Overview of World Salmon Markets

Key Points

- ✔ Total world salmon and salmon trout supply increased more than four-fold between 1980 and 2001 and the share of North American wild salmon in total world supply fell from more than half to about one-sixth. The increase in farmed salmon consumption and corresponding decrease in the share of North American wild salmon is reflected in all major salmon markets except for canned and salmon roe markets.
- ✔ World salmon consumption may be divided among five major markets: the European Union fresh and frozen market, the Japanese fresh and frozen market, the U.S. fresh and frozen market, canned salmon markets and other markets.
- ✔ Wholesale prices for wild and farmed salmon declined in all major markets from the late 1980s until about 2002. Wholesale prices for farmed Atlantic salmon and some wild salmon species have increased since 2002. Within these general long-term trends in prices, there have been substantial monthly and annual fluctuations in prices.
- ✔ The Japanese and European fresh and frozen salmon markets each consume more than twice as much salmon as the North American fresh and frozen market. It is in these three markets that farmed salmon has had the largest impacts on North American wild salmon. In order to understand the impacts of farmed salmon on North American wild salmon, one must first understand that this is a truly international market, with market forces acting on both the demand and supply side.
- ✔ Currency exchange rates—the values of end-market currencies relative to the U.S. dollar—affect the dollar value of foreign wholesale prices and the prices paid to U.S. salmon processors and fishermen. Changes in the value of the Japanese yen relative to the dollar have been a major factor affecting sockeye salmon prices.

Introduction

North American wild salmon are sold in numerous product forms and markets around the world. To understand what is happening to prices for North American wild salmon and how they are affected by farmed salmon, it is important to look at what is happening in all of the important global markets for North American wild salmon.

Press coverage of the issues facing the North American wild salmon industry often focuses on the U.S. market for fresh and frozen salmon, the rapid growth of U.S. imports of farmed salmon and strategies for wild salmon to compete more effectively with farmed salmon within the U.S. domestic market.

However, it is important to understand that the U.S. fresh and frozen market is not the most important market for North American wild salmon. Nor is it the market in which competition from farmed salmon has had the greatest effects on North American wild salmon prices. Other markets—in particular the Japanese market and canned salmon market—until recently accounted for larger shares of North American wild salmon production and have had a greater effect on the value of North American wild salmon harvests.[1]

In this chapter, we begin by reviewing trends in total world salmon supply and the dramatic decline over the past two decades in the share of North American wild salmon in that supply. Next, we examine the relative scale of salmon consumption in major markets and the relative role of different salmon producing countries in supplying those markets.

We then briefly review trends in the five most important markets for North American wild salmon—the Japanese fresh and frozen salmon market, the U.S.

[1] The volume of U.S. salmon consumed in the U.S. fresh & frozen salmon market is less than the volume which is canned and prior to 2001 was less than the volume exported to Japan.

fresh and frozen salmon market, the European fresh and frozen salmon market, canned salmon markets and the Japanese salmon roe market.

For each of these markets we discuss trends in total supply, trends in the market share of North American wild salmon, trends in wholesale prices, major factors affecting wholesale prices and how these factors have affected prices of North American wild salmon. Our discussion is necessarily brief. All of these markets are complex. Each could be the subject of an entire study.

All major salmon markets have been affected by the dramatic growth in world production of farmed salmon. But they differ in important ways. Their consumers have different traditions, tastes and income levels. They consume salmon in different product forms. They differ widely in the relative shares of wild and farmed salmon in total supply and the relative shares of different producing countries. They have experienced different trends in economic growth and the relative value of their currencies. Understanding these differences is important for beginning to understand the effects of farmed salmon on these markets and the resulting effects on the North American wild salmon industry.

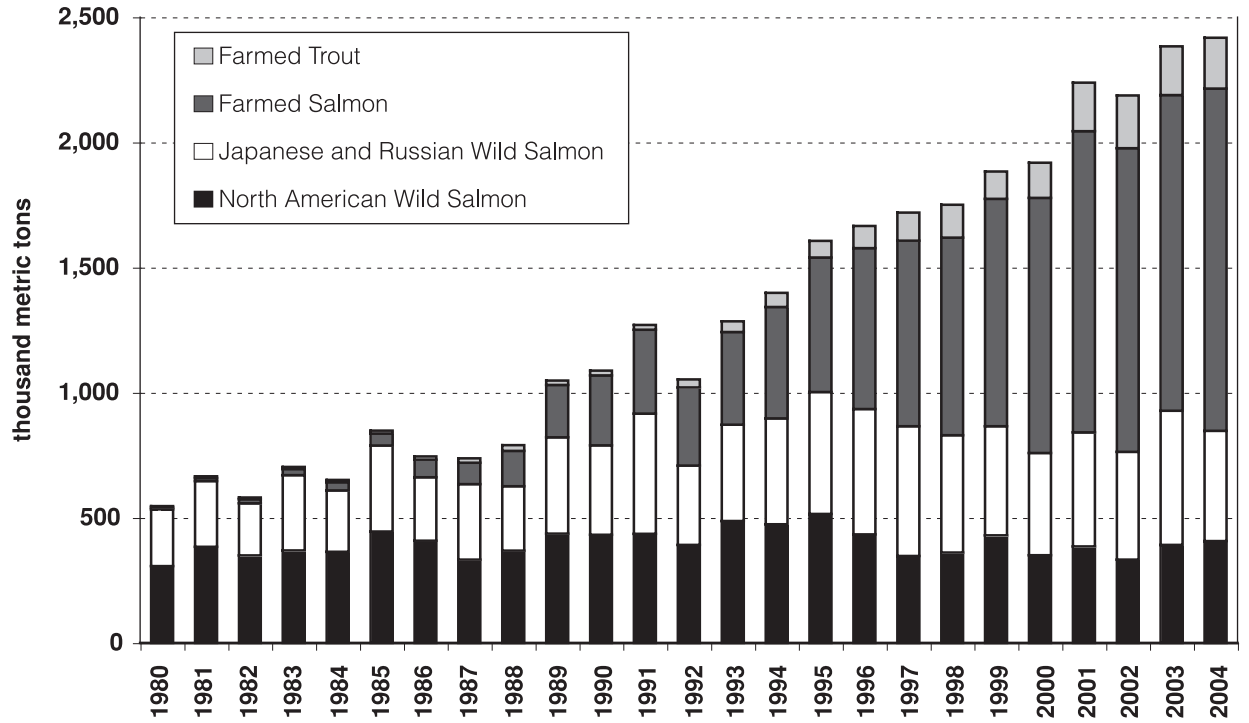
World Salmon Supply

Figure VI-1 shows world salmon and salmon trout supply for the years 1980-2004.[2] Major sources of supply include North American wild salmon, Japanese and Russian wild salmon, farmed salmon and farmed salmon trout.

The volume and sources of world salmon supply have changed dramatically over the past two decades. In 1980, total world salmon supply was less than 550,000 metric tons (mt). By 2004 world supply had more than quadrupled to more than 2.4 million mt.

In 1980, North American wild salmon catches of about 300,000 mt accounted for more than half of total world salmon supply. North American wild salmon catches increased to a peak of more than 500,000 mt in 1995 and then declined to about 400,000 mt in 2004—about one sixth of total world supply. The declining share of North American wild salmon in world salmon production is reflected in similarly dramatic declines in the share of North American wild salmon in all major salmon markets except for canned markets and salmon roe markets.

Figure VI-1 **World Salmon and Trout Supply 1980-2004**



Source: All data are FAO Fishstat+ data except that data (used to calculate North American wild salmon catches) for Alaska are CFEC Alaska Salmon Summary Data 1980-2005 and data for the Pacific Northwest are NMFS catch data. "Farmed trout" includes only farmed rainbow trout raised in salt water.

[2] As was discussed in Chapter V, in this report we use the term "trout" to refer specifically to farmed rainbow trout raised in salt water pens, mostly in Scandinavia and Chile, which is a similar product to farmed salmon and competes directly with farmed salmon in world markets.

Japanese and Russian wild salmon catches more than doubled from less than 250,000 mt to more than 500,000 tons in 1997 and have remained at about that level. Since 1996, Japanese and Russian wild salmon catches have exceeded North American wild salmon catches. Note that Japanese catches are generally ranched chum salmon.[3] Hatcheries produce the chum salmon fry that are released to the wild; the returning salmon are intercepted, stripped of roe or milt and then processed as fresh, frozen or salted salmon primarily for the Japanese market.

World production of farmed salmon grew dramatically from less than 10,000 mt in 1980 to more than 1.5 million mt in 2004 (see Chapter V). In 2004, farmed salmon and trout accounted for five-sixths of world supply.

Table VI-1 provides more detail on the contribution of North American wild salmon to total world supply during the period 2000-2004. North American wild production accounted for 17 percent of total world salmon supply. Wild production in other countries—Japan and Russia—accounted for 20 percent of world supply. Farmed salmon accounted for 63 percent of world supply.

World production of sockeye, pink and chum salmon production is entirely wild, including ranched pink and chum. During the period 2000-2004, North America accounted for 80 percent of sockeye supply, 50 percent of pink supply (Russia accounted for most of the rest) and 24 percent of chum production (Japan accounted for almost all of the rest).

There is some wild (including ranched) chinook and coho supply, as well as a significant amount of farmed production. By the 2000-2004 period, farmed production of these species greatly exceeded wild production. North American wild production accounted for about 36 percent of world chinook production and only 14 percent of world coho production.

Major World Salmon Markets

World salmon consumption may be divided among five major markets: the European Union fresh and frozen market, the Japanese fresh and frozen market, the U.S. fresh and frozen market, canned salmon markets and other markets. There are significant differences between these markets in their sources of supply, species and products consumed and short-run market conditions.

Figure VI-2 shows estimated salmon and trout consumption in each of these major markets for the period 1989-2004, by source of supply.

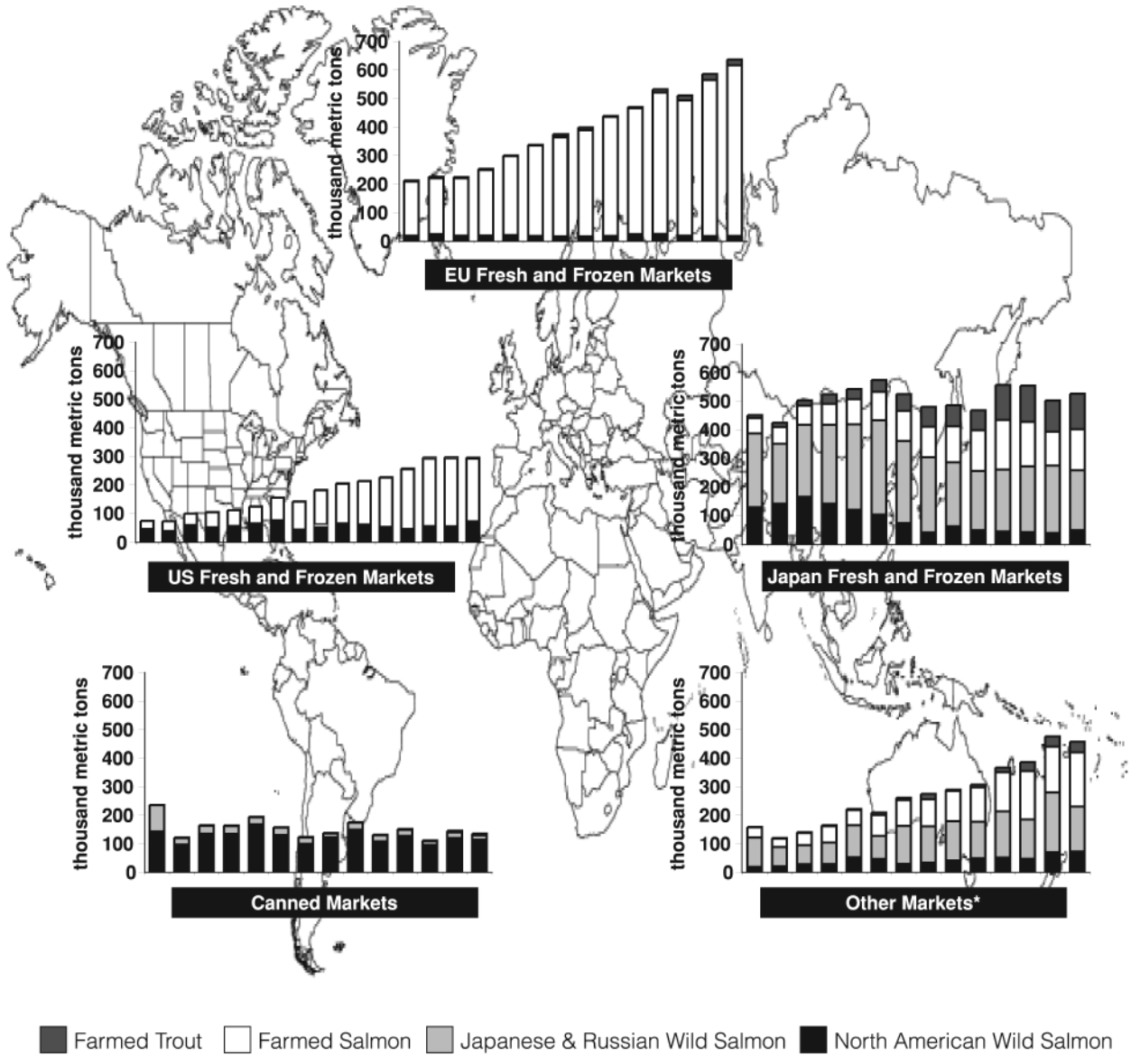
Table VI-1 **Average World Wild and Farmed Salmon and Trout Supply, by Species, 2000-2004**

