79,787	151,296	374,706
1998	141,816	99,356	125,921	367,093
1999	145,936	99,525	123,861	369,322
2000	125,162	98,411	124,082	347,655
2001	110,481	82,691	148,247	341,419
2002	104,435	74,702	128,570	307,707
2003	104,435	80,352	101,448	286,235
2004	98,712	73,684	132,166	304,562
2005	103,918	60,366	118,220	282,504
2006	94,238	76,152	112,992	283,382
2007	71,315	71,126	102,828	245,269
2008	81,489	68,980	78,690	229,159
2009	89,063	89,744	58,815	237,622
2010	87,392	62,974	68,260	218,626
2011	78,358	63,921	83,841	226,120
2012	84,187	56,906	97,832	238,925
2013	-*	63,071	99,461	-
2014	-	53,398	116,434	-

-*.....not available

Sources: Ministry of Agriculture, Forestry, & Fisheries 1998-2015.

DEMAND

Japanese demand of frozen surimi (supply minus exports and the cold storage inventory on December 31) was 170,000 mt in 2012, an increase of 3 percent compared with 2011 (Table 16). Between 1995 and 2012, annual demand of frozen surimi averaged 219,000 mt per year.

**Table 16. Japanese demand for frozen surimi, 1995-2012
(metric tons)**

Year	Supply	Exports	Inventory	Demand
1995	436,263	39	126,870	309,354
1996	392,587	843	89,025	302,719
1994	374,706	2,627	106,299	265,780
1998	367,093	1,085	99,615	266,393
1999	369,322	596	109,164	259,562
2000	347,655	660	86,828	260,167
2001	341,419	309	83,595	257,515
2002	307,707	3,175	84,255	220,277
2003	286,235	1,941	79,241	205,053
2004	304,562	989	72,926	230,647
2005	282,504	1,485	80,227	200,792
2006	283,382	1,034	76,152	206,196
2007	245,269	1,387	72,362	171,520
2008	229,159	1,037	94,366	133,756
2009	237,622	929	69,031	167,662
2010	218,626	995	67,925	149,706
2011	226,120	1,058	60,697	164,365
2012	238,925	1,399	67,744	169,782

Sources Ministry of Agriculture, Forestry, & Fisheries 1997-2015
Ministry of Finance 1997-2015

MARKETS

Surimi is usually sold directly to licensed buyers, with a set price at production-center wholesale markets located at Japanese ports of landings and consumer-center wholesale markets located in cities with populations of more than 200,000. Surimi is also sold directly to processors and representatives of supermarket chains. The largest consumer fish wholesale market is the Tokyo Central Wholesale Market. In 2014, this market handled about 480,000 mt of fishery products valued at about \$3.8 billion (Tokyo Metropolitan Government). It therefore plays an important role in providing information on the supply and demand of fishery products in Japan. Also, the wholesale price determined in the Tokyo Central Wholesale Market frequently serves as a price index for fishery products throughout the world.

Wholesale prices for surimi vary, depending on quality, origin, species, supply and demand, and other factors.

Table 17 show monthly average wholesale prices of frozen surimi in Japan between 1988-2014. Monthly average wholesale prices for frozen surimi fluctuated that period. The fluctuations were influenced mainly by the quantities in cold storage holdings; usually, the lower the cold storage holdings, the higher the prices and vice versa. Wholesale prices for frozen surimi generally fall during summer.

Table 17. Monthly average wholesale prices of frozen Surimi* at Tokyo Central Wholesale Market, 1988-2014 (yen/kg) .