	Species	North American wild	Japanese & Russian wild	Farmed	Total
Thousand Metric Tons	Atlantic			1,077	1,077
	Chinook	12	1	20	32
	Sockeye	95	24		119
	Coho	19	2	116	137
	Pink	167	169		335
	Chum	81	258		339
	Trout			188	188
	Total	**374**	**454**	**1,401**	**2,229**
Share of World Supply	Atlantic			100%	100%
	Chinook	36%	2%	62%	100%
	Sockeye	80%	20%		100%
	Coho	14%	2%	84%	100%
	Pink	50%	50%		100%
	Chum	24%	76%		100%
	Trout			100%	100%
	Total	**17%**	**20%**	**63%**	**100%**

Source: All data are FAO Fishstat+ data except that data (used to calculate North American wild salmon catches) for Alaska are CFEC Alaska Salmon Summary Data 1980-2005 and data for the Pacific Northwest are NMFS catch data. "Farmed trout" includes only farmed rainbow trout raised in salt water.

[3] See footnote 2 in Chapter II.

Figure VI-2 **Estimated World Salmon Consumption 1989-2004**



*Note: estimates of consumption in other markets are highly sensitive to yield assumptions and are less reliable than other estimates shown.

These estimates are based on numerous assumptions of varying reliability and should be considered only approximate. However, they are reasonable indicators of the relative scale of different markets, the relative rates of growth of consumption in different markets and the relative importance of different sources of supply for each market. Appendix B provides technical details of the derivation of these estimates.

There are several important points to be noted from Figure VI-2. First, until recently, the Japanese fresh and frozen salmon market was the world's largest market. However, the rapidly growing European Union now consumes a slightly larger volume. In 2004, U.S. fresh and frozen salmon consumption was only about half that of Japan or the European Union.

Second, all five markets are important for North American wild salmon. Canned salmon markets account for the largest share of North American salmon production. The Japanese market, which formerly accounted for the largest share, has declined in relative importance due to declining North American production and exports of frozen sockeye salmon.

Third, consumption of farmed salmon grew dramatically between 1989 and 2004 in all markets except for canned salmon. In both relative and absolute terms, the growth in consumption was greatest in the European fresh and frozen market. The European Union accounted for about 50 percent of the increase in world farmed salmon consumption during this period, the United States accounted for 20 percent and Japan accounted for 11 percent.

Fourth—and most importantly for this study—the U.S. fresh and frozen market ranks behind other markets in importance for both wild and farmed salmon. Competition between North American wild salmon and farmed salmon is occurring in multiple markets, which are subject to different trends in both supply and demand. The effects of this competition can only be understood by examining *all* of these markets, not just the U.S. fresh and frozen salmon market.

Tables VI-2, VI-3 and VI-4 (on the following pages) provide more detailed estimates of supply to each market during the period 2000-2004 from major wild and farmed salmon producers. These estimates are based on numerous different (and sometimes conflicting) data sources and assumptions and should be considered only approximate. However, they serve to provide a general indicator of the relative magnitude of different markets and the relative importance of different sources of supply.

During the period 2000-2004, the U.S. fresh and frozen market consumed about 234,000 mt of salmon annually, or about 14 percent of world salmon consumption. The U.S. fresh and frozen market accounted for about 19 percent of consumption of North American wild salmon and also for about 21 percent of world farmed salmon consumption (Table VI-3). Of U.S. fresh and frozen salmon consumption, North American wild salmon accounted for 16 percent, Chilean farmed salmon accounted for 40 percent and Canadian farmed salmon accounted for 26 percent (Table VI-4).

The European fresh and frozen market consumed about 477,000 mt of salmon annually, or about 30 percent of world consumption. The European market accounted for about 50 percent of farmed salmon consumption, but only about 7 percent of consumption of North American wild salmon consumption. Of European consumption, Norwegian farmed salmon accounted for the largest share (52 percent) followed by United Kingdom farmed salmon (24 percent).

The Japanese fresh and frozen salmon market consumed about 446,000 mt of salmon, or about 28 percent of world consumption. The Japanese market accounted for about 15 percent of North American wild salmon consumption and about 14 percent of farmed salmon consumption. Of Japanese consumption, Japanese wild salmon accounted for the largest share (36 percent), followed by Chilean farmed salmon (17 percent).

Canned salmon markets consumed about 115,000 mt of salmon, or about 7 percent of world consumption. Canned salmon markets accounted for about 39 percent of North American wild salmon consumption but less than 1 percent of farmed salmon consumption.

Challenges in Estimating World Salmon Consumption

Estimating trends in consumption of salmon from different producing regions in different end-markets is a challenging exercise, for a number of reasons:

- Inconsistent data. Different data sources for salmon production and trade are often inconsistent. For example, industry and government sources on farmed salmon production often do not match and export data from one country may not match import data for the countries to which salmon was exported. Some countries' reported exports exceed their total salmon production.
- Missing data. Some kinds of data needed to estimate consumption do not exist. For example, there are no data for how much Alaska wild salmon is consumed in the United States. Consumption can only be inferred by starting with how much salmon was caught and subtracting other uses such as exports and yield losses in processing.
- Re-exported products. Some salmon are shipped to one country for processing and then re-exported to other countries. For example, substantial volumes of U.S. salmon are processed in Canada and substantial volumes of Norwegian salmon are processed in Denmark. This makes it difficult to tell where salmon imports actually originated.
- Varying product yields. The weight of salmon declines as it is processed. Thus the total volume of consumption is less than the total volume of production. Import and export data reflect varying degrees of processing and thus the same weight does not necessarily reflect the same volume of catches or the same volume of consumption.

For all of these reasons estimates such as those shown in Figure VI-2 require numerous assumptions and analysts' best judgment and should be considered only approximate.

Table VI-2 Approximate Annual Average World Salmon Production and Consumption, 2000-04 (thousand metric tons)

Type of salmon	Producing country	Total production (round weight basis)	Consumption by End-Market (processed weight basis)					Weight loss in processing
			United States fresh & frozen markets	EU Fresh & frozen markets	Japanese fresh & frozen markets	Canned salmon markets	Other markets	
North American wild salmon	United States	346	38	18	32	86	49	123
	Canada	28	9	0	5	11	0	5
	Total	**374**	**47**	**18**	**37**	**97**	**49**	**128**
Japanese & Russian wild salmon	Japan	249	0	0	161	5	38	46
	Russia	205	0	0	27	11	99	68
	Total	**454**	**0**	**0**	**188**	**15**	**136**	**114**
Farmed salmon	Norway	483	7	249	34	1	86	105
	Chile	370	94	18	75	2	28	152
	UK	143	8	105	1	0	0	29
	Canada	104	61	0	0	0	0	42
	United States	17	10	0	0	0	6	1
	Japan	10	0	0	11	0	0	0
	Others	86	3	65	4	0	12	3
	Total	**1,213**	**184**	**437**	**126**	**3**	**133**	**333**
Farmed trout	Norway	67	0	9	29	0	12	17
	Chile	105	3	1	61	0	7	34
	Others	16	0	3	4	0	4	5
	Total	**188**	**3**	**13**	**95**	**0**	**22**	**56**
Total		**2,229**	**234**	**468**	**446**	**115**	**341**	**631**

Note: Estimates of consumption by end-market are based on numerous assumptions and should considered only approximate indicators of relative volumes. See Appendix B for details of data and assumptions.

Table VI-3 Approximate Shares of World Salmon Consumption, by Consuming Markets, 2000-2004

Type of salmon	Producing country	Consuming Markets (processed weight basis)					TOTAL
		United States fresh & frozen markets	EU Fresh & frozen markets	Japanese fresh & frozen markets	Canned salmon markets	Other markets	
North American wild salmon	United States	17%	8%	15%	38%	22%	100%
	Canada	36%	0%	19%	45%	0%	100%
	Total	**19%**	**7%**	**15%**	**39%**	**20%**	**100%**
Japanese & Russian wild salmon	Japan	0%	0%	79%	2%	18%	100%
	Russia	0%	0%	20%	8%	72%	100%
	Total	**0%**	**0%**	**55%**	**5%**	**40%**	**100%**
Farmed salmon	Norway	2%	66%	9%	0%	23%	100%
	Chile	43%	8%	34%	1%	13%	100%
	UK	7%	92%	1%	0%	0%	100%
	Canada	100%	0%	0%	0%	0%	100%
	United States	63%	0%	1%	0%	36%	100%
	Japan	0%	0%	100%	0%	0%	100%
	Others	4%	76%	5%	0%	14%	100%
	Total	**21%**	**49%**	**14%**	**0%**	**15%**	**100%**
Farmed trout	Norway	0%	18%	58%	0%	24%	100%
	Chile	4%	1%	86%	0%	9%	100%
	Others	0%	27%	38%	0%	36%	100%
	Total	**2%**	**10%**	**72%**	**0%**	**17%**	**100%**
Total		**15%**	**29%**	**28%**	**7%**	**21%**	**100%**

Source: Calculated from consumption estimates in Table VI-2.

Table VI-4 **Approximate Shares of World Salmon Consumption, by Producing Country, 2000-2004**

Type of salmon	Producing country	Consuming Markets (processed weight basis)					TOTAL
		United States fresh & frozen markets	EU Fresh & frozen markets	Japanese fresh & frozen markets	Canned salmon markets	Other markets	
North American wild salmon	United States	16%	4%	7%	74%	15%	14%
	Canada	4%	0%	1%	10%	0%	2%
	Total	**20%**	**4%**	**8%**	**84%**	**15%**	**15%**
Japanese & Russian wild salmon	Japan	0%	0%	36%	4%	11%	13%
	Russia	0%	0%	6%	9%	29%	9%
	Total	**0%**	**0%**	**42%**	**13%**	**40%**	**21%**
Farmed salmon	Norway	3%	53%	8%	1%	25%	24%
	Chile	40%	4%	17%	2%	8%	14%
	UK	4%	22%	0%	0%	0%	7%
	Canada	26%	0%	0%	0%	0%	4%
	United States	4%	0%	0%	0%	2%	1%
	Japan	0%	0%	2%	0%	0%	1%
	Others	1%	14%	1%	0%	4%	5%
	Total	**79%**	**94%**	**28%**	**3%**	**39%**	**55%**
Farmed trout	Norway	0%	2%	7%	0%	3%	3%
	Chile	1%	0%	14%	0%	2%	4%
	Others	0%	1%	1%	0%	1%	1%
	Total	**1%**	**3%**	**21%**	**0%**	**7%**	**8%**
Total		**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Calculated from consumption estimates in Table VI-2.

Other salmon markets include fresh and frozen markets in Canada, Russia, Eastern Europe, South America and the Far East. Our estimates of consumption for these markets are less reliable than for the other markets shown in Table VI-2, because they were calculated as residual volumes after subtracting volumes consumed in other markets and assumed yield losses in processing. The combined volume of salmon consumed by these markets is probably larger than that consumed by the U.S. fresh and frozen market but less than that consumed by the European or Japanese fresh and frozen markets. Consumption of farmed salmon has also grown rapidly in these other markets.

Salmon roe markets are not included in the preceding discussion or the figure and tables. The volume of world salmon roe production is relatively small in comparison with that of canned, frozen and fresh salmon. However, salmon roe is also a valuable salmon product. Most salmon roe production is from wild salmon. Japan accounts for the largest share of production, followed by the United States and Russia. Japan is by far the largest consuming market for salmon roe, followed by Russia.

In the following sections, we examine the markets described above in greater detail. For each market we discuss trends in total supply, trends in the market share of North American wild salmon, trends in wholesale prices and major factors affecting wholesale prices.

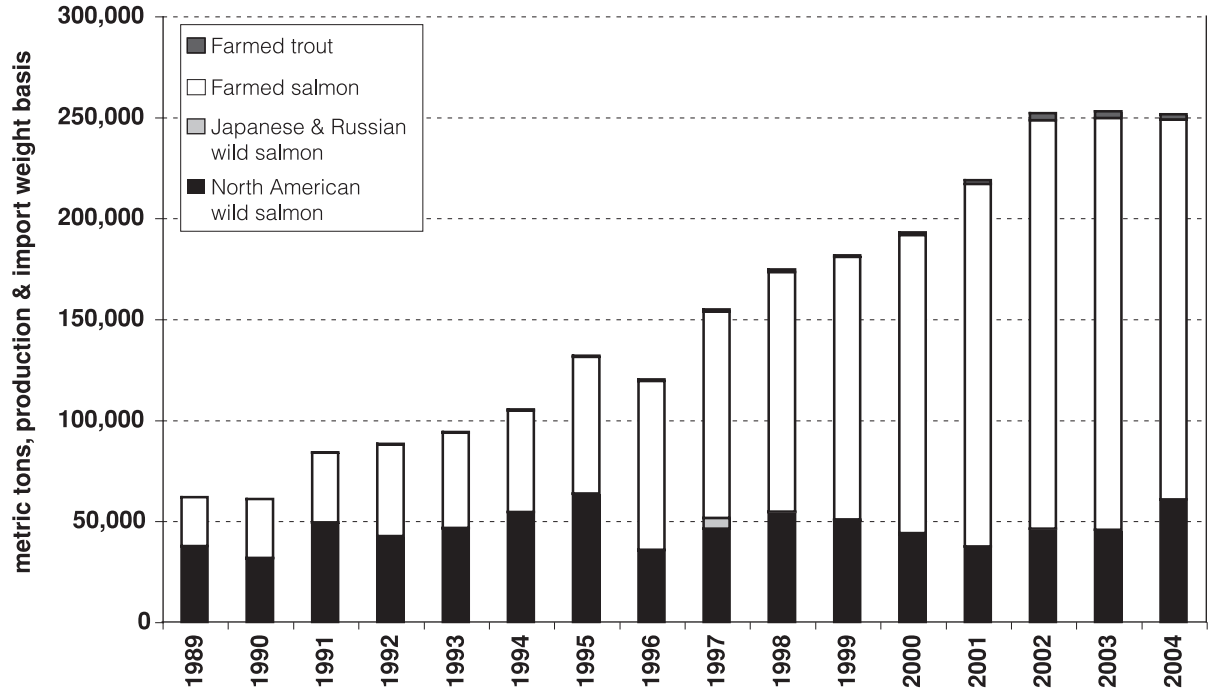
The U.S. Fresh & Frozen Salmon Market

Later chapters of this report provide a detailed discussion of the U.S. market for fresh and frozen salmon. Here, we provide only a brief introductory overview of major trends.

As shown in Figure VI-3, U.S. fresh and frozen salmon consumption grew very rapidly from about 60,000 mt in 1989 to about 250,000 mt in 2004. Almost all of this growth in consumption was from imported farmed Atlantic salmon from Canada and Chile. In contrast, U.S. fresh and frozen market consumption of North American wild salmon has fluctuated with North American wild salmon catches but has not increased substantially over time. Chapter VIII provides a more detailed review of trends in different sources of supply to the U.S. market.

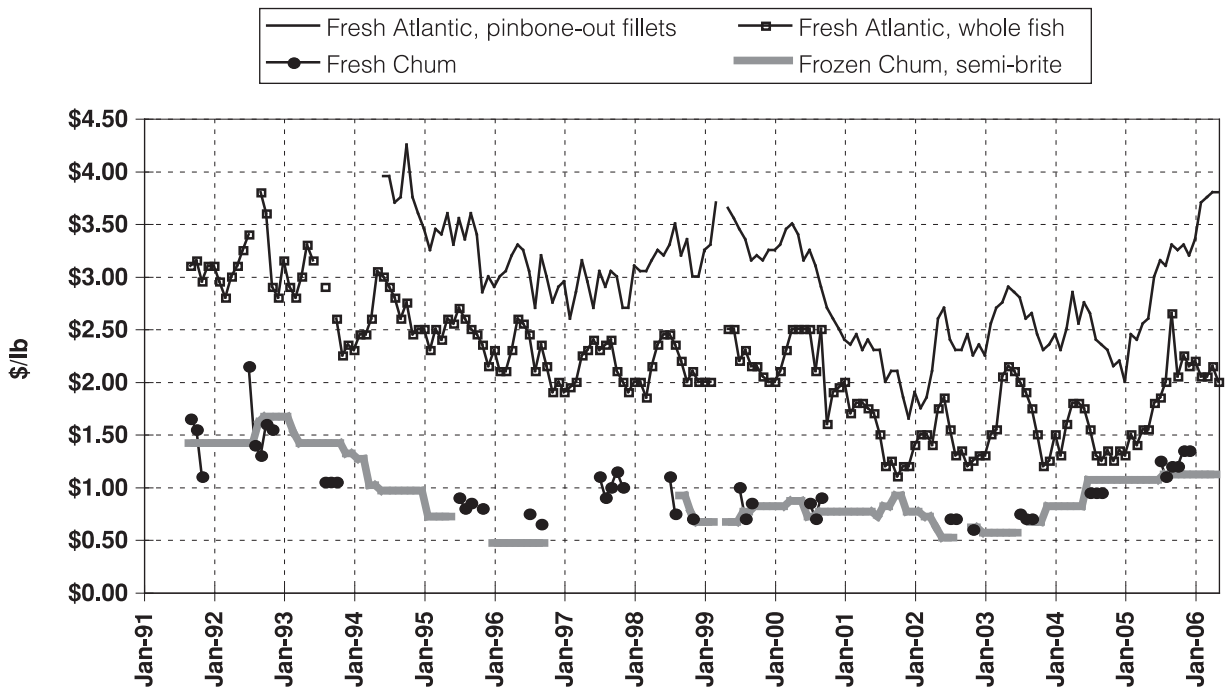
Growth in farmed salmon consumption has transformed U.S. fresh and frozen salmon consumption. Between 1989 and 2004, the share of farmed salmon in total supply increased from 39 percent to 75 percent, while

Figure VI-3 **Estimated United States Fresh & Frozen Salmon Consumption, 1989-2004**



Source: See discussion of data sources and assumptions in Appendix B.

Figure VI-4 **U.S. Wholesale Prices for Selected Salmon Products: Farmed Atlantic and Wild Chum**



Source: Urner Barry Publications, Inc., Seafood Price Current. Prices are low list prices for Chilean 2-3 lb fillets, FOB Miami; 6-8 lb Atlantics, FOB Northeast; 4-6 lb gillnet head-off fresh chum, FOB Seattle; 6-9 lb H&G frozen chum, FOB Seattle.

the share of wild salmon in total supply fell from 61 percent to 24 percent.

Figure VI-4 shows trends in U.S. wholesale prices for four salmon products: fresh farmed Atlantic fillets, fresh farmed Atlantic whole fish, fresh wild chum and frozen wild chum.[4] There are four important points to be noted about U.S. price trends. First, within any given year, there is significant variation in prices from month to month. Within any given year, prices of fresh farmed salmon may vary by as much as $0.50 per pound or more. For example, prices for fresh whole Atlantic salmon typically peak in the spring and decline over the rest of the year. These variations are caused by seasonal variation in demand and supply. Similarly, fresh wild chum salmon prices vary during the season, typically falling as catches increase.

Secondly, different products command different wholesale prices. Not surprisingly, wholesale prices for fresh farmed Atlantic salmon fillets are typically about $1.00 per pound higher than for fresh whole farmed Atlantic salmon because of pin-bone out (PBO) processing. More importantly, fresh whole farmed Atlantic salmon command much higher wholesale prices than frozen wild chum salmon.

Third, prices for all salmon products declined significantly between the early 1990s and 2002. Wholesale prices, not adjusted for inflation, for all four products shown in Figure VI-4 were about $1.00 per pound lower in 2003 than they were in the early 1990s. The decline in prices was not steady or continuous. Prices fell dramatically between 1993 and 1996 and then leveled off for several years. In 2000 and 2001 prices for farmed salmon fell dramatically, declining by 50 percent or more in less than two years.

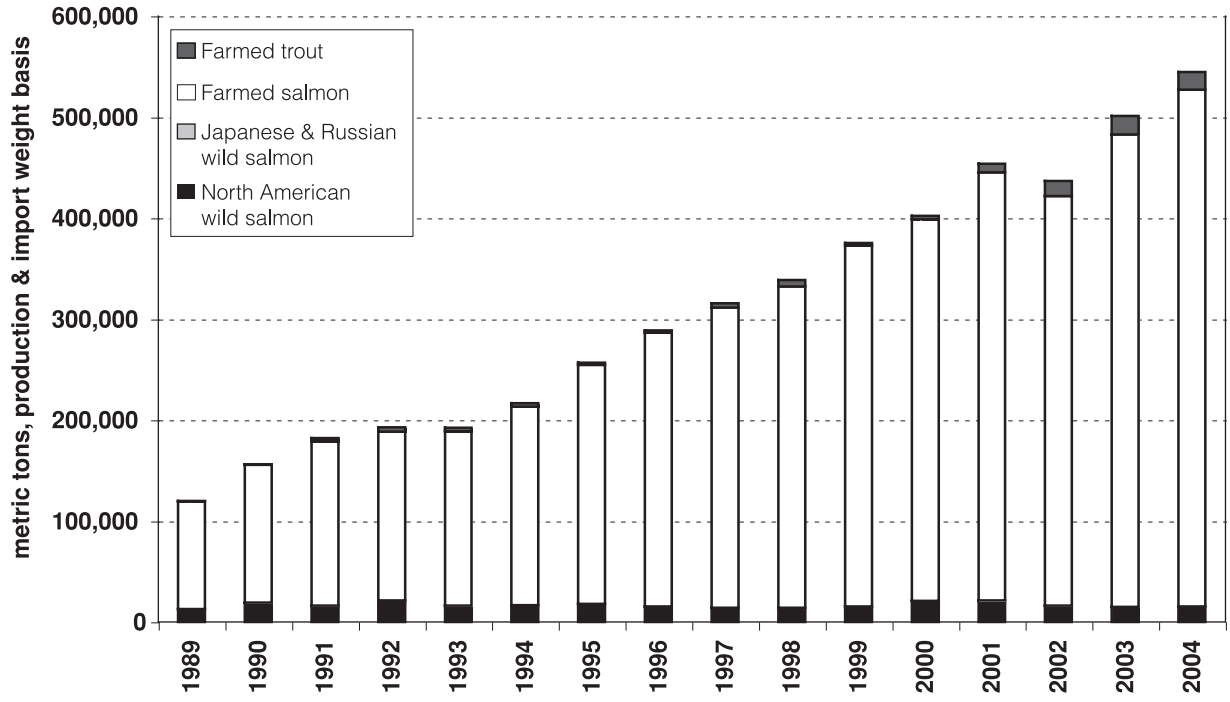
Fourth, between 2002 and early 2006 prices recovered significantly for all four species, to levels of the mid-1990s. For all four products shown in the figure prices increased by more than $0.50 per pound; for fresh farmed Atlantic fillets prices increased by more than $1.00 per pound.

These longer-term trends in U.S. salmon prices reflect longer-term trends in U.S. demand and supply to the U.S. market. Prices have tended to decline when the growth rate of supply exceeded the growth rate of demand and to stabilize or increase when the growth rate of demand equaled or exceeded the growth rate of supply. Prices trended downwards when supply was growing rapidly prior to 2002; prices recovered when the growth of supply slowed after 2002.