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1988	339	354	358	373	390	366	370	355	364	330	316	342
1989	336	330	355	390	373	353	372	334	357	354	377	366
1990	407	364	360	401	379	378	321	354	348	364	366	358
1991	379	400	487	527	579	576	622	640	697	745	754	761
1992	782	724	643	730	611	606	609	542	478	455	453	413
1993	387	337	352	349	367	308	338	345	340	328	333	337
1994	321	334	350	340	325	352	305	318	317	341	343	386
1995	449	358	387	361	451	378	349	373	377	394	372	350
1996	391	404	363	324	362	342	299	293	285	298	353	335
1997	369	374	385	383	392	410	368	371	397	430	414	391
1998	416	353	341	336	327	333	370	372	369	420	340	348
1999	399	435	345	336	368	366	369	313	391	348	383	333
2000	363	369	351	311	320	309	322	317	375	401	344	381
2001	331	307	292	274	287	257	292	262	301	284	259	289
2002	309	342	350	334	343	315	284	313	298	301	303	334
2003	307	331	378	327	327	322	340	335	312	229	289	235
2004	266	288	285	267	287	300	341	329	263	289	274	291
2005	382	337	346	302	303	255	335	432	372	418	405	386
2006	439	405	392	404	340	434	355	332	409	394	408	421
2007	450	486	449	335	363	436	410	443	483	433	401	372
2008	433	438	550	506	595	546	505	568	633	505	441	577
2009	696	449	397	644	495	379	412	311	412	464	415	355
1010	539	388	424	415	469	463	395	424	464	534	506	507
2011	476	475	474	443	341	501	467	429	518	483	589	606
2012	542	607	627	339	363	595	426	496	528	498	529	465
2013	636	424	378	378	588	379	309	540	351	478	537	413
2014	616	595	512	386	400	419	504	513	561	564	509	480

*.....includes all grades, all species of surimi. Source: Tokyo Metropolitan Government 1989-2015

SURIMI-BASED PRODUCTS

For many centuries, the Japanese have practiced the art of manufacturing surimi-based products. Traditional methods consisted of processing the fish into raw surimi and then kneading it immediately into a finished product. Since both fish and raw surimi would denature quickly, the entire process had to be performed without much delay after the fish was landed (Okada 1981).

The advent of stable frozen surimi in 1960 revolutionized the traditional methods for making surimi-based products. With year-round availability of frozen surimi, manufacturers of surimi-based products were no longer dependent on unstable local fish catches and fresh surimi. The tremendous expansion of the surimi-based product industry was made possible by this important change.

The majority of surimi-based products, approximately 70 percent, is comprised of various types of fish cake called "kamaboko". About 30 percent of surimi-based products are represented by yaki-chikuwa (broiled surimi product), fish sausage, and fish ham (Table 18).

Kamaboko products are divided among three major categories: steamed kamaboko, fried kamaboko, and boiled kamaboko. Typical steamed kamaboko is called itatsuki (board-mounted) kamaboko, but the variety also includes imitation shellfish. Typical fried kamaboko (age-kamaboko) products are satuma-age and tempura. Typical boiled kamaboko is hampen, a spongy marshmallow-like product which contains entrapped air. Yaki-chikuwa is broiled surimi product which has the shape of a hollow bamboo stem.

In Table 18 the production of imitation crab meat has been listed under the category of "flavored" kamaboko only since 1987. Until that time, it was included in the category of "other kamaboko".

The main ingredient of surimi-based products is a homogeneous gel of ground fish muscle, obtained by kneading the thawed frozen surimi or raw surimi into a paste with salt. It also contains other ingredients such as sugar, starch, sweet sake, and monosodium glutamate.

Table 18 and figure 4 summarize annual production of surimi-based products by Japan since 1957. The production peaked at 1,185,100 mt in 1973, but decreased continuously, to 538,329 mt in 2012.

Data on kamaboko from 2006 through 2012 are not available as breakdown, though available as sub-totals as in previous years. Also kamaboko sub-total during this same period combine yaki-chikuwa data.