The European Fresh & Frozen Salmon Market

European fresh and frozen salmon consumption grew very rapidly from about 120,000 metric tons in 1989 to about 550,000 mt in 2004. Almost all of this was of

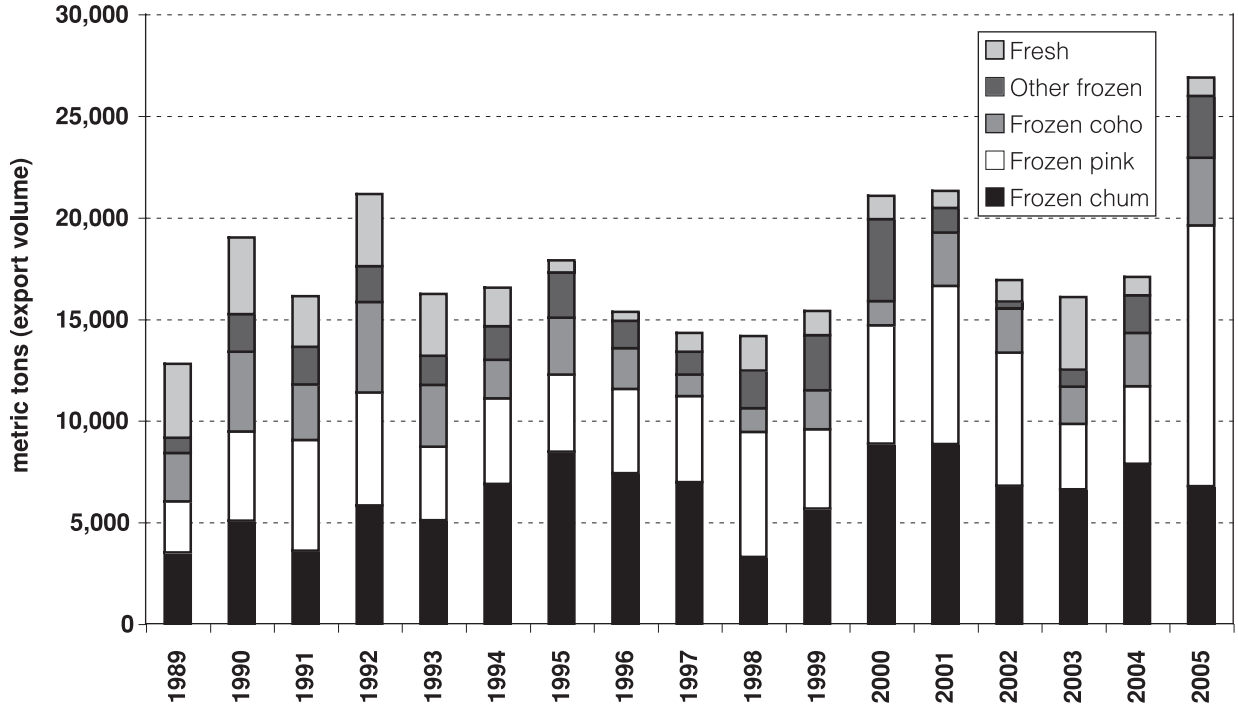
Figure VI-5 **Estimated European Union Fresh & Frozen Salmon Consumption, 1989-2004**



Source: See discussion of data sources and assumptions in Appendix C.

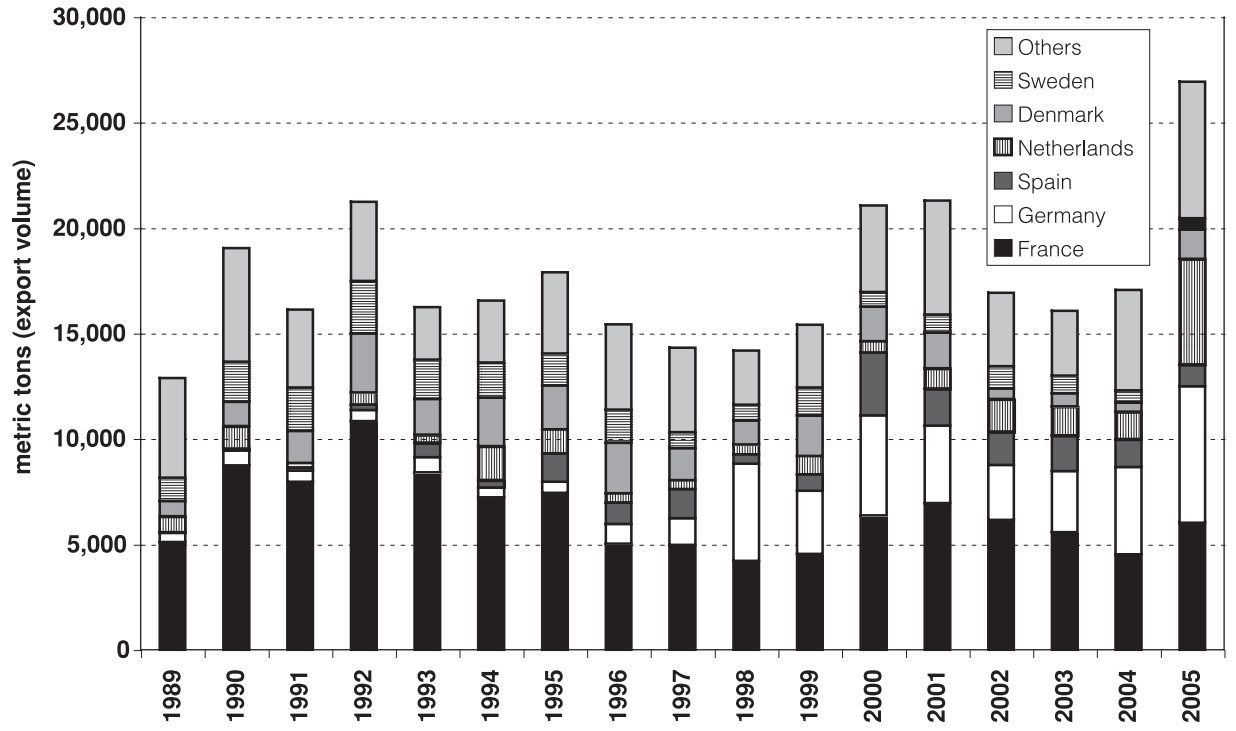
[4] Note that the figure shows wholesale prices for specific sizes and grades in specific regions of the country. Price trends for other sizes, grades and regions are generally similar but not identical.

Figure VI-6 **U.S. Exports of Fresh & Frozen Wild Salmon to the European Union, by Product**



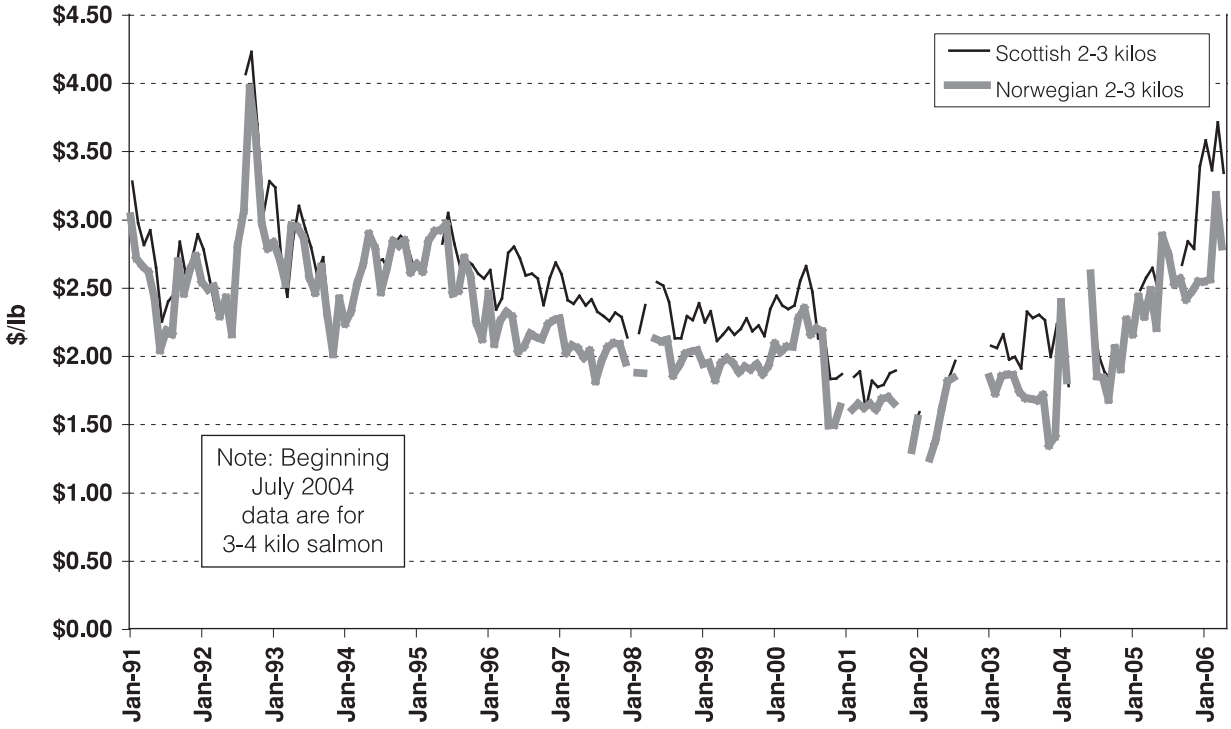
Source: NMFS Trade data. "European Union" includes all countries which were members of the European Union as of May 2006.

Figure VI-7 **U.S. Exports of Fresh & Frozen Wild Salmon to the European Union, by Country**



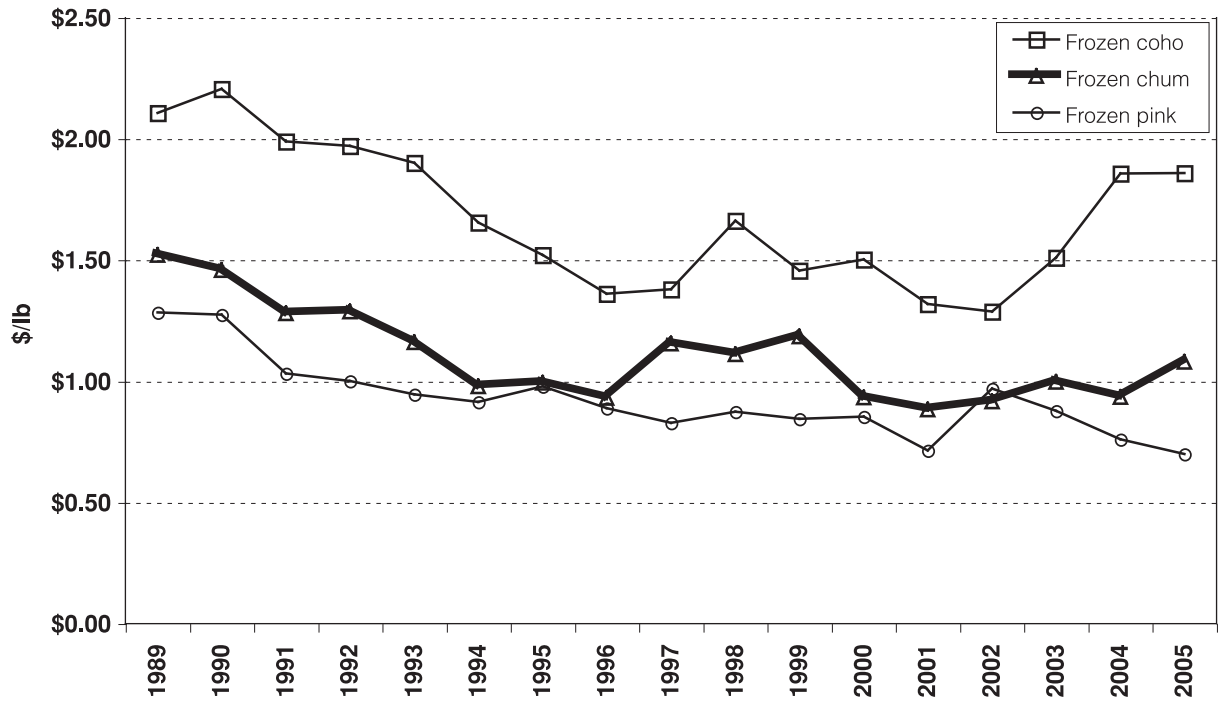
Source: NMFS Trade data. "European Union" includes all countries which were members of the European Union as of May 2006.

Figure VI-8 **Wholesale Prices of Fresh Atlantic Salmon at the Paris Rungis Market ($/lb)**



Source: FAO Globefish Salmon Commodity Update, May 2006 (page 17), and earlier issues. Prices converted from French Francs and Euros to U.S. dollars using Federal Reserve Bank of St. Louis Exchange Rate data.

Figure VI-9 **Average Export Prices of Selected U.S. Salmon Exports to the European Union**



Source: NMFS Trade data. "European Union" includes all countries which were members of the European Union as of May 2006.

farmed Atlantic salmon. Norway has accounted for about half of total European consumption, while the United Kingdom has accounted for about one-quarter. North American wild salmon accounts for only about 4 percent of total EU consumption.

Between 1989 and 2005 U.S. total annual exports to the European Union ranged between 13 and 27 thousand mt. Most exports were frozen chum, frozen pink and frozen coho salmon (Figure VI-6). Recall from Chapter III that pink and chum salmon are generally not of the same high quality as wild chinook, coho and sockeye and are generally poorer quality than farmed salmon. The most important export markets were France, Germany and Spain (Figure VI-7).

As European salmon consumption increased, prices for both farmed and wild salmon trended downwards from the late 1980s until 2002 (Figures VI-8 and VI-9). Farmed salmon prices increased rapidly after 2002 and reached near-record levels in early 2006 (Figure VI-8). Average prices also increased after 2002 for U.S. wild coho salmon exported to Europe, but not for wild pink salmon (Figure VI-9).

The Japanese Fresh & Frozen Salmon Market

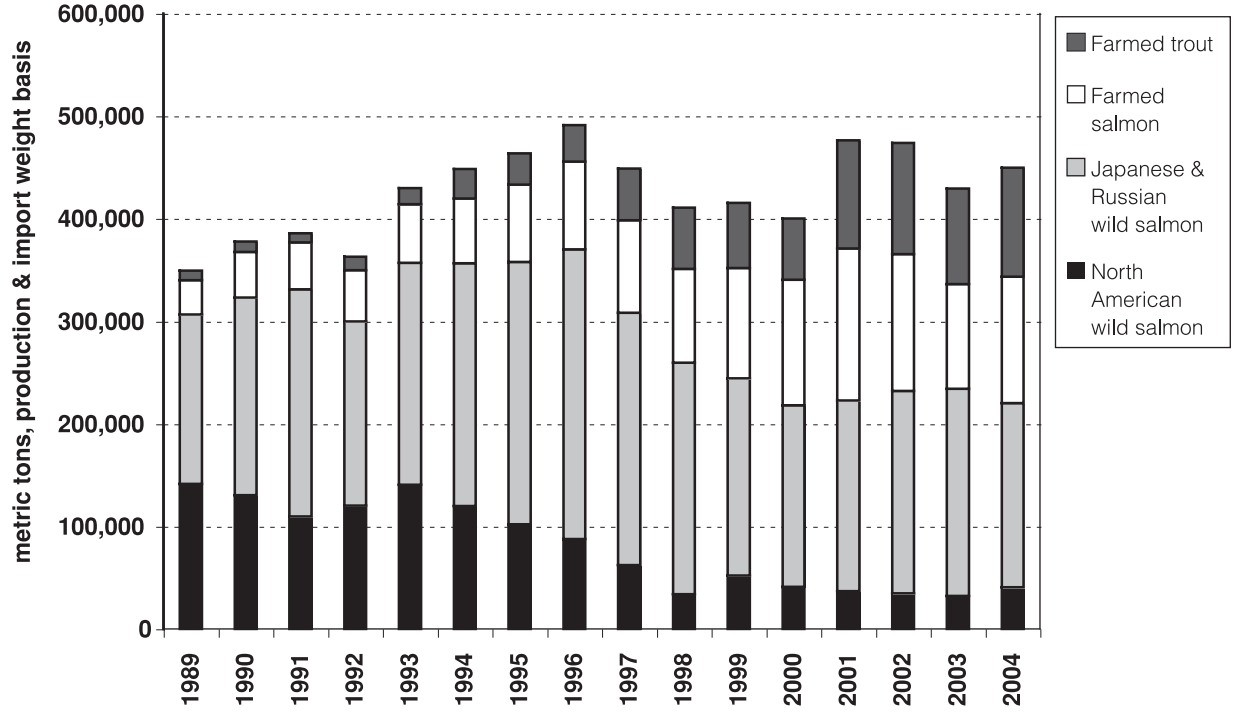
Japan was by far the largest salmon market in the world until the late 1990s when the European salmon market grew to about the same size. Japan consumes significant volumes of all wild and farmed salmon species from almost every major salmon producing country.

As in the United States and Europe, since the late 1980s there has been dramatic growth in consumption of farmed salmon and trout in Japan (Figure VI-10). However, Japan has experienced a very different trend in total salmon consumption than the U.S. and European markets. The growth in Japanese consumption of farmed salmon and trout has been mostly offset by declining consumption of wild salmon—resulting in much smaller growth in total consumption.

Japan consumes very large volumes of wild salmon, including both Japanese ranched salmon as well as wild salmon imported from North America and Russia. Since the late 1980s, Japanese imports of North American wild salmon have declined dramatically, reflecting lower North American sockeye salmon catches and changing markets. In contrast, Japanese imports of Russian salmon increased, as an increasing share of Russian production was exported following the collapse of the USSR.

Japanese salmon consumption grew rapidly from less than 300,000 mt in the mid-1980s to almost 500,000 mt in 1996 due to growth in consumption of both wild and farmed salmon. Between 1996 and 2000, however, wild salmon consumption declined sharply due to

Figure VI-10 **Estimated Japanese Fresh & Frozen Salmon Consumption, 1989-2004**



Source: See discussion of data sources and assumptions in Appendix B.

lower imports of North American wild salmon and lower Japanese catches of ranched salmon. Total Japanese consumption has increased since 2000, but has fluctuated and has not recovered to the 1996 level.

The Japanese consume a wider variety of salmon products than Americans or Europeans. Sliced salmon fillets, known as kirimi, are one of the most common salmon product forms. These may be salted, marinated or unsalted. Grilled sliced salmon, served with a bowl of steamed rice, may be part of lunch, dinner, or traditional Japanese breakfast. Salmon is a common element in a range of prepared meals, sold either "ready-to-eat," "ready-to-heat," or "ready-to-cook." It is a common filling for rice balls, a popular lunch item. Numerous other traditional and modern preparations of salmon are sold in supermarkets and fish stores. As with other fish and food products in Japan, quality standards for salmon products are very high.

Japanese salmon consumption patterns and preferences vary by geographical area and by age group. Usage and preparation of salmon differs by species depending on the texture of the meat, the oil content and the color. In markets where wild salmon was traditionally preferred, farmed salmon has gained increasing acceptance in the Japanese market as wild salmon supply has declined and farmed supply has expanded dramatically.

Japanese salmon consumption patterns are also highly seasonal, reflecting the timing of wild salmon runs in Japan and other countries (Wessells et al. 1994). However, seasonal consumption patterns have weakened over time as freezing technology has allowed wild salmon to be consumed year round and because of the year-round availability of farmed salmon.

The largest component of Japanese supply is wild chum salmon, almost all of which is fish released from hatcheries in northern Japan which are caught in coastal fisheries during the fall. (Figure VI-11). Catches of these ranched "fall chum" salmon have varied significantly from year to year, reflecting changes in fish releases and ocean survival rates. Fall chum salmon catches peaked in 1996 at 222,000 mt, fell by almost half to 125,000 mt in 2000 and were about 200,000 mt in 2004.

Until 1997, wild sockeye salmon—most of it imported frozen from North America—accounted for the second largest share of Japanese salmon supply. However, the share of wild sockeye in total supply declined dramatically from 33 percent in 1993 to just 11 percent in 2004 as sockeye supply declined and the supply of farmed salmon increased rapidly.

Most of the growth in Japanese salmon supply during the 1990s resulted from rapid growth in the supply of farmed coho salmon (mostly from Chile), farmed Atlantic salmon (mostly from Norway) and farmed trout (from Chile and Norway).

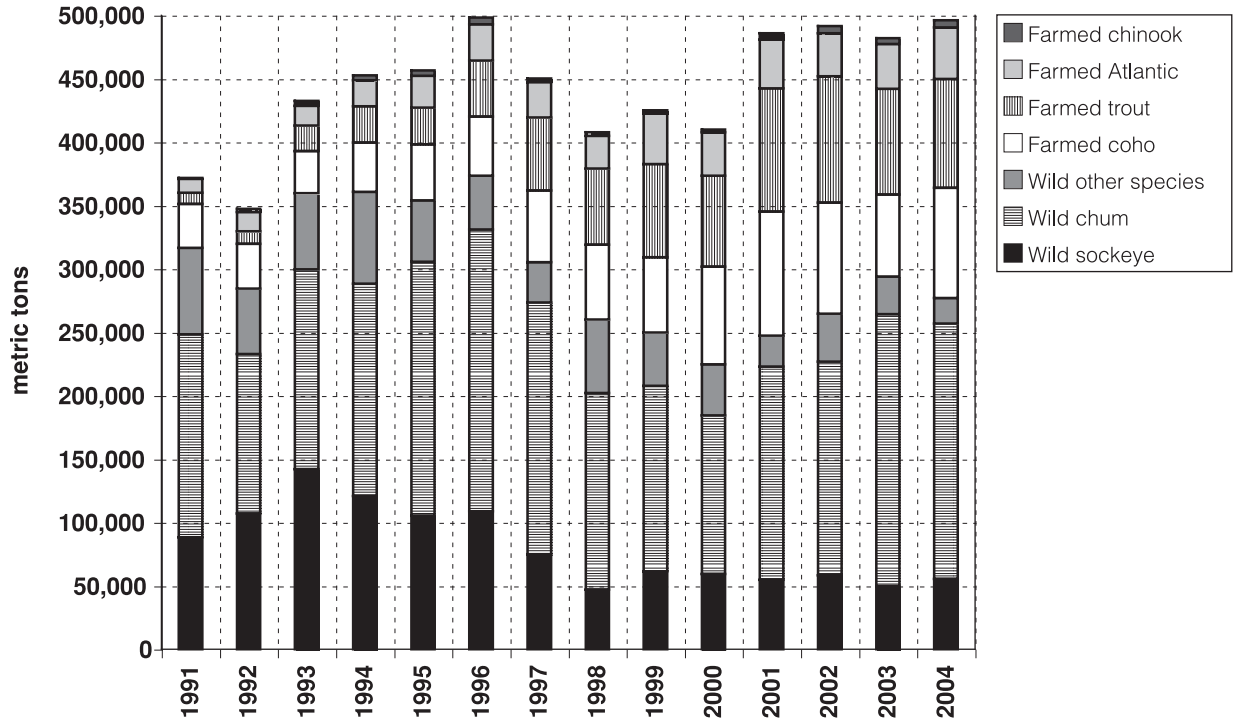
The North American wild salmon industry has been most affected by changes in the Japanese market for "red-fleshed" salmon. "Red-fleshed" salmon species which compete directly in the Japanese marketplace include sockeye salmon, coho salmon, chinook salmon and trout. During the 1990s, the total supply of red-fleshed salmon expanded dramatically as a result of rapid growth in Japanese imports of farmed coho and farmed trout. During the same time period, the supply of wild sockeye declined dramatically as North American catches declined and a smaller share of North American catches was frozen. As a result, the wild share of the Japanese red-fleshed salmon market declined from 73 percent in 1993 to just 25 percent in 2004 (Figure VI-12).

The increase in red-fleshed salmon supply, along with other factors, resulted in a dramatic decline in average prices. Figure VI-13 shows Japanese monthly average wholesale prices for frozen wild sockeye salmon and frozen farmed coho salmon for the twenty-five year period 1981-2006, measured in yen per kilogram. Figure VI-14 shows the same prices measured in $ per pound, after adjusting for dramatic changes in the yen-dollar exchange rate which occurred over this period.