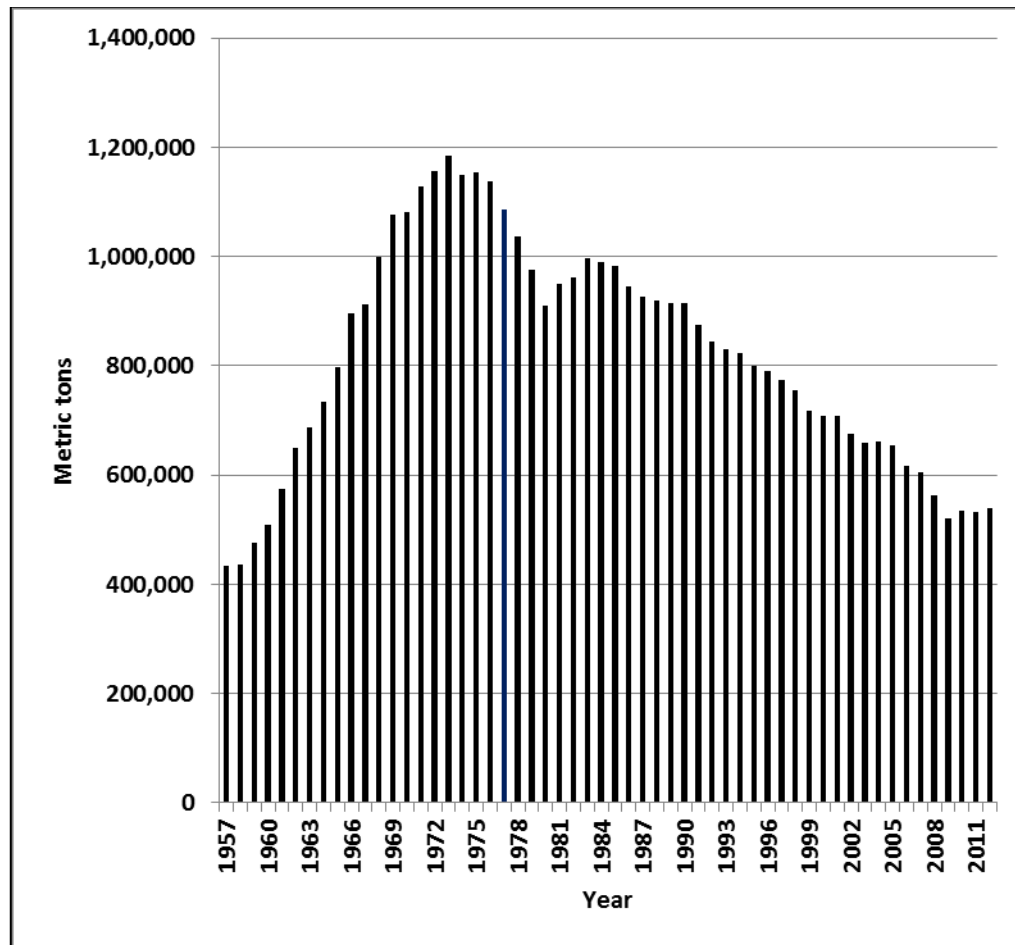


Figure 4. Japanese Production of Surimi-based Products, 1957-2012.

Source: Ministry of Agriculture, Forestry and Fisheries, 1959-2015

Table 18. Japan's Production of Surimi-based Products, 1957-2012, (metric tons).

Year	Kamaboko							Sub-total	Yaki-chikuwa	Fish ham/Sausage	Total
	In casings	Steamed	Fried	Boiled	Flavored	Others					
1957	0	* 0	0	0	0	0	0	0	0	35,895	434,152
1958	0	136,368	122,092	0	0	9,548	268,008	108,980	59,604	436,592	
1959	0	149,762	141,221	0	0	6,080	297,063	107,650	71,516	476,229	
1960	0	152,171	153,266	0	0	5,691	311,128	96,841	101,438	509,407	
1961	0	187,965	155,700	0	0	7,869	351,534	98,230	123,681	573,445	
1962	0	214,406	179,712	0	0	8,338	402,456	104,748	142,441	649,645	
1963	0	205,144	196,437	0	0	15,243	416,824	112,564	158,666	688,054	
1964	0	219,874	205,129	0	0	14,317	439,320	119,455	175,864	734,639	
1965	0	245,116	234,004	0	0	8,190	487,310	121,774	188,094	797,178	
1966	0	270,214	283,616	0	0	7,644	561,474	157,636	176,026	895,136	
1967	0	294,782	267,549	0	0	13,380	575,711	171,745	164,431	911,887	
1968	23,451	259,599	289,501	0	0	71,039	643,590	194,035	161,753	999,378	
1969	23,078	283,917	319,191	61,021	0	16,915	704,122	204,290	168,778	1,077,190	
1970	25,873	277,483	313,552	53,041	0	6,363	676,312	221,484	183,515	1,081,311	
1971	31,500	291,927	322,161	56,387	0	6,384	708,359	238,539	180,207	1,127,105	
1972	30,032	305,984	326,623	63,766	0	6,384	732,789	244,615	178,801	1,156,205	
1973	32,039	317,423	329,692	75,595	0	1,593	756,342	249,172	179,586	1,185,100	
1974	85,461	275,264	324,149	76,913	0	3,275	765,062	250,946	132,693	1,148,701	
1975	90,786	271,683	327,068	84,519	0	1,324	775,380	258,882	120,708	1,154,970	
1976	82,010	285,588	316,929	83,897	0	9,931	778,355	235,278	123,114	1,136,747	
1977	77,651	266,216	303,224	84,304	0	16,086	747,481	214,393	125,088	1,086,962	
1978	75,039	258,951	289,481	93,110	0	16,615	733,196	190,911	113,109	1,037,216	
1979	73,827	252,035	272,175	76,558	0	17,589	692,184	177,192	106,815	976,191	
1980	58,342	230,578	269,211	73,184	0	18,037	649,352	174,377	87,412	911,141	
1981	57,832	227,694	291,412	74,051	0	25,350	676,339	180,678	91,865	948,882	
1982	56,364	212,171	289,361	83,539	0	36,555	677,990	187,734	95,152	960,876	
1983	60,545	195,120	297,257	0	0	150,220	703,142	194,931	98,098	996,171	
1984	57,630	188,100	298,063	0	0	155,747	699,540	196,221	94,688	990,449	
1985	57,329	184,340	290,979	0	0	158,977	691,625	199,861	92,279	983,765	