Sliced salmon fillets (kirimi) in a Japanese Department Store

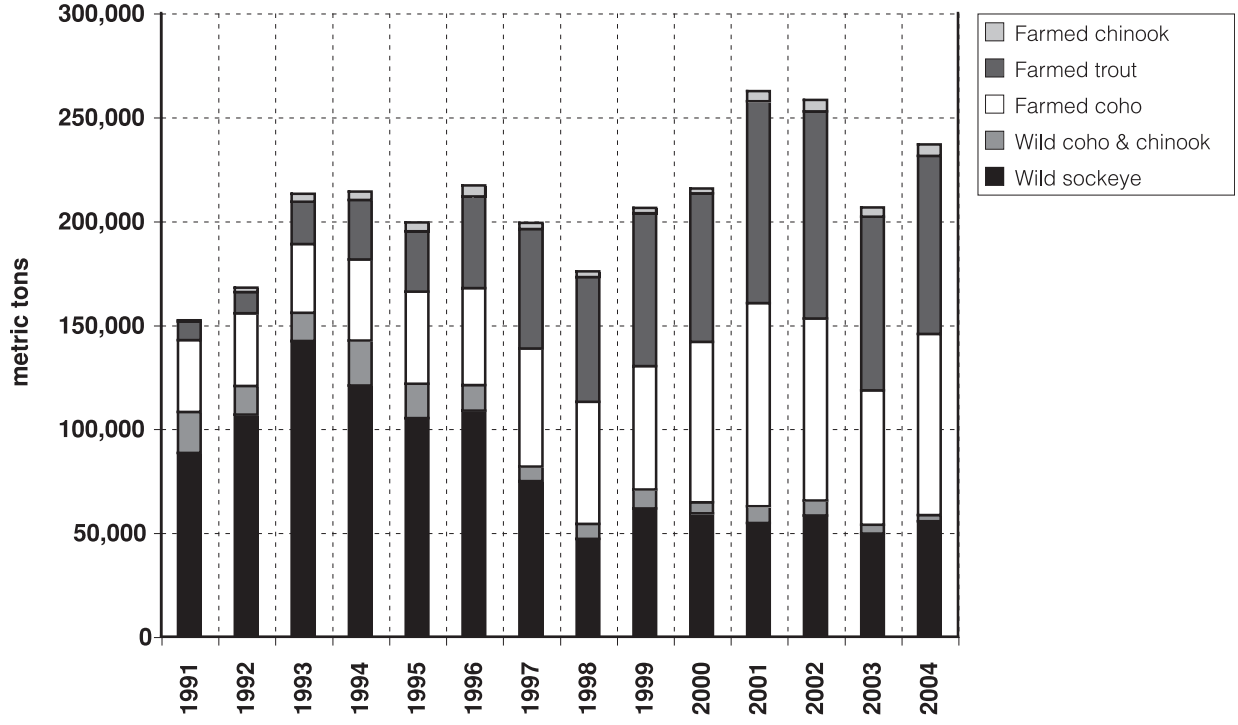
Photographs by Gunnar Knapp

Figure VI-11 **Japanese Salmon and Trout Supply, by Species**



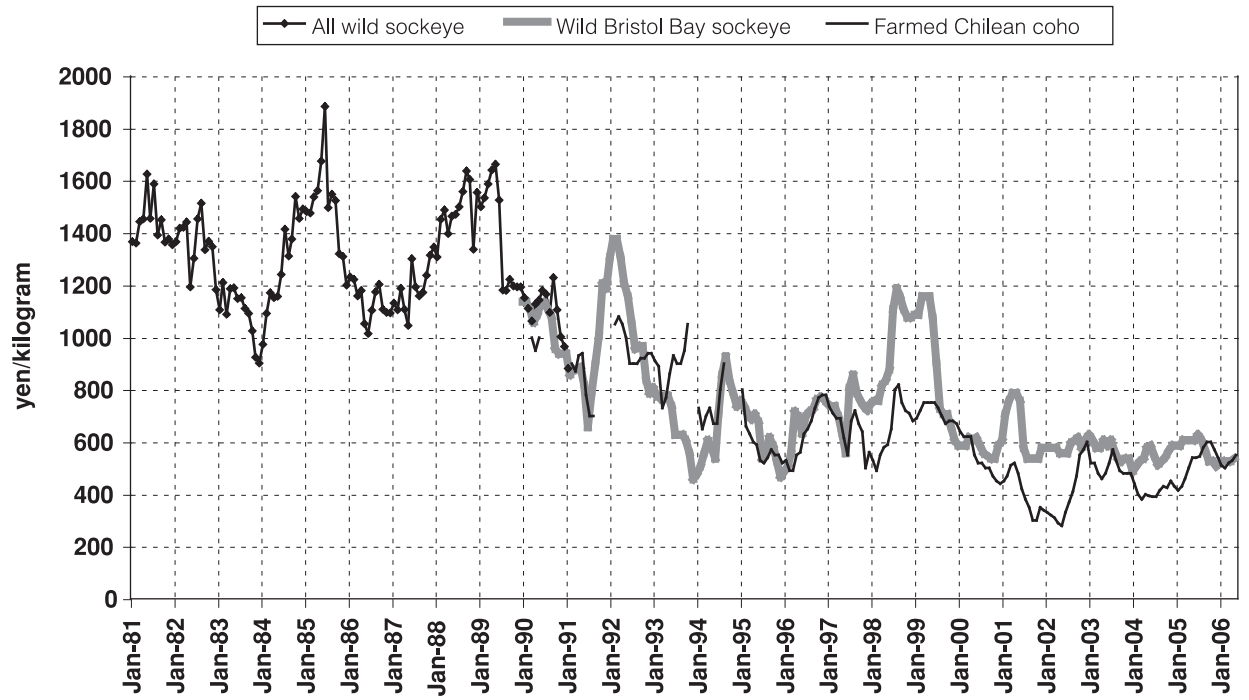
Source: Data are from various editions of the Seafood News Power Data Book, page 3. 1991 data are from the 2001 edition; 1992-2001 data are from the 2002 edition; 2002-2004 data are from the 2005 edition. Total supply estimates in this figure are higher than the estimates used in calculating Figure VI-10 for the years 1999-2004. This is because the estimates of Japanese consumption shown in Figure VI-10 for these years subtract Japanese salmon exports, which increased from 2,547 metric tons in 1999 to 60,062 metric tons in 2004.

Figure VI-12 **Japanese "Red-Fleshed" Salmon Supply, by Species**



Source: Sources are the same as for Figure VI-11.

Figure VI-13 **Japanese Wholesale Prices of Frozen Salmon, 1981-2006 (yen/kilo)**



Source: "All wild sockeye" prices are Tokyo Central Wholesale Market data. "Farmed Chilean Coho" and "Wild Bristol Bay Sockeye" prices are from the Seafood News Power Data Book 2002 edition for months prior to May 2002. Beginning May 2002, prices are from FIS Japan Frozen Wholesale Prices data.

There are three important points to be noted about Japanese wholesale prices. First, measured in yen, Japanese wholesale prices for frozen salmon have declined dramatically. During the 1980s prices for frozen sockeye salmon were generally more than 1200 yen per kilogram. Since 2000, prices have been below 600 yen per kilogram—only half the level of the 1980s. The decline in prices was driven partly by the increase in total salmon supply and partly by other factors including a slowdown in the Japanese economy and changes in the Japanese food distribution system. The food distribution system has changed due to increasing consolidation in the retail sector (larger supermarkets and chains). This leads to increased purchases in bulk and creates market power on the part of the buyer.

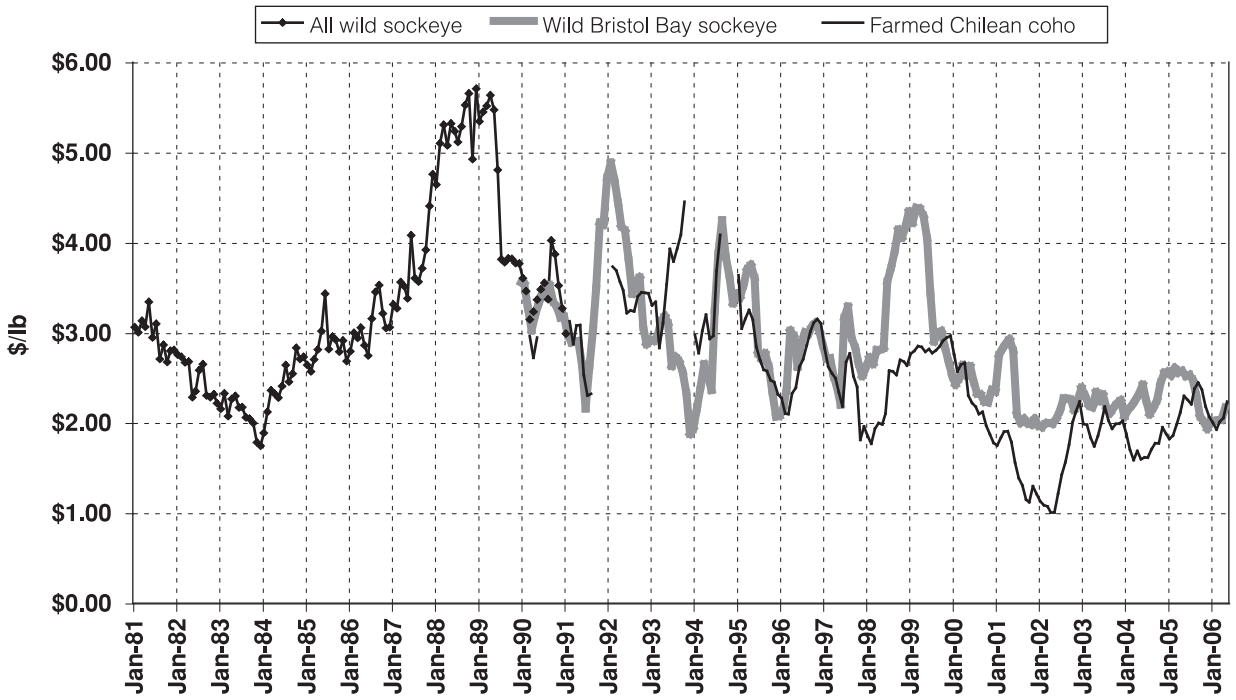
Second, as in the U.S. and European markets, against the longer-term trend of declining wholesale salmon prices have been up-and-down price cycles lasting 2-3 years. These price cycles have been driven primarily by periods of lower or higher total salmon supply caused by changes in wild salmon catches and farmed salmon production.

In the Japanese trade press, changes in prices are attributed to numerous factors, including wild salmon harvests and the extent to which they correspond to preseason projections, farmed salmon production and imports and increases or decreases in frozen salmon inventories. Market psychology and speculation also play a role in wide price swings. When the market is perceived to be "falling," buyers are reluctant to buy, contributing to downward pressure on price. When the market is perceived to be rising, buyers rush to buy, contributing to upward pressure on price.

Third, price trends for wild sockeye salmon and farmed coho salmon have been correlated but not identical. During the early 1990s wild sockeye salmon and farmed coho salmon sold for similar prices. Since the late 1990s farmed coho prices have been lower than wild sockeye prices much of the time, reflecting increasing supply of farmed coho and decreasing supply of wild sockeye. The fact that at times wild sockeye have commanded higher prices than farmed coho indicates that part of Japanese demand is specifically for sockeye salmon. The fact that this price differential declines when wild sockeye supply increases suggests that sockeye-specific demand is limited and that as sockeye supply increases it competes more directly with farmed salmon and trout. (We discuss the effect of farmed salmon supply on sockeye prices in more detail in Chapter XIII.)

Fourth, long-term price trends in Japan are different when expressed in yen (Figure VI-13) than when expressed in dollars (Figure VI-14). This is because the value of the yen relative to the dollar changed substantially over the past two decades. During the mid-1980s the value of the yen relative to the dollar

Figure VI-14 Japanese Wholesale Prices of Frozen Salmon, 1981-2006



Source: Prices are the same prices shown in Figure VI-13 converted to $/lb using Federal Reserve Bank of St. Louis Exchange Rate data.

was rising very rapidly. This is the main reason why Japanese wholesale prices expressed in dollars rose dramatically between 1984 and 1988 (and one of the main reasons why ex-vessel prices paid to fishermen for wild salmon rose dramatically during this period). After 1989 the value of the yen continued to rise, but not as rapidly. As a result wholesale prices expressed in dollars trended downwards, but the relative decline was not as great as for prices expressed in yen.

In contrast to the United States and most countries in Europe, Japan may be considered a mature market for salmon. Per capita consumption is high, salmon is widely available and consumers are very familiar with salmon. Thus it seems unlikely that total Japanese salmon demand will grow significantly in the future.

Canned Salmon Markets

For most of the history of the North American salmon industry, canned salmon was by far the most important product. It was only in the 1970s, with the development of freezing technology and the rapid growth in Japanese demand for imported frozen salmon from America, that other products—in particular frozen salmon—became important. Canned salmon remains an important and valuable product form for U.S., Canadian and Russian wild salmon fisheries.

Until very recently, almost all canned salmon production was from wild salmon. The United States is the largest producer of canned salmon, followed by Russia or Canada, depending on the year (Figure VI-15).[5]

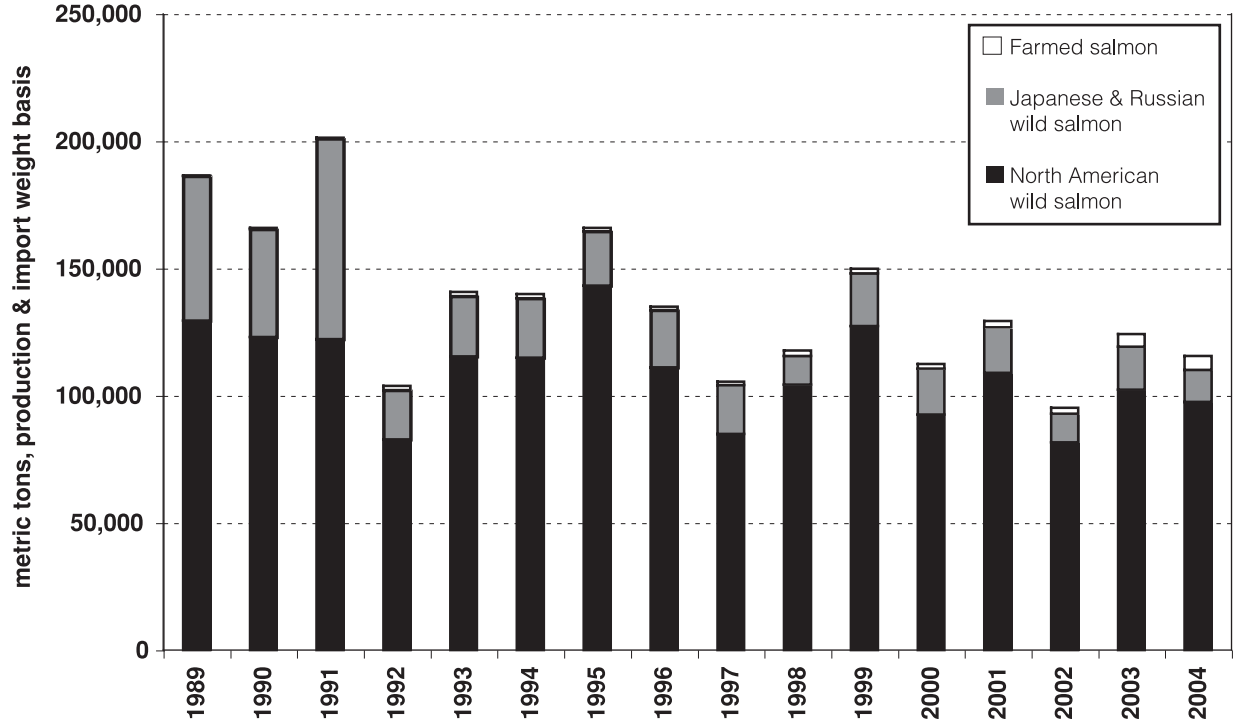
Total world canned salmon production varies widely from year to year. This reflects high annual variation in catches of wild Pacific salmon, particularly for pink salmon.

Pink salmon typically accounts for about three-quarters of North American canned salmon production, while sockeye salmon accounts for most of the rest. High wild salmon catches led to high canned pink salmon production in the 1980s and 1990s, including several years of record or near-record production (Figure VI-16). Canned sockeye salmon production remained relatively high as well, despite falling catches, as the canned share of sockeye salmon production increased.

Europe (particularly the United Kingdom) is the most important market for canned sockeye, while the United States is the most important market for North American canned pink salmon. Between 2000 and 2004, about 92 percent of U.S. canned sockeye salmon production was exported, while only about 29 percent of U.S. canned pink salmon production was exported.

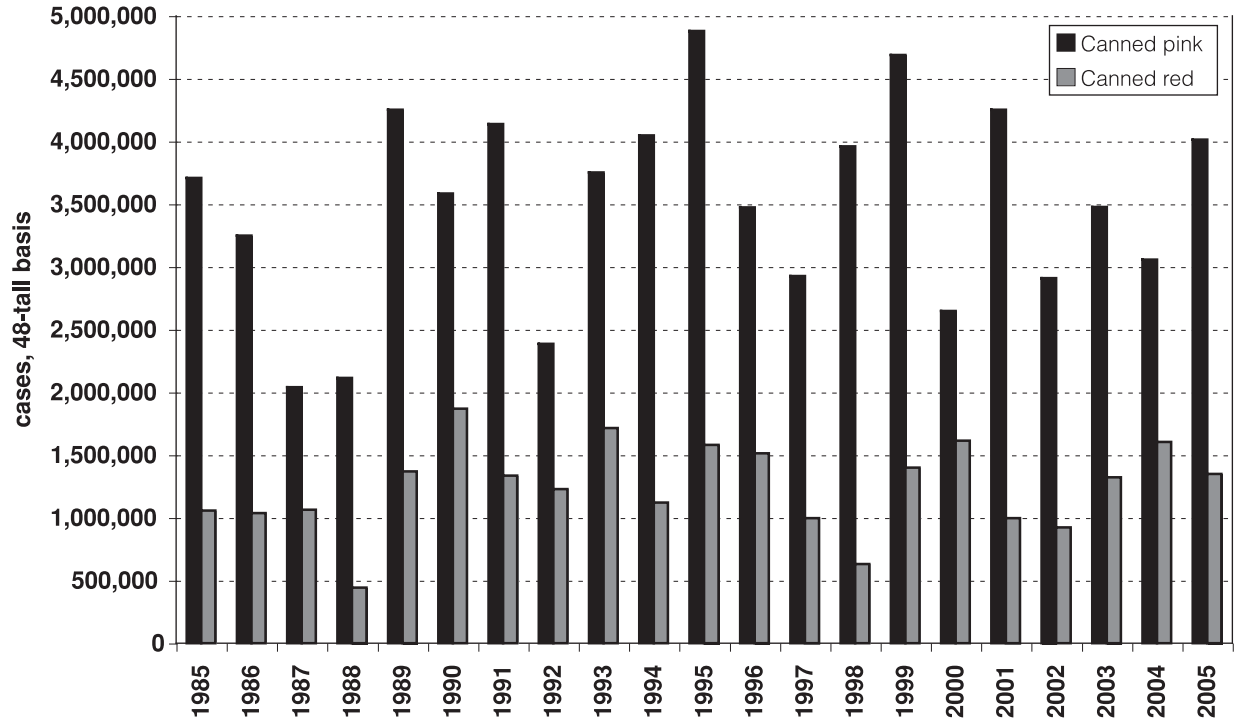
[5] Estimates of Russian wild canned salmon production are of uncertain reliability. Increasing volumes of Russian salmon are being frozen and shipped to other countries such as Korea and Thailand for canning. It is difficult to trace the scale of this canned production or to quantify its role in world markets.

Figure VI-15 **Estimated World Canned Salmon Consumption, 1989-2004**



Source: See discussion of data sources and assumptions in Appendix B.

Figure VI-16 **North American Canned Salmon Pack**



Source: Canned pack is from NFPA Canned Pack Data and BC Canned Salmon Pack Bulletin Data.

Table VI-5 **United States and Canadian Average Canned Salmon Production and Exports, 2000-2004**

		United States			Canada	United States & Canada Total
		Sockeye	Pink	Total		
Canned pack (cases, 48-tall basis)		1,093,563	2,937,531	4,219,413	546,409	4,765,822
Canned production (metric tons)		21,996	59,209	85,599	10,967	95,658
Exports (metric tons)	Canada	6,123	4,734	13,518		
	United Kingdom	11,439	5,601	17,493	3,860	21,353
	Australia	1,226	3,170	4,864	1,480	6,344
	Netherlands	837	1,423	2,432	200	2,632
	Belgium	119	468	1,594	880	2,474
	New Zealand	88	345	381	1,100	1,481
	Other	331	1,184	2,766	1,980	4,746
	TOTAL	**20,165**	**16,926**	**43,048**	**9,500**	**52,548**
Exported share of production		92%	29%	50%	87%	55%
Share of Exports	Canada	30%	28%	31%		
	United Kingdom	57%	33%	41%	41%	41%
	Australia	6%	19%	11%	16%	12%
	Netherlands	4%	8%	6%	2%	5%
	Belgium	1%	3%	4%	9%	5%
	New Zealand	0%	2%	1%	12%	3%
	Other	2%	7%	6%	21%	9%
	TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**

Note: United States total includes small volumes of chinook, coho and chum salmon.

Sources: NFPA Canned Pack Data; BC Canned Salmon Pack Bulletin data. Canned production in metric tons was estimated based on an assumed product weight of 44.25 pounds per case of 48-talls, except that ADFG COAR data were used for the Alaska portion of the United States pack when this resulted in a higher estimated production (see Appendix B for more discussion of this adjustment). U.S. exports are from NMFS trade data. Canadian exports are from FAO Globefish Salmon Commodity Update, May 2006, page 61.

The United Kingdom is the largest export market for canned salmon, followed by Australia, the Netherlands and Belgium.

U.S. retail canned pink salmon prices typically range between $1.50 and $2.00 for a 14.75 ounce "tall" can, while prices for "tall" cans of sockeye are almost twice that. Canned pink consumption varies widely by region, with the highest consumption in the southeast. Canned pink salmon consumption is highly seasonal, peaking in March.

Average wholesale prices for both canned pink and canned sockeye salmon fell sharply in the early 1990s and have generally remained low, particularly for pink salmon. In contrast to fresh and frozen salmon wholesale prices, canned salmon wholesale prices did not recover strongly after 2002 (Figure VI-17).

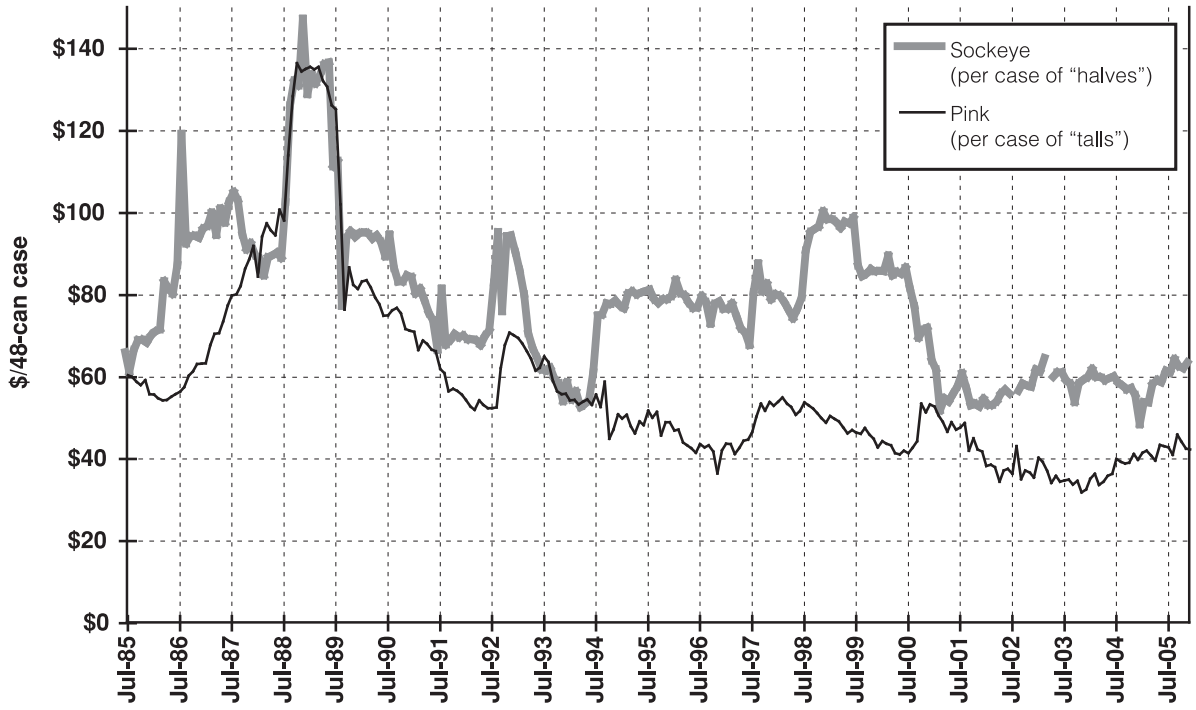
In general, short-run changes in canned salmon markets tend to be driven by supply conditions, while longer-run changes also reflect the influence of longer-term trends in demand. Prices typically fall after seasons of high canned salmon production and rise after seasons of low production.