Table 18 (continued). Japan's Production of Surimi-based Products, 1957-2012 (metric tons).

Year	In casings	Steamed	Kamaboko				Sub-total	Yaki-Sausage	Fish ham/Sausage	Total
			Fried	Boiled	Flavored	Others				
1986	52,750	175,600	276,209	0	0	154,658	659,217	195,351	90,732	945,300
1987	57,990	170,952	271,488	59,797	68,952	18,311	647,490	189,297	89,146	925,933
1988	58,645	172,766	277,618	56,307	60,688	19,754	645,778	190,451	84,304	920,533
1989	63,226	169,784	273,563	55,152	58,011	26,037	645,773	184,713	85,345	915,831
1990	57,844	165,177	279,607	54,148	65,270	25,382	647,428	181,693	85,653	914,774
1991	57,647	155,619	270,459	49,991	59,321	27,604	620,641	174,735	78,331	873,707
1992	50,979	158,173	265,960	47,541	55,493	26,719	604,865	169,607	70,884	845,356
1993	48,035	146,271	264,952	47,487	57,424	26,194	590,363	172,579	66,828	829,770
1994	44,268	142,218	265,346	45,918	59,365	26,153	583,268	173,445	66,059	822,772
1995	42,693	135,633	258,698	44,837	59,036	24,264	565,161	169,559	66,196	800,916
1996	38,443	132,743	258,927	43,818	58,136	26,139	558,206	166,940	65,285	790,431
1997	35,454	129,703	258,110	44,333	26,544	23,668	547,812	259,807	65,282	772,901
1998	35,419	125,648	252,899	42,445	52,292	18,874	527,577	164,066	62,816	754,459
1999	33,648	119,773	235,835	38,213	50,980	16,115	494,564	159,848	62,306	716,718
2000	34,701	119,950	232,121	40,394	50,451	15,404	493,021	153,285	60,286	706,592
2002	30994	111,332	223,357	36956	49618	20,710	472,967	141,530	62,068	676,565
2003	31270	105,556	212,172	33285	53607	17,484	453,374	137,238	67,681	658,293
2004	30175	101,768	211,477	32676	55894	17,766	449,756	139,343	71,223	660,322
2005	26805	100,781	217,862	34153	54517	21,115	455,233	131,732	68,282	655,247
2006	...	...	...	...	...	...	554,026	...*	63,930	617,956
2007	...	...	...	...	...	...	536,679	...	69,162	605,841
2008	...	...	...	...	...	...	491,662	...	72,167	563,829
2009	...	...	...	...	...	...	453,850	...	66,873	520,723
2010	...	...	...	...	...	...	468,830	...	64,794	533,624
2011	...	...	...	...	...	...	463,811	...	67,776	531,587
2012	...	...	...	...	...	...	474,503	...	63,826	538,329

0*not available

-* Consolidated into Kamaboko sub-total

Sources: National Surimi Association 1984
Ministry of Agriculture, Forestry and Fisheries 1959-2015

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