Inventories serve to dampen these effects of large or small production in any given year. Canned salmon is processed during the summer harvest season but sold over the course of the entire year. As a result, large inventories of canned salmon are built up during the late summer and early fall, which are then drawn down over the winter and spring. The level of "carryover" inventories at the start of a new harvest season—an indicator of the tightness of supply conditions for canned salmon—is considered a key market indicator by the industry. Two years of high catches and canned salmon packs can flood the market.

There is concern within the salmon industry about whether canned salmon is becoming "old-fashioned" and whether demand will decline as the population declines of consumers who grew up eating canned salmon as a staple food. There is interest within the industry in developing more new product forms which are more attractive and convenient.

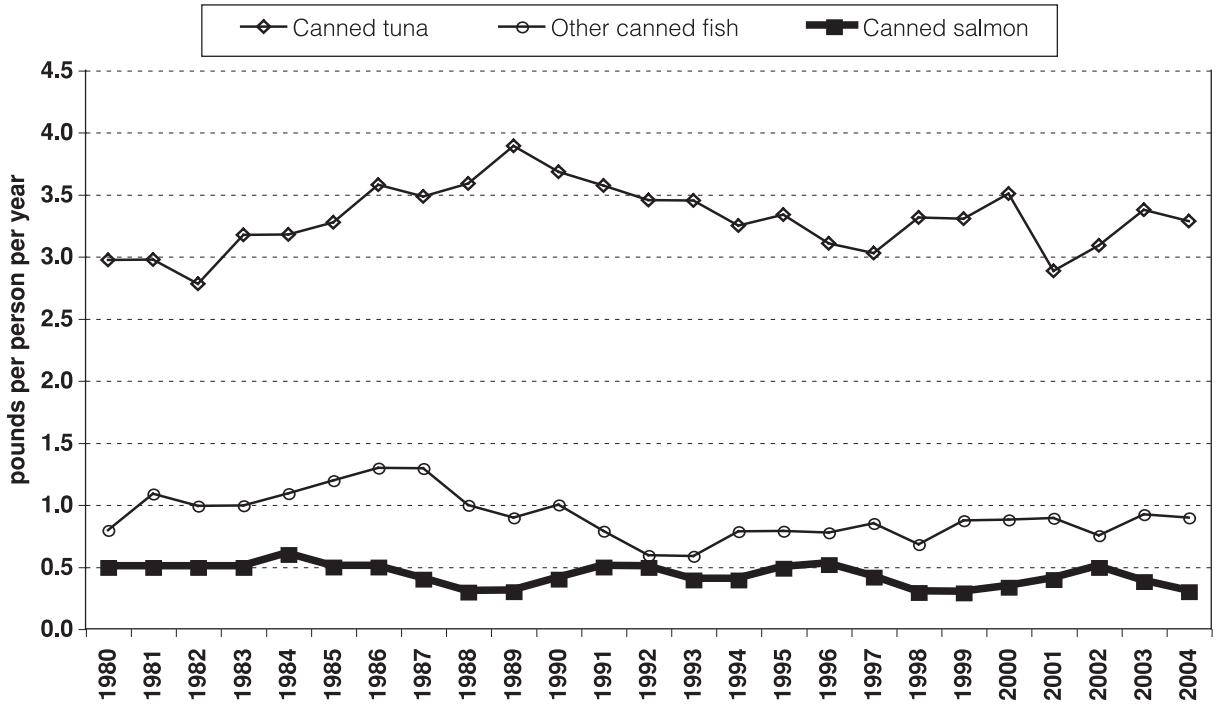
Historically, cans of salmon included the skin and bones (which are soft and edible). In recent years, production of "skinless-boneless" canned salmon has increased,

Figure VI-17 **Average Wholesale Prices for Alaska Canned Salmon (per 48-can case)**



Source: ADOR Salmon Price Reports. Data prior to August 2000 are statewide average prices; later data are average prices for Bristol Bay sockeye and Southeast Alaska pinks.

Figure VI-18 **Estimated United States Per Capita Consumption of Canned Fish**



Source: USDA ERS Food Supply Data. Worksheet mtfish.xls; spreadsheet "Pcc."

which offers consumers a more attractive product. Another recent new product form has been plastic pouches, which are thermally processed similarly to canned salmon. At present however these products, which cost more to produce, represent only a small share of "thermally processed" salmon products, while traditional cans continue to account for most production.

Figure VI-18 shows U.S. per capita consumption of canned fish products, which is dominated by canned tuna. Per capita canned salmon consumption varies widely from year, reflecting differences in the canned pack and available supply and related changes in retail prices and promotions—but is typically less than one-third that of canned tuna.

Canned farmed salmon production increased after 2000 but remains only a small share of world supply. U.S. imports of Chilean canned farmed salmon increased from 60 mt in 2001 to 2,961 mt in 2003 but fell to 2,607 mt by 2005. Although the volume of canned farmed salmon imports remains relatively small compared to total U.S. production, it may be beginning to affect markets for Alaska canned salmon processors. Anecdotal evidence from press reports attributed the closure of a major salmon cannery in Cordova, Alaska following the 2003 season to the loss of a market for boneless-skinless canned pink salmon at Costco and Sam's Club stores, which chose instead to buy canned Atlantic salmon from Chile (Welch 2004).

Canned Farmed Salmon

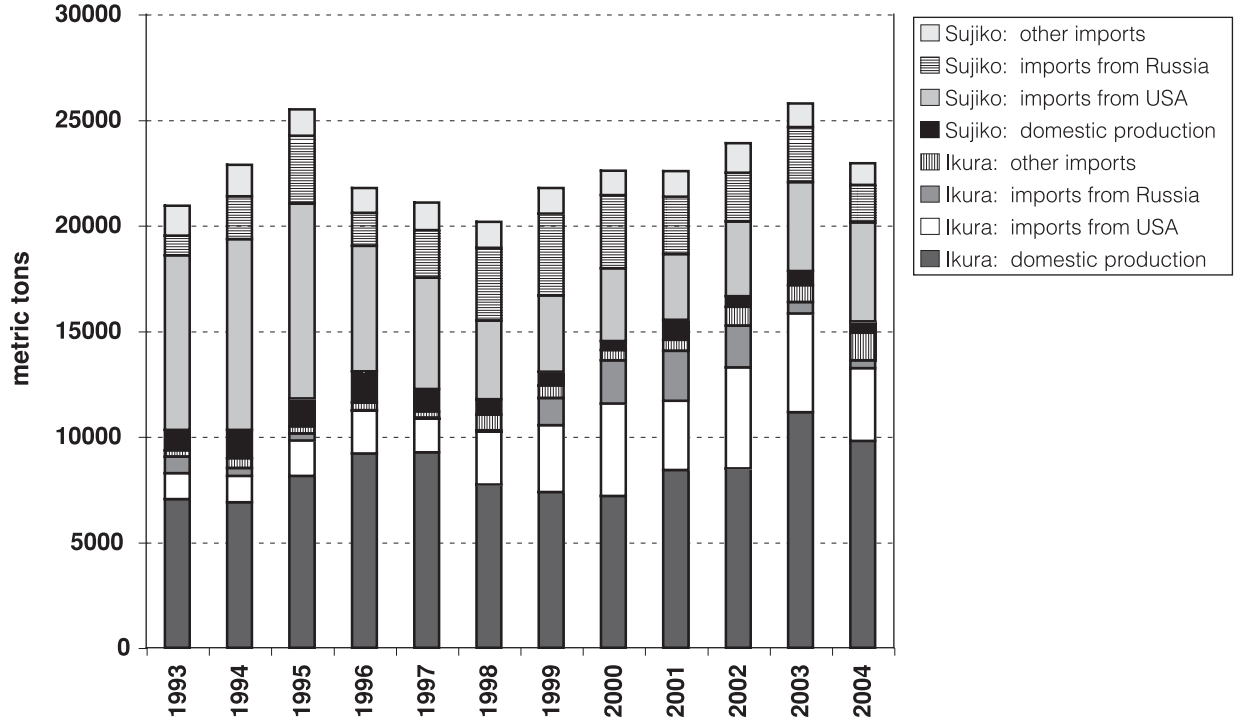
Photo by Gunnar Knapp

Salmon Roe Markets

Salmon roe is an important and valuable salmon product, especially in the Japanese and Russian markets. Although most of the world's salmon roe production is from wild salmon, production of roe from farmed salmon and trout is growing in importance and offers considerable economic opportunity for the future.

Almost all U.S. salmon roe production is exported, mostly to Japan—the world's largest market—and increasingly to Russia. Japanese domestic production is

Figure VI-19 Japanese Salmon Roe Supply



Source: Japan Seafood News Power Data Book 2001 edition, page 79 & 2005 edition, page 75.

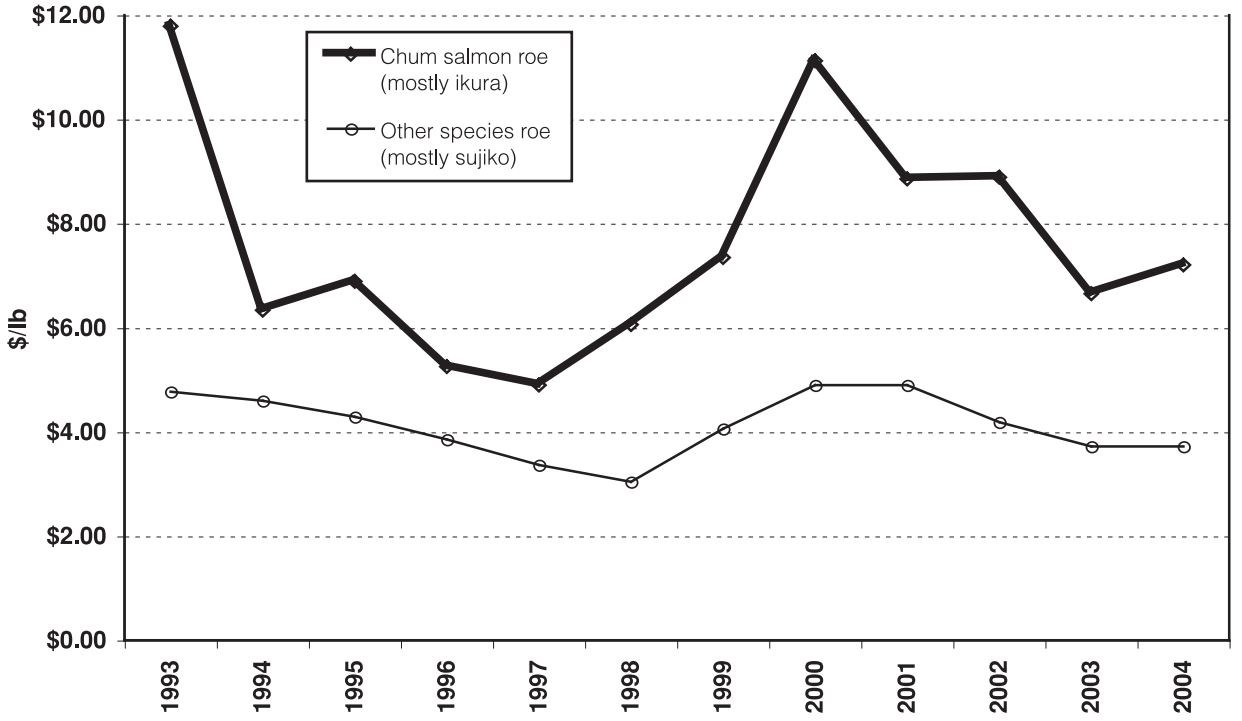
the largest source of supply to the Japanese market, primarily chum salmon ikura from large Japanese catches of hatchery chum salmon. Imports of U.S. ikura (primarily from chum salmon) and sujiko (primarily from other species) represent the next largest source of supply, followed by imports from Russia (Figure VI-19).

To date, relatively little roe is produced from farmed salmon, because most farmed salmon are harvested well before they start to mature sexually. However, production of roe from Scandinavian farmed trout, considered to be of high quality, is increasing and could have significant effects on future roe markets.

Salmon roe prices vary from year to year, reflecting year-to-year changes in Japanese domestic supply and import supply (Figure VI-20), as well as longer-term changes in demand for salmon roe products. A sharp peak in ikura prices in 2000 resulted from very low Japanese chum salmon harvests, which reduced Japanese domestic production.

In general, salmon roe markets are affected by different factors than those affecting markets for fresh, frozen and canned salmon and exhibit different trends over time. Salmon roe is and will likely remain an important contributor to the value of wild salmon catches.

Figure VI-20 Average Wholesale Price for Alaska Salmon Roe



Source: ADFG COAR data.

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